

NUCLEAR REGULATORY COMMISSION

ORIGINAL

In the Matter of:

HOUSTON LIGHTING & POWER COMPANY, et al.)

) DOCKET NOS. 50-498 OL

South Texas Nuclear Project Units 1 & 2)

50-499 OL

DATE: June 23, 1981

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AT: San Antonio, Texas



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UNITED STATES OF AMERICA

BEFORE THE
NUCLEAR REGULATORY COMMISSION

In the Matter of:)
HOUSTON LIGHTING & POWER) Docket Nos. 50-498 OL
COMPANY, ET AL.) 50-499 OL
South Texas Nuclear Project)
Units 1 and 2)

Bankruptcy Courtroom
Third Floor
Federal Building
San Antonio, Texas

Tuesday,
June 23, 1981

PURSUANT TO ADJOURNMENT, the above-entitled
matter came on for further hearing at 9:00 a.m.

APPEARANCES:

Board Members:

CHARLES BECHHOEFER, ESQ., Chairman
Administrative Judge
Atomic Safety & Licensing Board
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

ERNEST E. HILL, Nuclear Engineer
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C O N T E N T S

<u>WITNESSES</u>	<u>DIRECT</u>	<u>CROSS</u>	<u>REDIRECT</u>	<u>RECROSS</u>	<u>BOARD EXAM.</u>
C. Bernt Pettersson, Timothy K. Logan, Charles Hedges and W. Stephen McKay (A Panel - resumed)	---				
By Mr. Jordan	5919			6125	
By Mr. Sinkin	5969			6128	
By Mr. Gutierrez	6033			6131	
By Judge Hill					6077
By Judge Lamb					6085
By Judge Bechhoefer					6113
By Mr. Gutterman			6123		
C. Bernt Pettersson and Jon G. White (A Panel)					
By Mr. Gutterman	6139				
By Mr. Gay	6163				
By Mr. Sinkin	6198				
By Mr. Gutierrez	6202				
By Judge Lamb					6203
By Judge Hill					6209
By Judge Bechhoefer					6209
By Judge Lamb					6212
By Judge Bechhoefer					6212
By Mr. Gutierrez				6215	
By Judge Hill					6217

E X H I B I T S

<u>NUMBER</u>	<u>IDENTIFIED</u>	<u>IN EVIDENCE</u>
CCANP No. 24	5986	6004
CCANP No. 25	6004	6004
CCANP No. 26	6004	6004
CCANP No. 27	6004	6004
CCANP No. 28	6004	6004
CCANP No. 29	6005	Not offered
CCANP No. 30	6026	6030

1-1

P R O C E E D I N G S

9:07 a.m.

JUDGE BECHHOEFER: On the record.

Before we begin the cross-examination of the backfill panel, are there any preliminary matters anyone wishes to raise?

(No response.)

JUDGE BECHHOEFER: If not, we will proceed to the cross-examination.

Off the record for a minute.

(Discussion off the record.)

JUDGE BECHHOEFER: Back on the record.

Mr. Jordan or Mr. Sinkin, you may proceed.

MR. JORDAN: Thank you.

Whereupon,

C. BERNT PETTERSSON

TIMOTHY K. LOGAN

CHARLES HEDGES

W. STEPHEN MCKAY

having been previously duly cautioned and sworn to tell the truth, the whole truth, and nothing but the truth, resumed the stand and testified further as follows:

CROSS-EXAMINATION

BY MR. JORDAN:

Q Good morning, gentlemen. My name is Bill

-2 1 Jordan. I'll be asking you some questions this morning
2 about your testimony.

3 Mr. Pettersson, I'd like to talk to you.
4 Beginning on Page 2 of your testimony, Line 7, you
5 describe what your position is at the South Texas Project.

6 I want to be clear -- first, you are employed
7 by Brown & Root?

8 BY WITNESS PETTERSSON:

9 A Yes, I am.

10 Q It says that you are now the assistant
11 discipline project engineer, civil structural discipline
12 for STP.

13 It then says that since 1974 you've been a
14 group leader for geotechnical engineering.

15 I draw from that that you have been in this
16 assistant discipline project engineer position since 1974;
17 am I correct?

18 BY WITNESS PETTERSSON:

19 A When I originally joined Brown & Root and
20 started to work on the South Texas Project in 1974, I
21 worked as a group leader for the geotechnical engineering.

22 Q I'm sorry; for what?

23 BY WITNESS PETTERSSON:

24 A As a group leader for geotechnical engineering.

25 Q Okay. That's geotechnical engineering?

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1 BY WITNESS PETTERSSON:

2 A That is correct. Yes.

3 Q Okay. Thank you.

4 BY WITNESS PETTERSSON:

5 A Approximately two years ago I was also
6 appointed as assistant discipline project engineer to
7 the civil structural discipline project engineer.

8 As the assistant discipline project engineer
9 I maintain my function as the group leader for geotechnical
10 engineer.

