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# Transcript of Proceedings

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

DEPOSITION OF LYMAN WAGNER HELLER

50-329

Bethesda, Maryland

Friday, 5 December 1980

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

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 In the matter of: :  
 : Docket Nos. 50-329-OM  
 CONSUMERS POWER COMPANY : 50-330-OM  
 : 50-329-OL  
 (Midland Units 1 and 2) : 50-330-OL  
 :  
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DEPOSITION OF LYMAN WAGNER HELLER

Bethesda, Maryland

Friday, 5 December 1980

Deposition of LYMAN WAGNER HELLER was resumed,  
 pursuant to adjournment, at 8:45 p.m., in Room P-114, Phillips  
 Building, 7920 Norfolk Avenue, Bethesda, Maryland, before  
 William R. Bloom, a notary public in and for the District of  
 Columbia, when were present on behalf of the respective parties:

On behalf of the Applicant:

RONALD ZAMARIN, Esq. and ALAN FARNEILL, Esq.,  
 Isham, Lincoln and Beale, One First National  
 Plaza, Chicago, Illinois

JAMES E. BRUNNER, Esq., Consumers Power Company,  
 212 W. Michigan Avenue, Jackson, Michigan

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On behalf of the Regulatory Staff:

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

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C O N T E N T S

<u>Witness</u>	<u>Direct</u>	<u>Cross</u>	<u>Redirect</u>	<u>Recross</u>
Lyman Wagner Heller (Continued)		251		

<u>Consumers' Exhibits</u>	<u>For Identification</u>
9	261
10	270
11	288
12	341



P R O C E E D I N G S

Whereupon,

LYMAN WAGNER HELLER

resumed the stand and, having been previously duly sworn,  
was examined and testified further as follows:

CROSS-EXAMINATION (Continued)

BY MR. ZAMARIN:

Q You understand of course that you are still under  
oath.

A Yes, sir.

MR. JONES: The witness has a correction to make  
to something he said yesterday in answer to one of your  
questions.

THE WITNESS: Yesterday you asked about my ex-  
perience with projects in which drilling had been accomplished  
in order to take samples and perform laboratory tests on  
them. I indicated that one of the projects was located in  
Wyoming. That is incorrect. That project was located in  
Montana.

Previous to that you had asked questions with  
respect to the projects that I had reviewed since the spring  
of 1978 and I gave you a number of projects. I should amend

eb2

1 that to say that I participated in those reviews as a super-  
2 visor in my normal role and was not the primary technical  
3 reviewer for those projects.

4 MR. ZAMARIN: Thank you.

5 BY MR. ZAMARIN:

6 Q Were those all the clarifications that you wished  
7 to make?

8 A Yes, those are all.

9 Q What is the acceptance criteria for the diesel  
10 generator building fix required by the staff?

11 A The acceptance criteria required by the staff is  
12 that information that is asked for in Regulatory Guide 1.70  
13 and in Standard Review Plan Sections 2.5 and 3.7.

14 Q As it relates to the diesel generator fix, tell  
15 me specifically what acceptance criteria are.

16 A The acceptance criteria would be that body of  
17 information, that body of commitments that would be suffi-  
18 ciently complete for a reviewer to perform independent  
19 analyses and to arrive at a conclusion that there is reasonable  
20 assurance for the safety and performance of that building  
21 as it relates to protection of the public health and safety.

22 Q Tell me what information is required to constitute

eb3

1 that body of information and commitments with regard to the  
2 diesel generator building.

3 A The detailed information would be similar to that  
4 that had been submitted at the construction permit stage and  
5 on which a finding -- a construction permit was issued that  
6 found that the plant could be constructed with minimum risk  
7 and with adequate assurance of public safety.

8 Q With regard to the diesel generator building fix,  
9 can you give me specific types of information that is re-  
10 quired in order to constitute that detailed information that  
11 in your opinion is similar to that that had been submitted  
12 at the construction permit stage?

13 A Some of the items that would be considered accept-  
14 ance criteria would be a listing of codes and standards that  
15 would be met by the resulting fix, a listing of the methods  
16 or technical specifications that would be enforced for the  
17 fix that's proposed, a commitment to perform certain analyses  
18 with a stated technical result, and the bounds within which  
19 that technical result would fall.

20 I have stopped my answer at this point since I  
21 indicated at the beginning that that would be some of the  
22 criteria or an example of the criteria that would be expected.

eb4

1 Q Okay.

2 Can you give me some more?

3 A That's all I can think of off-hand. I'm sure there  
4 are others though.

5 Q Who is it who decides what acceptance criteria are  
6 to be required or demanded with regard to the diesel generator  
7 building fix?

8 A My answer would have to be it's the amorphous body  
9 called the NRC staff as that's reflected in the Regulatory  
10 Guides that have been published with respect to the acceptance  
11 criteria that have been agreed upon in the Standard Review  
12 Plan, plus whatever special requirements the reviewer of  
13 that particular item might need for good reason to arrive at  
14 a conclusion of negligible risk to the public health and  
15 safety.

16 Q Who is the reviewer with regard to the diesel  
17 generator building who would make that determination as to  
18 what he might need for good reason to arrive at a reasonable  
19 assurance?

20 A Again that would be a team effort composed of  
21 the reviewer, consultants, management staff, policy makers  
22 within the NRC itself, different committee members, ACRS,



eb5

1 perhaps even the Appeal Board if the case happens to be a  
2 litigated case.

3 Q Who is the reviewer to whom you refer with re-  
4 gard to the diesel generator building?

5 A Again, it's really a staff function. At one time  
6 we discussed yesterday it was Mr. Gillen. At one point in  
7 time it was myself. At this point in time it is the Corps  
8 of Engineers in Detroit, assisted and bounded by their own  
9 management chain, and by Mr. Kane, who is conducting the over-  
10 all coordination of the review.

11 Q What investigation, if any, was done on the indi-  
12 viduals in the Corps of Engineers who were to act as this  
13 reviewer to provide reasonable assurance to the staff that  
14 they were capable and competent in conducting that review?

15 A May I ask that the question be repeated, please?

16 MR. ZAMARIN: Would you read it back, please?

17 (Whereupon, the Reporter read from the record  
18 as requested.)

19 THE WITNESS: The investigation as such in a formal  
20 manner was not conducted. But before the review was assigned  
21 to the Corps of Engineers, I and Mr. Kane discussed the  
22 background requirements and the qualifications of persons

eb6

1 necessary to perform the review and to arrive at the safety  
2 evaluation conclusions that were necessary with Mr. Norton  
3 of the Corps of Engineers, with Mr. Rixby Hardy of the Corps  
4 of Engineers, with Mr. William Lawhead of the Corps of  
5 Engineers, and other technical supervisors in order to assure  
6 that adequate competence would be assigned to the review of  
7 this project.

8 At this point we trusted their management to make  
9 available persons of sufficient experience and competence to  
10 perform that review.

11 The NRC did not initiate an investigation beyond  
12 what I have stated.

13 BY MR. ZAMARIN:

14 Q What acceptance criteria did you give to the Corps  
15 management with regard to the qualifications of personnel?

16 A We indicated the kind of work that would be re-  
17 quired, the kinds of public appearances that would be neces-  
18 sary, the probable need for preparation of affidavits for  
19 appearing before the Advisory Committee on Reactor Safety.

20 We indicated to them that a geotechnical engineer,  
21 preferably experienced, would be preferable to one more  
22 experienced in geological skills, and I believe they concurred.



eb7

1 with our judgment and agreed with us with respect to the  
2 qualifications of the people necessary to do the work.

3 Q You said a geotechnical engineer with what type  
4 of experience, as opposed to geological?

5 A A geotechnical engineer with appropriate experience  
6 and qualifications.

7 Q And what was that appropriate experience that is  
8 part of the acceptance criteria for the Corps reviewers?

9 A I don't know that we got into the details of  
10 exactly what the qualifications of the person must be. We  
11 did describe what we anticipated the problems would be, what  
12 possible fixes might be proposed for the facility itself,  
13 and left the selection of the qualifications to meet those  
14 problems up to the Corps management.

15 Q Do you know if anyone has reviewed the qualifica-  
16 tions of those individuals-- And by "anyone" I'm referring  
17 to anyone within the NRC -- to see if in fact they meet the  
18 qualifications required for one who is to conduct a review,  
19 perform an independent analysis to assure the conclusion  
20 that there is reasonable assurance that there is no risk to  
21 the health and safety of the public?

22 A Not in a formal way. I have asked Mr. Kane from

eb8

1 time to time who was assigned to the project, the Midland  
2 project or the Bailly project, and whether he had talked with  
3 these individuals, not in a prying manner but in a conversa-  
4 tional manner to learn what kind of experience they had, and  
5 he assured me that he had satisfied himself that they were  
6 able to do the review.

7 Q Did he tell you any more about what he had found  
8 out about their qualifications with regard to the reviewers  
9 working on the Midland project?

10 A It was my impression that he was satisfied with  
11 the people that had been assigned.

12 Q I understand.

13 Did you get any further information from him,  
14 however, as to what it takes to satisfy him, or what it took  
15 to satisfy him with regard to the Corps reviewers for the  
16 Midland project?

17 A I didn't feel that was necessary since we had dis-  
18 cussed that at length with the Corps prior to their choosing  
19 and assigning reviewers for the job.

20 Q I understood you to say that you described tasks  
21 that were to be performed with the Corps management and then  
22 left it to the Corps management to decide which qualifications

eb9

1 would be best suited or more appropriate for performing those  
2 tasks.

3 A Yes, sir.

4 Q And what I'm asking now is whether anybody in the  
5 NRC then found out what qualifications had been determined  
6 by the Corps management to be appropriate for performing those  
7 tasks and to see whether in fact the reviewers that had been  
8 assigned by the Corps did in fact possess those qualifications.

9 A I feel that's the same question you asked before.  
10 I will try to answer it again, what was actually done.

11 Q I understand what was done. You said it was left  
12 to the Corps management to decide what qualifications and  
13 therefore they presented bodies. And then I asked you whether  
14 you had had any discovery of what qualifications the parti-  
15 cular individuals had.

16 You communicated you had asked Joe Kane on several  
17 occasions and he assured you he was satisfied with the quali-  
18 fications of the Corps reviewers. I then asked you what  
19 those qualifications were and whether you knew whether Joe  
20 Kane had ever found out what they were, and you said they had  
21 been discussed at length with the Corps management.

22 A Okay.

eb10

1 Q But I understood you to say that just the tasks  
2 were discussed with the Corps management and what we're miss-  
3 ing are the qualifications, one, two, three, four and five.

4 A Thank you. I understand the missing link you're  
5 seeking, I believe.

6 When I talked with Joe I asked him who the re-  
7 viewers were, what their backgrounds were, what divisions  
8 they worked with with the Corps, if they had been reassigned,  
9 what projects they had worked on in the Corps. I did not ask  
10 for 171 or any kind of resume from the reviewers that had  
11 been assigned, but I left it up to Joe to be satisfied that  
12 they were in fact qualified within the same general level of  
13 qualifications that we had discussed prior to awarding the  
14 contract.

15 I feel that is much the same answer I gave before  
16 but if you want an expansion I'll try again.

17 Q Did Joe Kane tell you that he had ever seen resumes  
18 of the individuals in the Corps who were assigned to the re-  
19 view?

20 A No, sir. His conversations were first-person  
21 conversations with the people involved as he went over the  
22 details of the review and the reports that they submitted.



eb11

1 Q And did he tell you that he had learned the back-  
2 ground of each of the reviewers?

3 A I had the impression that he had learned suffi-  
4 cient background to be satisfied that they were not newly  
5 graduated engineers with no experience in any aspect of geo-  
6 technical engineering.

7 Q And in your opinion did Joe Kane communicate to  
8 you that he had conducted sufficient exploration of the back-  
9 ground and qualifications and expertise of these reviewers  
10 so as to make an informed judgment as to their engineering  
11 qualifications and qualifications to perform the type of re-  
12 view required by the staff in this kind of a situation?

13 A It was my impression that he was satisfied. I'm  
14 not sure that I asked it in exactly that way.

15 Q I'd be surprised if you did.

16 (Brief recess.)

17 MR. ZAMARIN: Back on the record.

18 I have here a document that I am marking Consumers'  
19 Exhibit Number 9 for identification as of this date.

20 (Whereupon, the document  
21 was marked Consumers' 9  
22 for identification.)

eb12

1 MR. ZAMARIN: It's a January 23, 1980 memorandum  
2 for James P. Knight through Robert E. Jackson from L. W.  
3 Heller.

4 BY MR. ZAMARIN:

5 Q I would like you to take a look at this and tell  
6 me if this appears to be or is a copy of a memorandum that  
7 was prepared by you and accurately reflects what your con-  
8 clusions were with regard to the status of the geotechnical  
9 review of Midland by the Corps of Engineers on or about  
10 January 23rd, 1980.

11 And I understand when this was prepared it is very  
12 likely that it didn't have the notations and the gaily colored  
13 markings that I have put on it.

14 Do you have my question with regard to Exhibit  
15 Number 9 in mind?

16 A I have read Exhibit Number 9 just now.

17 Q Do you recall what my question was with regard to  
18 it?

19 A No, I do not.

20 MR. ZAMARIN: Would you read it back, please?

21 (Whereupon, the Reporter read from the record  
22 as requested.)



ebl3

1 THE WITNESS: Yes, it is a memorandum I prepared  
2 summarizing the status of the Midland and the Bially plants  
3 at the time you indicated.

4 BY MR. ZAMARJN:

5 Q I notice on the second page it has a list of  
6 people to whom copies were sent, and the last one on that  
7 list is T. Davison. I think it might be misspelled. But  
8 is that the same Davison at the University of Illinois who  
9 is a technical consultant with regard to underpinning at  
10 Midland?

11 A Yes, sir, it is.

12 Q Do you know if-- That's not the correct spelling,  
13 is it?

14 A No, sir, it is not.

15 Q Have you worked with Davison with regard to  
16 Baily?

17 A Yes, sir.

18 Q And do you have confidence in his work?

19 A I'm confident that he will represent his client  
20 properly, yes, sir.

21 Q Do you have confidence in his work?

22 A Yes, sir, I do.

eb14

1 Q By saying you're confident he will represent his  
2 client properly you're not suggesting that because he works  
3 for the staff on Bailly that he would tend to color his  
4 opinions or his conclusions in any way to favor the position  
5 that is being taken by the staff at all?

6 A No, sir. He would represent the needs of his  
7 client properly was my implication.

8 Q Okay.

9 And you don't suggest by that that he would take  
10 any position or state any conclusion other than that which he  
11 believes is the best, based upon his best engineering judg-  
12 ment?

13 A Yes, sir, for his client.

14 Q You keep adding "for his client." And again are  
15 you suggesting that because he works for the staff on Bailly  
16 that he would tend to present a position that might be dif-  
17 ferent than that which he would present if he worked for the  
18 licensee on Bailly?

19 A I believe that any consultant to NRC, to any  
20 employer, owes that employer his best work to support his  
21 client's case. He's doing an excellent job for us and I  
22 feel he's doing an excellent job for Consumers Power.

eb15

1 Q You're not suggesting that he's compromising his  
2 engineering integrity or compromising any engineering decision  
3 or conclusion he may reach because of the identity of his  
4 employer, though?

5 A I'm not suggesting that, no.

6 Q Okay.

7 A I'm only suggesting that his work is toward the  
8 best interests of his client.

9 Q And do you believe that that in any way means that  
10 he would alter an engineering judgment so as to better serve  
11 the desires of his client?

12 A Serve the needs of his client, yes. It doesn't  
13 necessarily mean that he would alter an engineering judgment.  
14 Certainly the requirements of the job would dictate the con-  
15 clusions he would draw.

16 MR. ZAMARIN: Read back the question and the  
17 answer, please.

18 (Whereupon, the Reporter read from the record  
19 as requested.)

20 BY MR. ZAMARIN:

21 Q I guess what I'm confused with, my question was as  
22 to whether you believed he would alter an engineering judgment

eb16

1 because he thought that that would better do what his clients  
2 want.

3           You said, I think, that you believed he would  
4 alter an engineering judgment if he thought that would better  
5 serve the needs of his client. And that to me suggests some-  
6 thing dishonest, and I don't think that's at all what you were  
7 intending. And that's why I want to make sure it is abso-  
8 lutely clear on the record as to what you say.

9           A       Let me try to make the statement the way I mean  
10 it. It may not answer your question. If not, please ask  
11 again.

12           Q       Oh, I will.

13           A       I'm not suggesting that he is in any way acting  
14 in an unethical way, either for us on the Bailly project or  
15 for Consumers on the Midland project, or for any other client  
16 that he has and serves as a consultant.

17                   My point is that a consultant, any consultant,  
18 serves the needs of his client and his judgments are based on  
19 the needs of his client, not that those judgments will be  
20 biased in any way, but they must fit the needs of his client.

21           Q       Okay.

22                   When you refer to "the needs of his client," with



eb17

1 regard to Bailly, for example, what are the needs of the  
2 staff vis-a-vis Davison to which you refer?

3 A Those needs are spelled out in the contract. Some  
4 of the items of necessity are appearance at hearings before  
5 the Advisory Committee for Reactor Safety. Some of those  
6 needs are meeting with the technical staff of the applicant.  
7 Some of those needs involve inspection specifications for  
8 pile driving.

9 Our needs, in a nutshell, boil down to having a  
10 good case that will survive intervenors, survive challenge  
11 perhaps after the plant is built, and convince the different  
12 hearing boards that we have in fact a foundation that mini-  
13 mizes the risk to public health and safety of the Bailly  
14 plant.

15 Q If in Davison's opinion you didn't have a good  
16 case, do you think that he would bend his engineering judg-  
17 ment in any way so as to serve your needs of having a good  
18 case, or your needs for having a good case?

19 A I believe the set of circumstances that form the  
20 framework of the need define the various facets of judgments  
21 that can be applied to any given facet of that problem. It  
22 does not mean that his judgments would be bent; it would mean

eb18

1 that his judgments would be tailored to the specific facets  
2 of the need.

3 Q I haven't the faintest idea what you just said.  
4 I'm sorry.

5 A Let me try again.

6 If I recall your question correctly, and I neglected  
7 to have it reread, it went to the thought that Davison would  
8 bend his judgments to satisfy the needs of his client.

9 Q Let me correct you. It didn't really go to that  
10 thought. Just what I was trying to clarify was that you had  
11 indicated that it was necessary in your mind for a consultant  
12 to satisfy the needs of his client, and then in describing  
13 the needs of the staff at Bailly, you indicated that one of  
14 the needs was in having a good case that would survive inter-  
15 venors' scrutiny, or any other scrutiny.

16 And I just wanted to make sure that it can't be  
17 inferred from your answer that you're saying that Davison  
18 in any way would give something other than what he honestly  
19 believes to be an appropriate engineering conclusion just to  
20 make sure that you had your good case.

21 A In this particular instance I feel that he is not  
22 bending his best judgment. I feel that we, by the nature of



eb19

1 our needs, may be making judgments that are more conservative  
2 than would normally be necessary for construction projects  
3 of lesser risk to public health and safety.

4 Q Do you know of any instance in which he has bent  
5 his judgment, since you say in this case you don't think he  
6 has?

7 A No, because I feel his judgments and the work he  
8 is doing for us on Bailly do appropriately fit our unique  
9 needs of the Nuclear Regulatory Commission. I'm saying that  
10 those needs are somewhat more conservative perhaps than would  
11 be appropriate for a less sensitive structure than a nuclear  
12 power plant where that sensitivity of course relates to  
13 public health and safety.

14 Q Do his judgments with regard to Bailly accurately  
15 and adequately reflect the standard required for adequate  
16 assurance at Bailly?

17 A That test is yet to come. I don't know the answer  
18 to that question.

19 Q How about in your opinion? Certainly Lyman Heller  
20 has some thoughts about that.

21 A In my opinion we are tailoring it to meet the  
22 minimum standards that will be necessary in the future to

eb20

1 survive challenges that we know will be there.

2 Q So in your opinion do the judgments of Davison  
3 with regard to Bailly meet the standards of the NRC required  
4 for adequate assurance?

5 A I believe they do.

6 Q And would that be true of his work with regard to  
7 Midland as well?

8 A I have not reviewed his work at this point.

9 Q So you don't have any idea, as you sit here now,  
10 of what his work on Midland is?

11 A I know what structure he's working on, and I have  
12 an idea what the proposed solution is. We have not gone through  
13 enough review I think to arrive at that conclusion.

14 MR. ZAMARIN: I have here what I am marking as  
15 Consumers 10 for identification as of today's date.

16 (Whereupon, the document  
17 referred to was marked  
18 as Consumers Exhibit 10  
19 for identification.)

20 MR. ZAMARIN: It is some handwritten notes dated  
21 November 29th, 1979. I'll give you a moment to locate that  
22 in your files if that's what you're attempting to do, or I

eb21

1 can show you my copy.

2 (Pause.)

3 THE WITNESS: I have located the referenced hand-  
4 written note.

5 BY MR. ZAMARIN:

6 Q It refers to a meeting on Midland and it styles  
7 it "Stello's meeting." What does that mean?

8 A I think the brackets around the words "Stello's  
9 meeting," as I recall, was simply a note to myself that he  
10 appeared to be the person who had requested the meeting,  
11 although I don't have personal knowledge that he's the person  
12 who requested the meeting.

13 Q Is Exhibit 10, this 11/29/79 note, in your hand?

14 A Yes, sir, it is. I have a copy of it.

15 Q What was the purpose of this meeting, as you recall?

16 A I'm not sure what Stello's purpose was. It  
17 appeared to me that he wanted to get the involved people to-  
18 gether and discuss the Bailly situation with respect to the  
19 Midland case and to kick around the thought that the principal  
20 architectural design features may have changed at Midland  
21 because of the changed support conditions.

22 MR. ZAMARIN: Would you read that back for me,

B2

eb22

1 please?

2 (Whereupon, the Reporter read from the record  
3 as requested.)

4 BY MR. ZAMARIN:

5 Q What is the Bailly situation to which you refer?

6 A The Bailly situation is a rather complex situation.

7 The principal features of it are a pile foundation that was  
8 proposed at the construction permit stage and on which a  
9 license was granted, and the change in those piles that was  
10 proposed and was under review by the staff, and the considera-  
11 tions that the staff of the Commission had given to that change  
12 in foundation conditions with respect to the question of  
13 whether the principal architectural and design features had  
14 been changed for the Bailly plant.

15 Q About in the middle of the page it says "Stello:"  
16 and then underneath that it says something, and then the  
17 next word is "Thornburgh," underscored.

18 What's that first word?

19 A That precedes "Thornburgh"?

20 Q Yes.

21 A March, M-a-r-c-h.

22 Q Is that someone's first name?



eb23

1           A       No, sir, that is a month of the year.

2           Q       I don't understand. Then the sentence says:

3       "March. Thornburgh says not good foundation."

4                    Can you tell me what that sentence means?

5           A       Yes, sir. It means that in March Mr. Thornburgh,

6       who is a member, a ranking member of our Inspection and

7       Enforcement Office, had indicated that the foundations at

8       Midland left something to be desired. And this note having

9       been written in November simply referred back to the Region

10      III determination I believe dated in March, recording this

11      situation at Midland.

12          Q       Do you know anything more about Thornburgh's

13      statement that the foundations left something to be desired?

14          A       I understand why Afifi does not take notes.

15                   (Laughter.)

16          Q       The context there is that Stello is speaking and

17      he's reporting to the group that in March of 1979 a Region III

18      investigation report indicated, and that Mr. Thornburgh of

19      I&E had told Mr. Stello that Midland did not have the best

20      of foundations.

21          Q       Do you know what was meant by that statement?

22          A       It is only a recording of fact, a statement of fact.

eb24

1 Q I know, but I'm asking you what is meant, if you  
2 know what is meant by the statement that Midland didn't have  
3 the best of foundations.

4 A Well, those are my words. "Not good foundation."  
5 That was just my shorthand.

6 Q What did that mean to you?

7 A It means to me that there's a problem with the  
8 foundations at Midland.

9 Q And can you tell me what that problem of founda-  
10 tions is that is being referred to there, or do you know in  
11 any detail?

12 A Yes. I leafed through the Region III report on --  
13 the QA and foundation report.

14 Q Are you referring to that Investigation Report  
15 Number 78-20? Around March of 1979 it was published.

16 A I believe that's correct, to the best of my recol-  
17 lection.

18 Q When it says "March. Thornburgh says not good  
19 foundation," do you know if Stello was referring to that inves-  
20 tigation report, a draft of which was prepared on March  
21 15th, 1979, and the final version of which was issued on  
22 March 22nd, 1979, over the signature of Mr. Thornburgh?



eb25

1 A I don't know that that is a fact, if those are  
2 true facts. I assume that that is what Stello was talking  
3 about -- was talking about at that point.

4 Q Who is Vassallo?

5 A Vassallo at that time was the Acting Director of  
6 the Division of Licensing in the Office of Nuclear Reactor  
7 Regulation, to the best of my recollection.

8 Q And who is Showard?

9 A Showard is the chief of the Structural Engineering  
10 Branch within the Division of Engineering.

11 Q And is the Jackson listed Robert E. Jackson?

12 A That is correct.

13 Q Who is Case?

14 A Case is the Deputy Director of Nuclear Reactor  
15 Regulation.

16 Q Who is "plus five"? Lawyers who didn't need to be  
17 mentioned?

18 A Unidentified people that I didn't know their first  
19 names or didn't bother to continue my notes.

20 Q Are Cunningham, Liberman and Murphy all from OELD?

21 A I believe they are, yes, sir, or representatives  
22 of Regional Offices.

eb26

1 Q Do you know if at this meeting there was any dis-  
2 cussion of civil penalties related to the Midland soils  
3 problem?

4 A I do not recall.

5 Q Do you know if prior to this meeting the NRC had  
6 been considering civil penalties as a result of or related  
7 to the Midland soils problem?

8 A I do not have any knowledge to that effect.

9 Q When Stello suggested an order to suspend founda-  
10 tion construction do you know if there was anyone who dis-  
11 agreed with him at that meeting?

12 A I don't recall any particular person who disagreed  
13 with that suggestion. I'm sure it was discussed pro and con  
14 among the group but I can't recollect what the arguments  
15 were.

16 Q You don't recall any general disagreement that  
17 might have been expressed?

18 A I don't recall any general disagreement, no, sir.

19 Q Do you recall what any of the lawyers said at the  
20 meeting?

21 MR. JONES: I would object to going into the  
22 conversations. I will assert the attorney-client privilege.

eb27

1 MR. ZAMARIN: Let's see if he can recall. We may  
2 not have to hassle about it.

3 THE WITNESS: I really don't recall.

4 BY MR. ZAMARIN:

5 Q Had you attended any other meetings besides this  
6 11/29/79 meeting at which the question of an order to suspend  
7 foundation construction was discussed or mentioned?

8 A I don't remember whether I did or not. There were  
9 all kinds of meetings. That's why I keep notes. I have a  
10 poor memory.

11 Q Why did you attend the meeting on 11/29/79?

12 A I was asked to attend.

13 Q Do you recall who at that meeting might have been  
14 in favor of issuing the order to suspend, and who might have  
15 been opposed to issuing the order to suspend?

16 A No, sir, I cannot recall who was pro and who was  
17 con. In many cases one person would argue for and two minutes  
18 later argue against. So it's difficult to identify the  
19 issues with people.

20 Q How did you feel at that meeting about that?

21 A I felt at that point in time it was necessary to  
22 do something of a positive nature to attempt to bring the

eb28

1 plant into reasonable expectations of compliance with the  
2 PSAR.

3 Q How did you feel about whether to issue an order?

4 A I'm not familiar with the legal instruments that  
5 are used to attempt to control construction, particularly  
6 after the construction permits have been issued, so I can't  
7 comment.

8 Q Are you saying you really didn't have a position  
9 one way or the other in this raging debate about whether an  
10 order to suspend foundation construction should be issued or  
11 not on 11/29/79?

12 A Well, I felt that there needed to be some assurance  
13 that the end product would be acceptable for those poor  
14 devils who have to review the operating license application.  
15 So, with that point of view, I was in favor of supplementing  
16 the docket to a point where a positive conclusion could be  
17 reached, and whatever legal mechanisms or other mechanisms,  
18 voluntary mechanisms were available I favored.

19 Q Did you suggest at that meeting in any way that  
20 Consumers had not submitted adequate acceptance criteria?

21 A I'm not sure I had an opportunity to say anything  
22 at that meeting. If not at that meeting I'm sure I suggested



eb29

1 it previously to someone, suggesting there was not adequate  
2 acceptance criteria.

3 Q With regard to the statements you have made that  
4 Consumers had not provided adequate acceptance criteria, tell  
5 me each item of information or data that they had not pro-  
6 vided which you believed they should have provided.

7 A I can give you some of the items. Again, I cannot  
8 attempt to be complete.

9 Q Well, you can attempt to be complete. But I under-  
10 stand recollection serves such that you may not be able to.

11 A I think the first item would be a listing of the  
12 codes and practices that were committed to be used in arriving  
13 at a design or interpretation of the end results of the fixes  
14 had, to my knowledge, not been submitted at that point in  
15 time.

16 I believe that criteria related to settlements,  
17 differential settlements, piping stresses, piping bedding,  
18 placements of pipes in the plant fill area had not been sub-  
19 mitted with respect to conditions that would be attained  
20 after the fix was implemented.

21 At that time I do not believe there was any  
22 remedial actions proposed for the service water pumphouse



eb30

1 other than perhaps an over-all concept.

2 I believe that it had been recently -- I will say  
3 "discovered" that the return lines to the emergency cooling  
4 water pond were not shown on submissions in the FSAR and  
5 questions regarding the list of safety items and the function  
6 of those safety items could be expected to be incomplete.

7 We were aware from previous visits to the site  
8 of design construction concepts for the borated water tanks  
9 that were in general variance with such concepts in con-  
10 struction at other nuclear power plants.

11 And a combination of these concerns, a lack of  
12 knowledge of how these concerns were to be addressed or if  
13 they were to be addressed, coupled with reports by our I&E  
14 and Quality Assurance people in which less than a hundred  
15 percent confidence in the ability to carry out the fixes was  
16 expressed, this combination of circumstances led me to believe  
17 that we should take a pause in the review process in an  
18 attempt to gather these essential pieces of information.

19 I have finished my answer.

20 Q In the first item where you talked about listing  
21 of codes and practices you indicated that none had been sub-  
22 mitted at that point in time, and I assume that you're

eb31

1 referring to the time that you discussed with people the lack  
2 of acceptance criteria that had been submitted. Tell me what  
3 point in time you're referring to.

4 A Oh, I would say the fall of '79, August, September,  
5 some time in that region.

6 Q And whom had you asked for a listing of codes and  
7 practices?

8 A I didn't ask anyone. I had leafed through the sub-  
9 mission, attempting to locate some positive, quantitative  
10 criteria and was unable to find such information in the sub-  
11 mittals that had come in.

12 Q So you didn't ask anyone at Consumers with respect  
13 to that information?

14 A No, I did not.

15 Q With regard to criteria related to differential  
16 settlement and piping stress and piping bedding and the  
17 placement of pipes, do you know if that information had been  
18 worked up by anyone at Bechtel or Consumers?

19 A No, sir, I do not.

20 Q Did you ask anyone at Bechtel or Consumers for  
21 that information?

22 A No, sir.

eb32

1 Q With regard to remedial actions for the service  
2 water pumphouse, other than perhaps an over-all concept, do  
3 you know if such remedial actions had been in fact reduced  
4 to more specific design than an over-all concept at that time?

5 A I don't believe that it had been but I don't  
6 recall specifically.

7 Q You didn't ask anybody for that, did you?

8 A No, sir.

9 Q With regard to the design construction concepts  
10 of borated water tanks, did you ask for any information with  
11 regard to that of either Bechtel or Consumers?

C2

12 A I did not ask for it. It may have been included  
13 in some of the questions that may have been submitted either  
14 by myself-- But I did not personally ask for them verbally.  
15 I guess that's what you're referring to.

16 Q Do you know whether anyone asked for, and didn't  
17 get the information?

2.300

18 A I'm sorry, could you repeat that question?

19 Q Sure.

20 Do you know whether anyone asked for, and didn't  
21 get the information?

22 A As I recall, at roughly that period of time

eb33

1 questions had been asked, perhaps not the same questions that  
 2 I have previously indicated, but a number of responses had  
 3 come back indicating that an answer would be supplied at some  
 4 point in the future.

5 In other cases an attempt to answer the question  
 6 was submitted, but none of these answers contained any  
 7 what I would call acceptance criteria for the fixes that were  
 8 being envisioned.

9 Q Did you communicate that to anyone at Consumers  
 10 or Bechtel?

11 A By telephone or other means?

12 Q By any means.

13 A By any means?

14 Q Yes.

15 A No, I did not.

16 Q Who was it in I&E who told you that they were less  
 17 than 100 percent confident in the licensee's ability to carry  
 18 out remedial fixes?

19 A I think that was an impression that I got from  
 20 the report that I think you indicated was dated in March,  
 21 1979.

22 Q Investigation Report 78-20.



eb34

1           A       I obtained that impression from meetings that  
2 were held at NRC at which quality control issues were dis-  
3 cussed, and I can't recall the reviewers and the section  
4 leaders and the branch chiefs involved but I think that the  
5 Quality Assurance Branch in general left me with that im-  
6 pression.

7           Q       Did you have any specifics upon which that im-  
8 pression was based, upon which they based the information  
9 that they imparted to you which formed that impression, gave  
10 rise to that impression?

11          A       Well, as I recall that meeting, and I think it  
12 was in July of '79, there were some score of items that I&E  
13 had -- rather, the Quality Assurance Branch had presented  
14 to Consumers Power with respect to the QA/QC program. And  
15 Consumers was reporting the results of their investigation  
16 of those items.

17                   And I believe one of the issues on which there  
18 remained disagreement between reviewers and Consumers Power  
19 was the matter of the influence that Consumers personnel  
20 had on the quality assurance program. By that I'm inferring  
21 that Consumers contended that there was no breakdown in  
22 quality control or quality assurance with respect to



eb35

1 qualifications of inspectors, actions of inspectors, and I  
2 believe it was NRC's impression that there was indeed suffi-  
3 cient evidence to question that conclusion.

4 Q At what point in time was this alleged breakdown  
5 in quality assurance with regard to qualifications of in-  
6 spectors stated to have occurred? Was this back at the time  
7 of soils placement in the summer of 1979, the fall of 1979?

8 A There are others who could answer that question  
9 better than I can but it is my impression that the quality  
10 control/quality assurance side of the construction at Midland  
11 had been found less than satisfactory very early in the con-  
12 struction, and apparently there had been some improvements  
13 in that program such that construction could again proceed.

14 And I believe at some point the I&E offices and  
15 our QA people found additional breakdowns in the quality  
16 assurance program. So at what point in time I really can't  
17 say; it's just my impression from the meeting that that is  
18 the situation -- was the situation.

19 Q Okay.

20 The impression that was given to you at that meet-  
21 ing was that there were problems with the QA/QC program that  
22 existed, for example, in the spring of 1979 as opposed to

eb36

1 reports of problems that existed at some prior time which  
2 didn't exist currently in the spring of 1979?

3 A The impression I had is that there had been a QA  
4 problem, that there still was a QA problem, and that it was  
5 not likely that whatever remedial measures were going to be  
6 proposed for taking care of the foundations, that the same  
7 QA measures would be taken for the remedial actions on the  
8 foundation.

9 Q Do you know who Gene Gallagher is?

10 A Yes, sir.

11 Q Was he at the November 29th, 1979 meeting?

12 A I don't believe he was.

13 Q Is any of your impression with regard to the QA-  
14 discussions the result of communication from or by Gene  
15 Gallagher?

16 A No. They primarily came from our own QA/QC staff  
17 and reviewers.

18 Q NRR?

19 A Yes.

20 Q Who gave the Corps reviewers advice on the standard  
21 of assurance which is required in their review work with  
22 regard to the fixes at Midland?

eb37

1 A With regard to QA/QC, I believe you asked.

2 Q No.

3 MR. ZAMARIN: Would you read it back, please?

4 (Whereupon, the Reporter read from the record  
5 as requested.)

6 THE WITNESS: The standard of assurance is con-  
7 tained basically in the Code of Federal Regulations, Part 10.  
8 It's contained in Regulatory Guides that are used for ex-  
9 ploration, laboratory testing. It is contained in Standard  
10 Review Plans' references, bibliographies included in that  
11 Standard Review Plan.

12 It's contained I believe in the wordings of our  
13 SER's that we provided to them as examples of justifications  
14 for acceptance.

15 So to answer your question I would say that we  
16 attempted to indoctrinate the Corps reviewers with the prac-  
17 tices that the NRR staff uses, either by example or by actual  
18 guidance.

19 Q What actual guidance was given to them?

20 A Actual guidance would be the Code of Federal  
21 Regulations, Standard Review Plans and Regulatory Guides.

22 Q In addition to giving them those Guides and Plans

eb38

1 and Regulations and examples of SER's, was anything at all  
2 done to see that what was required to provide reasonable  
3 assurance to a reasonable staff member was in fact what was  
4 going to be or being required in order to provide reasonable  
5 assurance to these Corps reviewers?

6 A Nothing other than the general impression that we  
7 would expect the resulting facility to meet Corps practice  
8 which is part of our guidance I believe in the Standard  
9 Review Plan.

10 MR. ZAMARIN: I have here what I am marking as  
11 Consumers' Exhibit Number 11 for identification as of today's  
12 date, a June 4th, 1980 letter from the Department of the Army,  
13 Waterways Experiment Station, Corps of Engineers, Subject:  
14 Report of Review of Geotechnical Aspects of the Seismic  
15 Safety of Midland Nuclear Power Plant.

16 (Whereupon, the document  
17 referred to was marked  
18 as Consumers' Exhibit 11  
19 for identification.)

20 MR. ZAMARIN: I notice a copy with enclosures  
21 was sent to you, among others, and the enclosure is a Memo-  
22 randum for Record.



eb39

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BY MR. ZAMARIN:

Q Have you located that in your documents?

A I'm not sure it was in the-- Was it in the package I gave you?

Q I don't know if it was. The copy I have we got from Joe Kane.

A I suspect I do not have a copy.

Q All right. I'll let you look at mine.

The one sheet, the cover sheet, is not for your review. Those are my notes and it's not a part of the document, so I will fold that to the back.

Take a look at the document and tell me if in fact it's accurate and reflects that a copy was sent to you.

(Handing document to the witness.)

(Recess.)

B3

MR. ZAMARIN: Back on the record.

BY MR. ZAMARIN:

Q Can you respond?

A Yes, I recall receiving the document. I think I have leafed through it but not read it in detail as a reviewer would.

Q Page two of the Memorandum for Record that the

eb40

1 June 4th letter transmits, that Memorandum for Record is  
2 dated May 30th, 1980. There's a paragraph numbered seven  
3 which says, in the second sentence -- Strike that -- which  
4 says in total:

5 "In view of the large number of borings  
6 in the plant fill area and the conservatism adopted  
7 in my analysis, these few isolated pockets are no  
8 threat to plant safety. The fill area is safe  
9 against liquefaction in a magnitude 6.0 earthquake  
10 or smaller which produces a peak ground surface  
11 acceleration of 0.19g or less provided the ground-  
12 water elevation in the fill is kept at or below  
13 elevation 610."

14 This report, by the way, is signed by P. F.  
15 Hadala, Engineer, Acting Assistant Chief, Geotechnical  
16 Laboratory, Department of the Army, Waterways Experiment  
17 Station, Corps of Engineers, Vicksburg, Mississippi.

18 Here, I'll show you that Paragraph 7 that I just  
19 read. I'd ask you to look at it and tell me if you disagree  
20 with what Dr. Hadala says there.

21 A Yes, sir, it looks okay to me.

22 Q Actually you said "Yes, sir." I asked you if you

eb41

1 disagreed with it, so I guess your answer is No, you don't  
2 disagree. Is that correct?

3 A I do not disagree with the conclusions Dr. Hadala  
4 has stated in Paragraph 7 of his report.

5 Q Okay.

6 On page 4 of that same report, Paragraph Number 11  
7 is a section that starts "Comments regarding seismically-  
8 induced settlements." And in Paragraph 11 it says that:

9 "An independent approximate analysis  
10 based upon the same references cited on pages four  
11 and five of the Applicant's Responses to NRC Re-  
12 quests, Question 4, the same assumption of dry sand  
13 used in the preparation of Table 4-1A of Question  
14 4, and Dr. Hadala's engineering judgment indicated  
15 that the numbers for seismically-induced settlement  
16 in that table which are 4.012g and M equals 7 earth-  
17 quake are also reasonable for 0.19g and a magnitude  
18 6.0 event."

19 It goes on to state that:

20 "While a course of action is probably  
21 available to the applicant at no cost, it is, in  
22 Dr. Hadala's opinion, unnecessary and in view of

eb42

1 the field data discussed in the references cited  
2 on pages four and five of Consumer's Answers to  
3 Question 4, Dr. Hadala is fully satisfied that  
4 capillary action provides all the conservatism  
5 needed to review the seismically-induced settle-  
6 ments in Table 4-1A as upper-bound values for the  
7 earthquake shaking described."

8 Do you disagree with Dr. Hadala's conclusions as  
9 contained in Paragraph 11 which I now show you?

10 (Handing document to the witness.)

11 (Discussion off the record.)

12 MR. ZAMARIN: Back on the record.

13 Will you read the last question, please?

14 (Whereupon, the Reporter read from the record

15 as requested.)

16 THE WITNESS: I would not necessarily disagree  
17 with Dr. Hadala's conclusions. If I were the reviewer of  
18 the details of his analyses I probably would question the  
19 basis for his judgments.

20 BY MR. ZAMARIN:

21 Q And I take it from that then that after reviewing  
22 Paragraph 11, you would still have some question as to the



eb43 1 basis of his judgment?

2 A Yes. If I were the reviewer I would ask him the  
3 basis for the judgments on the settlement.

4 Q Okay.

5 Are you familiar with the information contained  
6 in the references to Question 4 and Table 4-1A, the Seed and  
7 Silver reference?

8 A I'm vaguely familiar, yes.

9 Q And that information doesn't indicate to you the  
10 basis for Dr. Hadala's conclusions stated in Paragraph 11?

11 A It would not be clear to me. It may have been  
12 clear to the person who reviewed that particular paragraph.

13 Q Do you know if any reviewer has challenged in any  
14 way Dr. Hadala's conclusion as stated in this Paragraph 11?

15 A I'm not aware of any challenge to the conclusions.

16 Q In your opinion with regard to reasonable assurance,  
17 does that require that you be 100 percent sure or certain  
18 with regard to a nuclear power plant component?

19 MR. PATON: At the CP stage or OL stage?

20 MR. ZAMARIN: The CP stage.

21 MR. PATON: Can I ask you to say reasonable  
22 assurance of what?

2b44

1 MR. ZAMARIN: We've been talking about reasonable  
2 assurance that the plant can be constructed and operated  
3 without undue risk to the health and safety of the public,  
4 and the attorneys in this proceeding.

5 (Laughter.)

6 MR. PATON: Thank you.

7 THE WITNESS: As I understand the question it has  
8 been modified, reasonable assurance with respect to the con-  
9 struction permit application, and we're talking now about  
10 PSAR criteria and commitments as opposed to the plant as  
11 constructed at the operating license stage.

12 MR. ZAMARIN: Yes.

13 THE WITNESS: Reasonable assurance is a judgmental  
14 term that is used mainly by the Advisory Committee on Reactor  
15 Safety, having taken all of the input information from the  
16 staff and from the applicant in the totality of their  
17 judgments. To reduce or condense "reasonable assurance" to  
18 the foundation fixes one would need to look at acceptance  
19 criteria that is used by the Accident Analysis Branch to  
20 determine what level of risk or the probability of improper  
21 engineering behavior would be likely for a particular com-  
22 ponent of the foundation, and that then would be factored

eb45

1 into the total risk model for that particular plant, not  
2 necessarily in a quantitative way but at least in a judg-  
3 mental way.

4 BY MR. ZAMARIN:

5 Q My question was in terms of whether one would have  
6 to be 100 percent certain in order to conclude that he had  
7 reasonable assurance. Can you either disagree or agree with  
8 that statement.

9 A One does not need 100 percent assurance; no, sir.

10 Q At the OL stage is it your opinion that one would  
11 need 100 percent certainty in order to have adequate assurance?

12 MR. PATON: I'm sorry, you say "adequate" assurance.  
13 Do you mean "reasonable" assurance?

14 MR. ZAMARIN: Yes, I meant to say "reasonable  
15 assurance."

16 THE WITNESS: I believe a goal of 99.999 percent  
17 is a worthwhile level of assurance to strive for at the  
18 operating license stage.

19 BY MR. ZAMARIN:

20 Q Okay, that's laudable, but is that practical and  
21 is that in fact your opinion of what is required?

22 A Yes, sir, it is.

eb46

1 Q Since Three Mile Island has there been a change  
2 in the approach to "reasonable assurance" within the staff?

3 A In my opinion there has been a change, yes.

4 Q Will you describe that change?

5 MR. PATON: Could I ask you-- I think we dis-  
6 tinguished a while ago between OL and CP.

7 MR. ZAMARIN: I don't know yet. Whatever change  
8 there is I want to know about.

9 THE WITNESS: I believe there has been an in-  
10 creasing desire to arrive at generally higher levels of  
11 assurance than had been deemed necessary prior to Three Mile  
12 Island.

13 BY MR. ZAMARIN:

14 Q Why?

15 A I don't know the reasons why. I think this is a  
16 perception and an opinion that I hold, having been subjected  
17 to the environment in the Office of Nuclear Reactor Regula-  
18 tion over the past year or so.

19 Q In your opinion that does not indicate a conclusion  
20 that the staff had not been doing their job properly prior  
21 to Three Mile Island, does it?

22 A I have no opinion on that matter.



eb47

1 Q You have no opinion as to whether the staff was  
2 properly doing their job before Three Mile Island?

3 A No, sir.

4 Q Do you have an opinion as to whether the staff  
5 has been doing their job properly since Three Mile Island?

6 A I believe they have been trying much harder to  
7 do their job; yes, sir.

8 Q From where did you obtain your perception or  
9 impression that since Three Mile Island higher levels of  
10 assurance were deemed necessary than prior to the Three Mile  
11 Island accident?

12 A It's really an over-all impression from reading  
13 a number of Commissioners' speeches, from conversations with  
14 my supervisors over the months.

15 MR. ZAMARIN: Would you read the answer back?

16 (Whereupon, the Reporter read from the record  
17 as requested.)

18 BY MR. ZAMARIN:

19 Q Can you be more specific about what any of these  
20 speeches or conversations consisted of as it relates to your  
21 perception or impression that a higher level of assurance is  
22 deemed necessary now than prior to TMI?

3,275

eb48

1           A       It's not possible to tie it down to any particular  
2 time or place. I get this impression from words that  
3 Mr. Knight has offered to his branch chiefs from time to time.  
4 They seem to be consistent with what he reports his directions  
5 to be from higher management and consistent with the action  
6 plans that have been taken by the Nuclear Regulatory Commis-  
7 sion, with the actions to resolve unresolved issues, and I  
8 think with speeches I have read in the bulletins that are  
9 circulated within our organization.

10           Q       Is the Midland site being singled out for any more  
11 particularized scrutiny than a general review of nuclear  
12 projects?

13           A       Not to my knowledge.

14           Q       Are you aware that on December 6th, 1979, there  
15 were outstanding questions that had been asked of Consumers  
16 Power Company on November 19th, 1979 that had not been due  
17 for answer as of December 6th, 1979?

18           A       I don't know the answer to that question.

19           Q       Do you know if anybody was aware when that  
20 December 6th, 1979 order was issued that the staff had just  
21 asked a bunch of questions that nobody had had time to  
22 answer?

eb49

1           A       I know that we had submitted questions from our  
2 branch and our area for -- since early 1977 when we began the  
3 operating license review. I'm not aware that the November  
4 questions were any more complete or conclusive than the  
5 previous questions. It was just another series of questions  
6 in different areas that needed to be addressed.

7                   MR. ZAMARIN: Could you read back the question,  
8 please?

9                   (Whereupon, the Reporter read from the record  
10 as requested.)

11                   THE WITNESS: I would assume that everyone involved  
12 in the review, particularly the Project Manager, would have  
13 been aware of the issuance of those questions and the date  
14 they were actually issued.

15                   My answer attempted to put a framework around the  
16 situation in which questions are continuously being generated  
17 in the operating license review and in particular, with the  
18 remedial actions now proposed for the foundations.

19                   BY MR. ZAMARIN:

20                   Q       Do you know if any of the questions asked in  
21 November of 1979 related to the acceptance criteria referred  
22 to in the December 6th, 1979 order?

eb50

1           A       I'm not sure that set of questions asked for --  
2       quote -- "criteria" -- quote -- specifically. I believe there  
3       were questions asked prior to that submission that went to  
4       the topic of acceptance criteria.

5           Q       Do you know whether those questions related to  
6       the acceptance criteria referred to in the December 6th order?

7           A       I don't recall exactly which submission that went  
8       from Licensing to the applicant contained those particular  
9       questions. I generally don't get copies of those submissions.

10          Q       Did you ever have a conversation with Joe Kane  
11       about the difficulties that could be expected in underpinning  
12       operations at Midland?

13          A       I expect that I did have at some point in time,  
14       primarily at the point where I was attempting to brief him  
15       on what had transpired, what I thought was being proposed for  
16       the underpinning at that time, which would be November or  
17       December 1979.

18          Q       Do you recall what the substance of that conver-  
19       sation was?

20          A       Not explicitly. I do recall some items, that I  
21       wanted him to understand that borings had been made through  
22       the service water pumphouse floor and borings had been made



eb51

1 I believe at that time also in the auxiliary building, the  
2 valve chamber or auxiliary building, -- I can't distinguish  
3 which is which -- that there were some schemes for temporary  
4 support that had been described to us that appeared as  
5 though they needed to have someone give them a reasonable  
6 degree of detailed review with the thought that when the fix  
7 is finally in that we will not have damaged the structures  
8 involved.

9 Q Do you recall anything else?

10 A No, I don't at this point.

11 Q Do you recall any discussions with Joe Kane about  
12 problems and how to reach resolution with regard to problems  
13 of a fix for the diesel generator building?

14 A Not specifically, no, sir.

15 Q Do you recall any conversations with Joe Kane about  
16 what the Corps is trying to do with regard to the cooling  
17 pond dikes?

18 A We've had many conversations on the dikes in the  
19 past months. If you can be explicit in terms of what the  
20 Corps is trying to do, I could probably answer in more  
21 detail.

22 Q I really can't be because I don't know what it is

eb52

1 that Joe Kane discussed with you. I'm trying to find that  
2 out.

3 A Okay. Well, we discussed many topics, first of  
4 all what the dikes are supposed to do, when they were built,  
5 under what conditions they were built, what the investiga-  
6 tions were for the dikes, the people who would need to be  
7 contacted for assessments of the systems review aspect,  
8 meaning what the pond has to do in terms of providing cool-  
9 ing, whether there are ways of keeping debris out of the  
10 pumps.

11 I believe we discussed the method of analysis  
12 that was submitted at the CP stage for seismic evaluation.

13 I do recall discussing with him the cutoff in  
14 the dike that prevents leakage through the sand lens; many  
15 items here.

16 Now with respect to what the Corps is doing, we  
17 discussed of course the borings that the Corps requested  
18 for confirmation of as-built conditions.

19 We discussed the location of those borings, the  
20 frequency of the borings.

21 I don't believe we discussed the laboratory tests  
22 that were going to be performed.

eb53

1 We discussed Table 37-1 I believe that was sub-  
2 mitted to Consumers Power, outlining the borings that would  
3 be worthwhile, and the reasons for the borings and the uses  
4 for which the information would be obtained.

5 I don't recall any other specific topics with  
6 respect to what the Corps was doing with the dikes, other  
7 than those that I've described.

8 Q What did Joe Kane tell you about his understanding  
9 of under what conditions the dikes were built?

10 A Could you repeat the question?

11 Q What did Joe Kane tell you about under what condi-  
12 tions it was his understanding that the dike had been built?

13 A I believe he was the one who pointed out to me  
14 that the dike had been constructed at an early stage under a  
15 limited work authorization issued prior to the issuance of  
16 the construction permit, and that that may have been one of  
17 the reasons that the dike was not "Q" listed or perhaps  
18 wasn't tested as would normally be expected for a structure  
19 related to a nuclear plant.

20 Q Did he tell you that he thought one of the reasons  
21 why the dike ought to be investigated is that the fill material  
22 was placed in the dike by the same contractor who placed the

eb54

1 fill material in the plant area where settlement, unusual  
7 settlement had been observed?

3 A I think that was eventually one of the things he  
4 raised to me, but I believe that that was prompted by the  
5 Corps of Engineers' review at some point during 1980.

6 Q Did he tell you that he believed that another  
7 reason why the dike should be investigated is because the  
8 methods of placing and compacting the fill and the equipment  
9 used for placing and compacting the fill in the dike was the  
10 same as that that was used in the plant area where unusual  
11 settlement of the fill had been observed?

12 A Yes, sir, he mentioned that.

13 Q Do you recall a meeting on October 12th, 1980, with  
14 the staff and the Corps of Engineers at which you spoke and  
15 presented a Vu-graph?

16 A I believe the meeting to which you are referring  
17 was held in Room 422 of this building for the briefing of  
18 Mr. Vollmer. Is that correct?

19 Q I don't know.

20 A That is the meeting that comes to mind when you  
21 say October the 12th.

22 Q I believe Hari Singh was there and made some kind



eb55

1 of a presentation perhaps.

2 A Yes, sir, he was there at that meeting.

3 Q He showed some Vu-graphs?

4 A Yes, sir, he did.

5 Q Okay.

6 What was the purpose of that meeting?

7 A The purpose of that meeting was to present to  
8 Mr. Knight and Mr. Vollmer a review and a briefing of the  
9 reasons why the Corps felt that additional borings, sampling,  
10 and laboratory testing work was justified and necessary at  
11 the Midland plant.

12 Q Was Mr. Tedesco at the meeting?

13 A I don't recall whether he was there or not.

3.580

14 Q Do you recall what Hari Singh's presentation con-  
15 sisted of at that meeting?

16 A His presentation consisted of a number of slides  
17 with an explanation of the locations of the different plant  
18 structures that were going to be underpinned, with the presen-  
19 tation of the scheme for providing remedial support, and  
20 with the location of borings that would relate to an evalua-  
21 tion of the proposed method of support for those structures.  
22 That's essentially the information that I recall

eb56

1 he presented.

2 Q Can you recall any of that information in any more  
3 detail that you just related?

4 A No, sir, not at this time.

5 Q Do you recall what you said at that meeting?

6 A I think that my contribution was simply to outline  
7 what was going to be presented, to indicate that we were  
8 reviewing information and attempting to come to conclusions  
9 and make decisions that were generally outside of the normal  
10 review process in that we were evaluating fixes rather than  
11 evaluating compliance with normal engineering designs and  
12 construction.

13 I pointed out roughly the level of settlement  
14 that is expected -- that was expected, rather, when the con-  
15 struction permit was issued, the amount of settlement that  
16 would be normally acceptable by some authoritative people in  
17 the field, the level of settlement of the diesel generator  
18 building that had been measured at that point in time,  
19 indicating that we were operating in an area of uncertainty  
20 and that to come to conclusions in an area of uncertainty  
21 it's necessary to obtain information to assure yourself that  
22 you are in fact making the correct decisions or judgments.

eb57

1 Q Did anybody at that meeting cite any facts upon  
2 which the conclusion that the settlement prediction of the  
3 diesel generator building based upon preload was inaccurate?

4 A I don't believe so; no, sir.

5 Q Did anyone present any evidence that that settle-  
6 ment prediction might be unreliable?

7 A There was a presentation to indicate there could  
8 be uncertainty in the approach to predicting future settle-  
9 ment of the diesel generator building.

10 Q Tell me all you can recall about that.

11 A I believe Mr. Kane made that presentation. I  
12 believe that you probably have all of the slides that he  
13 presented at that particular meeting.

14 I think his presentation centered around the  
15 piezometer readings that had been obtained at various loca-  
16 tions, the location of the settlement monuments on the  
17 structure, and perhaps also in the free field, information  
18 on the levels of those piezometer readings centering around  
19 his concern that perhaps the settlement readings were not  
20 indicative of no future settlement over the 40-year life of  
21 the plant.

22 Q Of no future settlement or of no future settlement

eb58

1 in excess of that predicted on the basis of the surcharge?

2 A I would assume the latter would be correct.

3 Q Okay.

4 Joe Kane places a lot of emphasis then in that  
5 analysis of his on the piezometric behavior. Is that right?

6 A He places emphasis on that part of the data which,  
7 in his judgment, interpretation, questions the validity of  
8 other parts of the data.

9 In other words he does not find consistency between  
10 the piezometer data and the settlement data sufficient to  
11 allow him to judge that the settlement data is correct.

12 Q What is your understanding of the inconsistency  
13 that Joe Kane finds?

14 A As I understand his interpretation of piezometer  
15 levels versus time, the plots that have been submitted to him  
16 by Consumers Power, it's the behavior of that peizometer at  
17 the time the preload was removed and at the time the ground-  
18 water levels were changing due to the filling of the pond.  
19 He does not find those piezometer time readings to be con-  
20 sistent with his expectations for that period of time.

21 Q You wouldn't be able to evaluate that data with  
22 a view toward reaching that conclusion or verifying that



eb59

1 conclusion without knowing the type of piezometer that was  
2 used, could you?

3 A Well, I believe one could interpret the general  
4 trend of the piezometer. The absolute values that the  
5 piezometer gave may not be quantitatively useful for analysis.

6 Q Wouldn't you expect even the trend to differ if  
7 you were using a slow-response or lagging type piezometer  
8 as opposed to a sensitive, more rapidly responding piezometer,  
9 especially in situations where pore pressures might be dissi-  
10 pated rapidly?

11 A There would be a quantitative difference. I would  
12 assume that the direction of movement of the piezometer would  
13 be fairly well defined by the loading and water level condi-  
14 tions at that point in time.

15 Q Is it your impression as you sit here that  
16 Mr. Kane's problem with the piezometer data is more than just  
17 quantitative readings of the piezometers?

18 A Yes, that's my interpretation.

19 Q And can you be more specific then about what it is  
20 in addition to the quantitative behavior or the quantitative  
21 measurements of the piezometers that troubles Joe Kane?

22 A I really can't recall the details of his arguments

eb60

1 specifically. I believe it was observed that the piezometers  
2 fell-- Under no charge the piezometers continued to fall  
3 and then began to rise again with what is interpreted to be  
4 the influx of water from the pond causing the general ground-  
5 water level to increase.

6 I believe he feels that the piezometers should not  
7 have exhibited that dip late in the — at some point in time  
8 after the preload was removed.

9 Q Are you referring to some perceived dip in the  
10 piezometer level at some point in time after the time of  
11 removal of the surcharge?

12 A I believe that's correct. I could be wrong. I  
13 have not reviewed that.

14 Q And when I say "at some point in time after re-  
15 moval," I'm talking about some point in time removed from the  
16 time of removal of the surcharge as opposed to at the time  
17 or immediately after removal of the surcharge.

18 A It's my understanding the pattern of the piezo-  
19 meter time behavior at removal of the surcharge was a sharp  
20 dip in the piezometer readings, and shortly thereafter the  
21 piezometers rose to some essentially constant level and then  
22 began to fall for the second time.

eb61

1           And at that point, later point, the piezometers  
2 again rose to agree with the general groundwater -- inter-  
3 preted to be the general groundwater regime at that piezo-  
4 meter. That's my understanding. I could be incorrect.

5           Q       In your opinion would a drop in the piezometer  
6 level upon removal or at the time of removal of the surcharge  
7 be expected?

8           A       Yes.

9           Q       And that wouldn't be inconsistent with the soil  
10 beneath the building being in secondary consolidation at that  
11 time, would it?

12          A       It would not be inconsistent at that point or any  
13 other point in the consolidation process.

14          Q       In your opinion is Joseph Kane as objective in his  
15 current review of the Midland soils issue as he, as a techni-  
16 cal reviewer, ought to be?

17          A       I would need to know what you mean by "objective"  
18 in order to answer that. Would it be possible for you to  
19 expand on what you consider to be objective?

20          Q       Sure.

21                   What I mean by "objective" is someone who is  
22 totally unbiased and uninfluenced by anything other than

eb62

1 the legitimate technical concerns with which he should be  
2 concerned.

3 A I feel he is being completely objective in his  
4 work. It's consistent with my observation of his work in  
5 the past on other plants, tailings dams and what-have-you.

6 Q Are you then saying that you base your appraisal  
7 of his objectivity based upon his normal conduct or on his  
8 conduct as compared to what you believe an objective technical  
9 review ought to consist of?

10 A Both.

End c2

11 Q Okay.  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22

#3  
CR5759  
WRB/jbml

4.130

1 I have a page from one of your files, a page from  
2 like a spiral steno-notebook, recording staff agenda of date  
3 8/29/80. The page I'm looking at is the fourth page of that  
4 little compendium.

5 A Yes, sir. I believe I have the page.

6 Q There's a little statement down there that has a  
7 number one, and then it says "Overview" which is underscored,  
8 and then a colon.

9 Do you see that?

10 A Yes. The page "Staff Agenda", August 29, 1980?

11 Q Right.

12 There's a little comment that says:

13 "A: Borings info are to supplement, not  
14 replace field data."

15 Is that a notation you put there?

16 A Yes, it is.

17 Q And then it says:

18 "Settlement predictions from field data  
19 have been" -- something or other that I can't read --

20 "...unsuccessful at North Anna. Understanding  
21 of soil condition" -- something -- "considered", I  
22 believe.



jbn2 1

Can you tell me what that says?

2

A I can tell you what it means better than I can attempt to read it to you. Would that be satisfactory?

3

Q Sure.

4

First tell me what it means.

5

A This is notes -- This is a page from some notes that I prepared at a meeting in Midland, at which Consumers Power appealed the taking of borings and samplings and so forth. I wanted to jot down a few statements that I wanted to make prior to the Staff's rebuttal at that meeting. And I wanted to indicate that the borings that were being asked for were supplemental information and were not meant to replace or supplement the settlement data that had been obtained or the piezometer data that had been obtained or the boring data that had been obtained.

6

The second point I wanted to make is that in my experience settlement predictions based only on previous settlement data and extrapolation of that data had not been successful in my experience reviewing the North Anna application.

7

That covers points A and B. If you have other questions I will try to answer them.

8

jbn3

1

MR. ZAMARIN: Off the record.

2

(Whereupon a short discussion was held

3

off the record, after which the deposition was

4

again resumed.)

5

MR. ZAMARIN: On the record.

6

BY MR. ZAMARIN:

7

Q The problem with the settlement at North Anna, if

8

my recollection serves me correctly, was related to a material

9

known as a saprolite, is that correct?

10

A Yes, sir.

11

Q And is the behavior of the soils in the Midland

12

fill, with the glacial till type materials in the Midland fill

13

better known and better understood than the behavior of the

14

saprolite?

15

A On a broad basis there probably isn't much differ-

16

ence between the understanding of the fill beneath the diesel

17

generator building as a specific area, and the understanding of

18

the saprolite that existed beneath the pump house at North Anna.

19

Q My question was directed more toward the known

20

behavior of the type of materials. Can you answer the question

21

with that in mind?

22

A Yes, sir, I'll try.

jbn4 1

2 Certainly the behavior of clays, thin clays, fat  
3 clays, or what have you, has been studied in the laboratory by  
4 many investigators throughout the world. And there is reason-  
5 able agreement on how to engineer structures on clay materials.

6 Saprolites are highly variable, difficult to  
7 describe. There are not well accepted methods for investiga-  
8 tion, classification and for laboratory test of the -- quote--  
9 saprolites, at least as they exist at North Anna. And I have to  
10 qualify that because saprolites can be as clay and as plastic  
11 as the materials at Midland. But for North Anna that's not the  
12 case.

13 In idealized conditions certainly the clays at  
14 Midland are better known than -- quote -- saprolites as a  
15 classification of soils.

16 Q Are the sands at Midland better known than the  
17 saprolites at North Anna?

18 A The material characteristics of sands, the sands  
19 as a material, whether they exist at Midland or wherever, is  
20 better known in terms of engineering properties, behavior under  
21 load and what have you than are saprolites.

22 Q In your opinion, during the surcharge program was  
the water table level beneath the diesel generator building

jbn5 1 brought up to elevation 625?

2 A I don't have any knowledge of the water level dur-  
3 ing that time.

4 Q Do you have any opinion as to whether any of the  
5 soil beneath the diesel generator building is unsaturated?

6 A I don't have any personal knowledge whether it's  
7 saturated or not. There is reasonable doubt in my mind as to  
8 whether it is 100 percent saturated, and there's reasonable  
9 doubt in my mind that the piezometers gave an accurate repre-  
10 sentation of the groundwater levels in that area or other  
11 areas because it's not uncommon to have large errors in  
12 piezometer readings.

13 Q By that could it be that the piezometers indicated  
14 a groundwater level that was way below where it actually was?

15 A Probably not way below, but within a couple of feet.

16 Q You say you have reasonable doubt that that soil  
17 beneath the diesel generator building is 100 percent saturated.

18 Can you tell me the bases for your reasonable doubt?

19 A Well, the basis is that experience with unsaturated  
20 clays in the laboratory, attempts to test these unsaturated  
21 clays, requires from time to time the saturation of the sample  
22 before you begin to perform your tests on that clay. And it



jbn6 1 takes a long time at reasonably high differential pressures  
2 in order to force water through that clay sample and flush  
3 out the air.

4 I would suspect that if the clays which appear not  
5 to have been saturated when they were placed were to go through  
6 that same process in the field that it would take certainly  
7 many months to saturate them.

8 Q To your knowledge there aren't any clays that  
9 appear not to have been saturated when they were placed in the  
10 diesel generator building, are there?

11 A My perception and opinion that the clays that were  
12 extracted from the borrow pit area, many of them likely were  
13 dessicated, which would mean that they were not saturated.  
14 And from the descriptions of how the materials were handled  
15 from the borrow pit to the fill area, I doubt that they ever  
16 attained saturation during placement or prior to placement.  
17 And since the water only came into that area with the filling  
18 of the pond, I would assume that saturation had not been  
19 attained by a large part of the fill.

20 Q What do you base your statement on that the material  
21 from the borrow area was likely dessicated?

22 A I don't know that to be a fact. It's not uncommon



jbn7 1 to see the clays cracked in that area.

2 Q You're just guessing?

3 A I'm guessing.

4 Q Following the meeting on January 16, 1980, you  
5 made the statement to someone that dewatering was not the  
6 preferred technical position with regard to the diesel  
7 generator building and liquifaction potential. Is that  
8 correct, that you made that statement?

9 A You said after a meeting on January 16?

10 Q 1980.

11 A -- 1980?

12 I said dewatering was not a preferred --

13 Q Let me strike that. Let me start over. Let me  
14 start over again.

15 Did you ever say to anyone on or about January 16,  
16 1980, that dewatering was not the preferred technical position  
17 with regard to the diesel generator building?

18 A I don't recall making that statement, no, sir.

19 Q Have you ever been of the opinion that dewatering  
20 was not the preferred technical position with regard to the  
21 diesel generator building?

22 A Not with respect to the diesel generator building

jbn8 1 alone, no, sir.

2 Q Not with respect to the --

3 A Not with respect to the diesel generator building  
4 alone.

5 Q Well, have you ever been of the opinion that it was  
6 not the preferred technical position with respect to the diesel  
7 generator building along with something else?

8 A I don't recall making the statement, but I still  
9 hold the personal opinion that dewatering is a very cumbersome  
10 way to solve the problems at Midland.

11 Q What do you think would be a less cumbersome, better  
12 way to do it?

13 A I've never held a very concerned opinion about  
14 liquifaction of the sands incorporated in the fill at Midland  
15 to begin with. I've also thought that the cost of dewatering  
16 and maintaining dewatering for 40 years could have been better  
17 employed by other means of support that would not require de-  
18 watering.

19 Q Such as?

20 A Such as those support methods that are being used  
21 for the pump house and for the auxiliary building.

22 Q In your opinion a less cumbersome and better position.

jbn9 1 with regard to the diesel generator building and liquifaction  
2 potential would be to underpin the diesel generator building?

3 A That would be one way of alleviating any problems  
4 with liquifaction and of supporting the diesel generator  
5 building without dewatering.

6 Q I know that would be one way. But in your opinion  
7 is that a preferred way of doing it?

8 A I haven't attempted to classify the alternatives  
9 for that. But certainly underpinning would be one way.

10 Q In your opinion is there need to be concerned with  
11 liquifaction potential with regard to the diesel generator  
12 building?

13 A Not with the dewatering in place, no, sir.

14 Q What about absent dewatering or underpinning of the  
15 diesel generator building? Do you think liquifaction is a  
16 problem?

17 A Not if the diesel generator was underpinned, no.

18 Q I said absent underpinning and absent dewatering  
19 do you think liquifaction would be a problem?

20 A I don't believe it would be a serious problem, no.

21 Q You indicated that you thought dewatering was  
22 cumbersome and expensive to do and maintain over a 40-year

jbn10 1 life of the plant. Do you have an opinion as to anything else  
2 that's less cumbersome that would be a better approach to the  
3 liquifaction concern?

4 A Well, I can simply repeat my answer, that to provide  
5 support to the facilities such that liquifaction would not  
6 threaten their stability would be one way of eliminating the  
7 dewatering system completely.

8 Q Right.

9 And you answer that that would be one way of doing  
10 it. And I'm asking you if you are then stating that it is your  
11 opinion that that is a better way to do it than dewatering?

12 A It's my opinion, based on nothing but a perception  
13 of the problem, that that would be a better way, yes.

14 Q And you're aware that a July 1979 dewatering was  
15 proposed -- presented as a proposed fix by Consumers Power  
16 Company?

17 A Yes, I'm aware of that.

18 Q And when did you first tell anyone, if you have,  
19 at Consumers Power Company that you believed underpinning was a  
20 better fix than dewatering?

21 A I don't believe I expressed it exactly that way.  
22 I think I spoke to Sherif at one point and suggested that perhaps



jbnll 1 underpinning might be a worthwhile alternative.

2 Q When was that conversation?

3 A I think it was after a meeting we had here. I'm  
4 not sure. It was early in the review.

5 Q In 1979?

6 A I think it was after that preloading had been removed

7 Q Well, was it a year after, or are you talking about  
8 some time shortly after the preloading was removed in August of  
9 1979?

10 A Not too long after.

11 Q Did you review the underpinning option to the diesel  
12 generator building from the seismic standpoint?

13 A There has been no proposal for an underpinning  
14 operation, so I have done no review of that, no, sir.

15 Q Did you give that seismic standpoint any considera-  
16 tion or serious thought with regard to your impression that  
17 underpinning might be a better idea?

18 A Oh, sure.

19 Q And with that consideration from a seismic stand-  
20 point you still believe that underpinning is likely to be a  
21 better solution than dewatering?

22 A That's my opinion.



jbn12 1           Q       This mention to Sherif Afifi about the possibility  
2 of underpinning as opposed to dewatering, could that have been  
3 on January 16, 1980, following a meeting where you also made a  
4 comment to Walter Ferris, and then Sherif joined the conversa-  
5 tion?

6           A       Sherif was there, yes, as well as Walt Ferris.

7           Q       So does it refresh your recollection then that  
8 that was after a January, 1980, meeting?

9           A       It sounds about the right time frame. It was a  
10 meeting here, I believe in the adjacent room.

11          Q       All right.

12                   Why was it that this was never mentioned to  
13 Consumers between July, 1970, and January, 1980?

14          A       It's generally the role of NRC to review what is  
15 submitted to us, and not to suggest design measures that might  
16 be useful to the A-E's. As a matter of policy we do not attempt  
17 to affect designs that are submitted to us.

18          Q       It's my understanding that Joe Kane has stated that  
19 if settlement of the diesel generator building during the  
20 surcharge program had reached 6 to 18 inches, that he would have  
21 then believed that the soil in the diesel generator building  
22 was in secondary consolidation.

jbn13 1

Do you agree with that stated conclusion?

2

A I think that judgment is in the right range of what could have been expected there.

4

Q Based upon what?

5

A Based upon the kinds of settlements we see in embankments for dams, fills of different kinds that, say, are in the 60 to 70 percent standard Procter compaction. One would guess a 40 foot fill of this kind would settle maybe a foot, ten inches.

10

Q Total settlement, or under the surcharge settlement?

11

A Total settlement over the lifetime of the embankment.

13

Q I see.

14

What I'm talking about is settlement under the surcharge load, would you expect it to settle between six and 18 inches just during the surcharge load, and if it didn't then be unable to conclude that it was in secondary consolidation?

18

A Yes, under the surcharge load, which is a method of rapidly causing all of the settlement to occur over a very short period of time -- all the settlement that the fill is capable of exhibiting, and one would expect that settlement to be roughly in the range that we observe on other projects over

22

jbn14 1 the entire lifetime of that project.

2 So the analogy there I think is that the range of  
3 ten inches is a reasonable expectation for a 40 foot deep fill.

4 Q And stating that you've taken into account whatever  
5 compactive effort there may have been with regard to the fill  
6 as it was placed and--in your opinion, then, a prediction of  
7 at least six inches was necessary with regard to the surcharge  
8 program?

9 A I can't say that it's necessary with regard to the  
10 surcharge program. I think something beyond a few inches, like  
11 two or three inches, would be expected by most people.

12 Q And do you take into account the settlement that had  
13 been experienced in the diesel generator building prior to the  
14 surcharge?

15 A That number is a bit evasive. I really don't know  
16 that there is any hard measurement of the settlement since it  
17 was placed. I suspect there really isn't.

18 Q We know some minimum, don't we? There may have  
19 been some before measurements were taken. But don't we know  
20 at least what the minimum was?

21 A Yes.

22 Q And when you're talking about the settlement to be

jbn15 1 expected in that fill, do you also include the settlement that  
2 we know took place prior to the surcharge, whatever it was,  
3 three or four inches, prior to the surcharge, as well as the  
4 settlement during the surcharge?

5 A It would take that into consideration.

6 There's a complicating factor and that is that the  
7 fill -- as I understand, much of the plant fill was placed a  
8 number of years ago, that there was excavation into that fill,  
9 the building was constructed, and then again backfill was placed  
10 around the building. So this would allow some time for con-  
11 solidation, and certainly some time for rebound when the hole  
12 was dug for the building. Fill would then be placed adjacent  
13 to the structure. And at that point one would begin to record  
14 the settlement of the fill.

15 So what I'm trying to say is, forgetting all those  
16 complexities, the total settlement that one would expect would  
17 be in the range of a foot.

18 That doesn't help?

19 Q No, it does.

20 And you base that upon geotechnical --

21 A Based upon what's observed, embankments and dikes,  
22 what have you, that are compacted perhaps not much better than



jbn16 1 the plant fill.

2 Q Do you base it on anything else?

3 A No, sir.

4 Q After the settlement problem was discovered at the  
5 North Anna pump house, what, if any, remedial actions were  
6 undertaken?

7 A The remedial actions and the investigations to  
8 determine the continued safety of the pump house and dike  
9 included excavation of test pits adjacent to the pump house.  
10 It included two boring programs in the dike area itself, it  
11 included cutting of pipes adjacent to the pump house, installa-  
12 tion of flexible sleeves on four service water lines going to  
13 the pump house. It included an assessment of the pumps that  
14 were interior to the pump house to be assured that the settle-  
15 ment that tilted the pump house would not adversely affect  
16 those.

17 Analyses of the available flexibility of the  
18 varied pipes leading to the pump house was carried out. A  
19 continuous monitoring of the settlement was carried out and  
20 continues to be carried out.

21 The limits, the acceptance criteria for the limits  
22 of the settlement were established based on code values and the

jbnl7 1 technical specifications for operating the plant include  
2 limitation on those settlements.

3 Q What are the limitations on the settlements as  
4 contained in the tech spec?

5 A I believe the limitations now for the pump house  
6 itself are broken into I believe three parts. The first  
7 relates to the differential settlement between the pipes in  
8 the fill and the pump house itself; the second relates to the  
9 pipes that extend from the pump house into the spray pond;  
10 the third one relates to the differential settlement of the  
11 structure itself, so as to preclude the initiation of cracks  
12 in that structure.

13 There may be others that I've forgotten at this  
14 point.

15 Q Was there any underpinning done of the pump house  
16 at North Anna?

17 A No, sir.

18 Q Was the pump house at North Anna surcharged or  
19 preloaded?

20 A No, sir.

21 Q Is there a prediction today as to how much that  
22 pump house will settle in the future?

jbn18 1 A I believe predictions have been made, yes.

2 Q Do you believe those predictions are reliable?

3 A Probably not reliable enough to base the safety  
4 evaluation on. The preferred method proposed by the applicant  
5 is to monitor and correct if the settlement exceeds the values  
6 prescribed in the technical specification. I think a settle-  
7 ment estimate still remains somewhere in the PSAR, however.

8 Q Would settlement monitoring and a tech spec with  
9 regard to a maximum allowed before some further action is  
10 required be an acceptable approach with regard to the diesel  
11 generator building at Midland?

12 A I would assume at some point, probably at the OL  
13 review, a technical specification of that type would be in order  
14 yes, sir.

15 Q What about now? What's the difference between  
16 what's being done at the North Anna pump house and applying  
17 that same type of criteria with regard to the diesel generator  
18 building at Midland now?

19 A A technical specification is an item that goes  
20 along with the fueling and operating of the plant itself.  
21 There is no real risk to public health and safety of a plant  
22 that has no fuel in it and is not operating. So there would

jbn19 1 be no need for a technical specification at this point in  
2 time. There would be no reason not to anticipate and to  
3 develop such a technical specification. And it could be  
4 reviewed at this time and perhaps accepted as a proposed  
5 technical specification during operation of the plant.

6 Q What I'm asking you is if with regard to the diesel  
7 generator building it would be any less acceptable than with  
8 the pump house at North Anna to monitor settlement; have a  
9 settlement monitoring program with specified frequencies of  
10 settlement observers and a stated limit of allowable settlement  
11 as an acceptance criteria for the diesel generator building?

12 A That sounds like a useful and worthwhile effort.  
13 The amount of settlement, of course, would be expected to be  
14 rationally tied to codes that would apply to the utilities and  
15 other functional components of the diesel generator building.

16 Q If that were done, would that be an acceptable  
17 solution in your opinion?

18 A It would certainly be a part of an acceptable  
19 solution. I really cannot speak for the reviewers who would be  
20 looking at this detail. They may either wish more or less,  
21 depending on what other hazards they might uncover with respect  
22 to settlement alone being the controlling criteria.

5.040



jbr.20 1 Q I'm now looking at what you described with regard  
2 to the North Anna pump house, and I'm asking for your opinion  
3 as the Section Chief in your area as to whether you believe  
4 that a similar type of approach as that which is being applied  
5 to the North Anna pump house would be an acceptable approach  
6 with regard to the diesel generator building settlement at  
7 Midland?

8 A I believe it could be, yes, sir.

9 Q Could be or would be?

10 A Could be.

11 Q Why won't you say that it would be?

12 A I have not reviewed the basis on which the technical  
13 specifications will be developed. I have not reviewed with our  
14 systems people the redundancy available for the diesel  
15 generator building.

16 We did have adequate redundancy available at  
17 North Anna. And whether or not we are putting all of our eggs  
18 in the settlement monitoring program or whether we have avail-  
19 able to us alternative ways of providing safety in that plant,  
20 I don't know. It would be based on these considerations that  
21 the acceptability of a single criterion would be accepted.

22 Q Let me get the question on the record, if you please

03 cbl  
1                   What was the redundancy that is available at North  
2 Anna?

3           A        The redundancy available at North Anna involves  
4 the availability of two Category I sources of water that can  
5 be supplied to the reactors at that plant. There is a ser-  
6 vice water reservoir with a spray cooling arrangement. There  
7 is also North Anna Lake which has Category I pumps, electrical  
8 buses, flexible connections, monitoring of hazardous settle-  
9 ment of the turbine building that is completely independent  
10 of the pumphouse itself.

11                   And one of reasons why simply watching, monitoring  
12 the settlement is acceptable is because even if that should  
13 not prove satisfactory there is a completely redundant system  
14 to supply water to that plant.

15                   And I can't answer you with respect to the diesel  
16 generator building whether an analogous situation occurs  
17 there.

18                   MR. ZAMARIN: Could you read the answer back,  
19 please?

20                   (Whereupon, the Reporter read from the record  
21 as requested.)

22                   BY MR. ZAMARIN:

eb2

1 Q Are you saying that the North Anna pumphouse could  
2 be taken completely out of service without any effect on the  
3 operation of the plant?

4 A It could be taken completely out of service with-  
5 out affecting the ability to shut that plant down under  
6 earthquake conditions; yes, sir.

7 Q Under both OBE and SSE conditions?

8 A Yes, sir.

9 Q Has the staff, to your knowledge, considered some  
10 type of similar monitoring program with regard to the diesel  
11 generator building at Midland?

12 A I feel the staff is anxiously awaiting commitments  
13 to that effect at this time, at this point in time.

14 Q Anxiously awaiting commitments to that effect?

15 A Anxiously awaiting commitments from Consumers  
16 Power to provide such monitoring.

17 Q Has that been discussed with Consumers, to your  
18 knowledge?

19 A No, sir. You're, I believe, asking my opinion.

20 Q That's right, I am. I'm just asking you if you  
21 know if that has been discussed with them.

22 A I don't know whether it has or not; no, sir.

eb3

1 Q By your answer do you indicate that the staff has  
2 considered a settlement monitoring program as an acceptance  
3 criteria with regard to the settlement problem of the diesel  
4 generator building?

5 A If it is proposed by Consumers Power we would  
6 certainly evaluate it in light of the other acceptance cri-  
7 teria; yes, sir.

8 Q But beyond that it has not been, to your knowledge,  
9 considered to date by the staff as a possible acceptance  
10 criteria?

11 A No, sir. We just review what's submitted to us.

12 Q Do you know whether the North Anna pumphouse is  
13 the normal source of coolant to the primary system at North  
14 Anna?

15 A Yes, I do.

16 Q Is it?

17 A No, sir.

18 Q What is the primary source of coolant?

19 A The primary source of coolant for normal plant  
20 operation is Lake Anna.

21 Q Is there a secondary system at North Anna? What  
22 kind of a reactor is North Anna?



eb4

1           A       I believe it's a Westinghouse PWR, a pressurized  
2 reactor.

3           Q       So it would have a secondary system; right?  
4                    You look puzzled.

5           A       Well, it's all in containment. I guess-- I'm not  
6 familiar with the systems terminology.

7                    The water used to cool the condensers at North  
8 Anna comes from the North Anna Lake. The pond or reservoir  
9 with spray cooling is used for emergency purposes to shut the  
10 plant down. And the pumphouse contains redundant Category I  
11 pumps to supply water in case of an emergency.

12          Q       I see.

13                    So the only time then that the pumphouse pumps  
14 would be used would be in the event of a failure of some  
15 primary pumps for emergency cooling?

16          A       I can't tell you when they're used. I think  
17 they're used as a matter of keeping them exercised from time  
18 to time in the normal cooling operation as well.

19          Q       What is the function of the diesel generator  
20 building at Midland, to your knowledge?

21          A       What is the function of it?

22          Q       Yes.

eb5

1 A To supply emergency power in case of a loss of off-  
2 site power.

3 Q In your opinion that would not be analogous to the  
4 use of the pumphouse at North Anna?

5 A No, it would not be analogous.

6 Q Why not?

7 A The North Anna pumphouse is located perhaps a  
8 quarter of a mile from the other Category I pumphouse and it  
9 would be difficult to imagine a problem occurring at one  
10 pumphouse that would affect the other pumphouse.

11 Although there are redundant diesel engines within  
12 the Midland diesel generator building itself, we don't have  
13 generators, we don't have bus lines or things of this kind.  
14 The building itself houses both of those redundant systems.

15 So to me the North Anna pumphouse situation and  
16 the ability to supply water to that pumphouse is different  
17 than the single building you have to supply emergency power  
18 at Midland.

19 Q You're aware, are you not, that each of the diesel  
20 generators are founded independently of the foundation of  
21 the diesel generator building?

22 A Yes, sir.

eb6

1 Q And that each one of the diesel generators is  
2 founded independently of each other diesel generator?

3 A Each one has a pedestal on which it's mounted;  
4 yes, sir.

5 Q Are you saying that there are two North Anna pump-  
6 houses that have the identical function except that one is  
7 a redundant system to the other, or a backup system to the  
8 other?

9 A I believe I can answer Yes without confusing your  
10 interpretation.

11 Q All right. .

12 And in addition to those two there is yet a third  
13 source of cooling water?

14 A No, sir.

15 Q All right.

16 What happens if there's a need for the North Anna  
17 pumphouse that we were talking about where the settlement  
18 monitoring is going on and the thing f. it out won't  
19 work?

20 A Okay.

21 If that should be the situation there is another  
22 pumphouse that pumps water from North Anna Lake. That

eb7

1 pumphouse and the pumps and the electrical connections are  
2 all Category I. It can pump water from a different water  
3 source, the different water source being Lake Anna. It pumps  
4 it through a different water line from a different side of the  
5 reactor into the reactor building to provide cooling for  
6 those -- whatever is necessary.

7 Q So then there are three systems for providing water.  
8 There's the pumphouse with the settlement monitoring. There's  
9 the pumphouse you just described. And then there's some-  
10 thing that does it under normal operation. Is that right?

11 A Let me describe the system one more time and I  
12 think you'll understand.

13 Q I doubt it. I'm trying really hard.

14 (Laughter.)

15 A The North Anna pumphouse that has been settling  
16 contains within it redundant pumps. There are redundant water  
17 lines to that pumphouse. But there's only one pumphouse  
18 containing those redundant pumps.

19 There is a second pumphouse that's located about  
20 a quarter of a mile from that pumphouse. It is located on  
21 the banks of North Anna Lake. It contains one Category I  
22 pump that supplies water through one pipe that goes through --



eb3

1 goes under the turbine building and enters the reactor and  
2 is capable of supplying water from North Anna Lake to the  
3 reactors in an emergency situation.

4 Q What would supply water to the reactors in a non-  
5 emergency situation, in the normal operating situation?

6 A There are pumps in the pumphouse at North Anna  
7 located on the banks of the North Anna Lake that supply normal  
8 cooling water for cooling condensers and normal operation of  
9 the plant, non-emergency conditions.

10 Q I see.

11 So if something were to happen to the pumphouse  
12 on the banks of the North Anna Lake, then all you would have  
13 would be the pumphouse that is being monitored for settlement.  
14 Right?

15 A That's correct.

16 Q And wouldn't that be an analogous situation to the  
17 diesel generator building at Midland where, if something  
18 happened to the offsite source of power, all that you would  
19 have would be the diesel generators to supply power?

20 A No, sir.

21 Q I mean you're looking at two pumps within the same  
22 building on the banks of that lake. Right?

ab9

1 A On the banks of the pond.

2 Q On the banks of the pond.

3 So if I flatten that building all you've got left  
4 is that pumphouse that's sinking, right?

5 A No, sir, that is the pumphouse. The one with the  
6 two pumps in it that are redundant is the one that is sinking.

7 Q I see.

8 The one that's sinking is the one that's on the  
9 banks of the North Anna pond?

10 A I'll distinguish between the two bodies. Let's  
11 call the small one the pond and the large one the lake. There  
12 are two pumps on the pond in one building. That is sinking.

13 There is one pump in the pumphouse on the lake  
14 that is not sinking.

15 Q Okay.

16 So you've got a pump on a pond in a house which  
17 is sinking that supplies the normal cooling water or the  
18 cooling water to the reactor under normal conditions?

19 A May I supply you with an exhibit?

20 Q Yes, please.

21 MR. ZAMARIN: I am marking Exhibit Number 12,  
22 and this is the diagram that you have drawn with regard to

eb10

1 the house on the pond and the house on the lake and the  
2 pump that will sink and the pump that won't.

3 (Whereupon, the document  
4 referred to was marked  
5 as Exhibit Number 12  
6 for identification.)

7 MR. ZAMARIN: I am marking as Pumphouse S the one  
8 that is undergoing settlement.

9 BY MR. ZAMARIN:

10 Q Have I marked that correctly? That's the one  
11 that is on the spray pond reservoir?

12 A That's correct.

13 Q And then the other pumphouse is up near the top  
14 of this, and that is shown as a red-- The emergency cooling  
15 pump within that pumphouse is shown as a red square, and  
16 that's up on the banks of North Anna Lake. Right?

17 A To the best of my memory, yes, sir.

18 Q Okay.

19 If something were to take out the pumphouse on  
20 the banks of the North Anna Lake so that that pump is not  
21 available for emergency cooling water, then wouldn't you have  
22 an analogous situation with regard to the pumphouse that is

eb11

1 settling as you would have with the diesel generator building  
2 at Midland in the event offsite power were lost at Midland  
3 with regard to a shutdown of the plant?

4 A I don't believe they are analogous because your  
5 hypothesis of loss of that pumphouse is something over which  
6 the applicant has control. The loss of offsite power is  
7 something that the applicant has no control over. So I feel  
8 that your hypothesis of loss of that pumphouse would be the  
9 same as loss of the diesel generator building, period.

10 Q How does the applicant have control over the loss  
11 of the pumphouse that I just tried to wipe off here, the one  
12 that's on the banks of North Anna Lake?

13 A Well, he has designed it for survival under all  
14 environmental conditions expected to occur at that plant,  
15 including the earthquake.

16 Q And is that structure that it's in a Category I  
17 structure?

18 A Yes, it's classified in the same manner as the  
19 diesel generator building.

20 Q Does it depend on offsite power?

21 A No, sir.

22 Q Where does it get its power?



eb12

1 A From the diesel generator building.

2 Q Not from the diesel generator building at Midland.

3 (Laughter.)

4 A I believe that section of the auxiliary building  
5 that contains the diesel generators is also Category I. It  
6 is not a separate building, however; it is a continuation  
7 of a structure that-- Part of its function is to house the  
8 diesel generators.

9 Q Did you ever have any conversations with Joe Kane  
10 about what was needed with regard to the preparation of  
11 testimony for the upcoming hearing?

12 A No, sir, I haven't. I honestly don't know what's  
13 required for those hearings.

14 Q Do you believe that the level of the load that was  
15 applied to the diesel generator building in surcharging was  
16 sufficient?

17 A Is that the end of the question?

18 Q Yes.

19 A To answer "sufficient" one must decide what is  
20 meant by "sufficient" to do what. I presume that you mean  
21 sufficient to consolidate the fill into secondary consolida-  
22 tion in the time frame in which the load was applied to that

eb13

1 fill.

2 Q Yes, sir.

3 A I really don't know the answer to that. That would  
4 require some detailed review which I'm assuming is being  
5 taken care of by the Corps or Mr. Kane.

6 Q Does that require the kind of calculations that I  
7 understand Willis Walker of the Tulsa District made?

8 A I'm not aware of those calculations.

9 Q All right. . .

10 Has Joe Kane conferred with you with regard to  
11 underpinnings at the Midland site?

12 A We have probably discussed it. I don't recall  
13 anything specific about the discussion.

14 Q Do you agree with the basic philosophy or basic  
15 concept of the fix that has been proposed with regard to the  
16 service water pump structure?

17 A No.

18 Q In what way do you disagree?

19 A I disagree in the same way that I disagreed in the  
20 previous deposition and that is that the pumphouse will not  
21 be supported in the way that was anticipated when it was  
22 designed, when the stresses were determined and when the

eb14

1 reinforcing bar layout was made, and therefore it will not be  
2 supported in the same way and therefore will not have the  
3 stresses that were anticipated under dead loads, live loads,  
4 earthquake loads or what-have-you.

5 Q And is it your opinion then that it is not possible  
6 within the limits of the concept of the proposed fix to  
7 satisfy the intent of those original design criteria?

8 A I believe there is a risk that they will not be  
9 satisfied, yes, sir.

10 Q And what is that risk?

C4

11 A That risk is that the changed support conditions,  
12 the changed response under earthquake loads will induce  
13 stresses in the structures that are greater than those that  
14 were anticipated or allowed by applicable design codes.

5.500

15 Q Would that same problem exist with regard to under-  
16 pinning the diesel generator building which I believe you  
17 felt was a reasonable proposal?

18 A It could exist, depending upon the arrangement of  
19 the underpinning.

20 Q Would that be true also with regard to the service  
21 water pump structure, that it could exist, depending upon  
22 the arrangement of the underpinning?

eb15

1 A Yes.

2 Q So then is it true that you don't have any problem  
3 with the basic concept of the fix, that it would simply have  
4 to have an arrangement that would take into consideration  
5 these concerns of yours?

6 A I interpreted "basic concept" as the scheme to  
7 support it at the cantilevered dam rather than uniformly over  
8 the entire plane of the structure that's in contact with the  
9 fill.

10 Q Then you did interpret my question correctly.  
11 Do you agree with the basic concept of the fix  
12 proposed for the electrical penetration area of the auxiliary  
13 building?

14 A I have difficulty identifying in my mind what is  
15 an electrical penetration area versus what is an auxiliary  
16 building and a steam valve chamber.

17 Let me answer by saying that the scheme that we  
18 have seen with respect to the location of the caissons would  
19 give me the same difficulty as has been discussed for the  
20 service water pumphouse.

21 Q Has a structural analysis been done in that regard,  
22 to your knowledge, with either the auxiliary building or the



eb16

1 service water pump structure?

2 A I don't know the answer to that.

3 Q Is that in your area of review?

4 A No, sir.

5 Q Do you agree with the basic concept of the fix  
6 proposed for the tank farm area?

7 A No, sir.

8 Q Why not?

9 A Because the design and construction for the support  
10 of those tanks is unconservative with respect to usual means  
11 of support of free-standing tanks related to other nuclear  
12 reactor applications, and also because the fill supporting  
13 those tanks has not been shown to conform to original design  
14 conditions and that no remedial measures are proposed to  
15 upgrade the reliability of the foundations for those tanks.

16 Q Do you believe that based upon the involvement  
17 that you have in the proposed fixes of the entire soils  
18 settlement question at Midland that you are qualified and in  
19 a position and informed enough to state a conclusion with  
20 regard to whether, based upon information provided and fixes  
21 proposed by Consumers Power Company, there exists or  
22 does not exist reasonable assurance that the plant would be

eb17

1 constructed and operated in a manner that would not endanger  
2 the health and safety of the public?

3 A May I ask that the question be repeated? It was  
4 long. I will try to find the heart of it.

5 MR. ZAMARIN: Would you read the question, please?

6 (Whereupon, the Reporter read from the record  
7 as requested.)

8 THE WITNESS: I'm not in a position at this point  
9 in time to formulate that conclusion. I think the review is  
10 still underway. Much has yet to be learned about the details  
11 of the fixes and the initial conditions that are present  
12 there, and it would be premature and presumptuous of me to  
13 answer in any other way than No. I am not now in a position  
14 to form that conclusion.

15 BY MR. ZAMARIN:

16 Q Do you believe that on December 6th, 1979, you  
17 were in a position to form that conclusion?

18 A No, sir.

19 Q Has there been some recent reorganization of NRR  
20 that has impacted on the EGEB?

21 A By "recent" do you mean within the past month, or  
22 the past year?

eb18

1 Q Since October 1979. Within the past year.

2 A Time passes so rapidly. I believe there has been  
3 a reorganization of NRR within the past year. I can't  
4 remember when the proposal and the actual effective date  
5 occurred at this time.

6 Q Do you recall how many reviewers there were in the  
7 Geotechnical Engineering Section in the fall of 1979?

8 A Yes.

9 Q How many?

10 A I believe there were three or four.

11 Q Possibly three beside yourself?

12 A Yes.

13 Q And how many reviewers are there now in the  
14 Hydrologic and Geotechnical Engineering Branch?

15 A I believe I tried to list them in my previous  
16 deposition and I think there's in the neighborhood of 17.

17 Q 17?

18 A Yes, sir.

19 Q Is there still a Geotechnical Engineering Section?

20 A Yes, sir, there is.

21 Q And how many reviewers are there in the Geotechnical  
22 Engineering Section?

eb19

1           A       There are presently seven in the Geotechnical  
2 Engineering Section.

3           Q       And is the function and the duties and responsi-  
4 bilities of the Geotechnical Engineering Section today any  
5 more or less expansive than it was in the fall of 1979?

6           A       No, sir, it's identical.

7           Q       When did the staffing of the Geotechnical  
8 Engineering Section increase from three reviewers and you as  
9 section leader to its current seven?

10          A       Some joined our section when the Office of Nuclear  
11 Reactor Regulation was reorganized, I think officially in  
12 the spring of 1980.

13          Q       Where did they come from?

14          A       They came from what was then the Division of  
15 Operating Reactors.

16          Q       And they didn't carry with them any responsibilities  
17 that they had had prior to the reorganization, did they?

18          A       There was some work that had to be finished, yes.

19          Q       Is it all done now?

20          A       I believe we have that wrapped up.

21          Q       Okay.

22          A       The rest of them came as a result of recruiting



eb20

1 actions that we have been taking for the last 18 months.

2 Q Do you believe that the current staffing of the  
3 Geotechnical Engineering Section is sufficient to handle the  
4 present and near-term anticipated workload of that section  
5 without the need for engagement of outside consultants?

6 A No. I feel that outside consultants are beneficial  
7 and necessary for handling the esoteric items that come up  
8 such as underpinning, dispersive clays and other areas that  
9 require unique expertise.

10 MR. ZAMARIN: I have nothing further, and have  
11 concluded this deposition interrogation of Mr. Heller, with  
12 the exception of one possible area that I have not inquired  
13 into fully, and that has to do with certain manpower issues.  
14 And my understanding is that at some time in the future if  
15 we should perceive the need to go into that area, then there  
16 would be no objection to resuming interrogation of Mr. Heller,  
17 limited to that one area.

18 Is that right?

19 MR. JONES: That's my understanding.

20 MR. ZAMARIN: With that then we're done.

21 Do you have any questions?

22 MR. JONES: No questions.

eb21

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(Whereupon, at 1:33 p.m., the taking of the deposition was concluded.)