11 Q So that your responsibilities which you
12 describe in the third paragraph of that -- I mean the
13 third sentence of that paragraph, have been the same
14 since 1974?

15 BY WITNESS PETTERSSON:

16 A That is correct. Yes. They are somewhat
17 broad as an assistant discipline project engineer, but
18 as far as geotechnical engineering the functions have
19 been the same, the responsibilities have been the same.

20 Q Turning to you, Mr. Logan, same page, project
21 QA supervisor for HL&P's W. A. Parish Unit No. 8 Project,
22 how long have you been in that position?

23 BY WITNESS LOGAN:

24 A Approximately a year.

25 Q One year?

1-4

1 BY WITNESS LOGAN:

2 A Yes.

3 Q What's the status of that plant?

4 BY WITNESS LOGAN:

5 A It's approximately 40 percent complete.

6 Q Can you tell us who's building it?

7 BY WITNESS LOGAN:

8 A EBASCO is building it.

9 Q That's EBASCO. Okay.

10 I'm sure this must be elsewhere, but I think
11 for me to follow this it would be helpful if you would
12 tell me what your position was before you were at the
13 W. A. Parish Unit.

14 BY WITNESS LOGAN:

15 A I was a site supervisor in QA for the Allens
16 Creek Project.

17 Q For what period of time?

18 BY WITNESS LOGAN:

19 A From, let's see, June of 1978, when I left
20 South Texas, until I was named the project QA supervisor
21 for W. A. Parish in 1979.

22 Q And then your position at STP prior to June
23 1978 was what?

24 BY WITNESS LOGAN:

25 A I held two positions. When I was first at

I-5
1 STP in June of '76 I was a senior engineer, and then in
2 June of 1977 I was promoted to lead engineer.

3 Q Were these positions in quality assurance?

4 BY WITNESS LOGAN:

5 A Yes, sir, they were.

6 Q What's a lead engineer? Or, in your particular
7 case, what was a lead engineer?

8 BY WITNESS LOGAN:

9 A I supervised the civil structural discipline
10 in QA. It's sort of a similar position to the one that
11 Robert Carvel holds now, project QA supervisor.

12 Q I see. Could you give us the -- explain the
13 range of the things you were responsible for?

14 BY WITNESS LOGAN:

15 A I was responsible for surveillance of concrete,
16 structural steel, backfill activities, all the other
17 civil structural related things.

18 Q And that was as lead engineer; was the same
19 true in your senior engineer position?

20 BY WITNESS LOGAN:

21 A I performed that surveillance, and I was not
22 a supervisor at that time.

23 Q I'm sorry, I'm not sure which time you're
24 talking about.

25 / / /

1-6

1 BY WITNESS LOGAN:

2 A As a senior engineer I didn't supervise, but
3 I performed the surveillance just as the other people in
4 the civil discipline in QA did.

5 Q As a lead engineer, which was your first
6 position, you supervised it?

7 BY WITNESS LOGAN:

8 A No. My first position -- I need to make
9 myself clear.

10 My first position was senior engineer.

11 Q Okay. I think you just cleared it up.
12 Thank you.

13 BY WITNESS LOGAN:

14 A All right.

15 Q Mr. Hedges --

16 BY WITNESS HEDGES:

17 A Yes, sir. Hedges.

18 Q Thank you. I would like you, if you would,
19 on Page 2 to put some dates on this.

20 You said you've been the project manager
21 for WCC's work at STP for the past five and a half years,
22 and that brought me back to 1975. Is that correct?

23 BY WITNESS HEDGES:

24 A Yes. I took over the project and the project
25 managership in, I believe, September 1975.

1-7

1 Q And you've been responsible, then, for WCC's
2 work on the project since that time?

3 BY WITNESS HEDGES:

4 A That's correct.

5 Q And you're still in the same position?

6 BY WITNESS HEDGES:

7 A That's correct.

8 Q You said here that the two and a half years
9 before that you were periodically involved in the site
10 studies and preparation of the STP PSAR documents.

11 What was your position in that period of
12 time?

13 BY WITNESS HEDGES:

14 A Prior to my taking over the project manager-
15 ship of the South Texas Project for Woodward-Clyde
16 Consultants work, the work on the project was performed
17 in our California, San Francisco and Oakland offices.

18 In September of 1973 I became involved as
19 what you might say consultant to aid them in developing
20 the PSAR and the design studies. I went --

21 Q By "them," who do you mean?

22 BY WITNESS HEDGES:

23 A The Oakland office of Woodward-Clyde
24 Consultants.

25 I went to Oakland and spent six months in

1-8

1 Oakland working on the project, the latter part of '73,
2 early part of '74.

3 After that I had a periodic involvement in
4 review or evaluation of certain items.

5 Q Were you with WCC in Texas at the time?

6 BY WITNESS HEDGES:

7 A No. My office is in New Orleans. I came to
8 the New Orleans office in July 1973.

9 Q Okay. I see. So you were -- what wasn't
10 clear was that you were with WCC at the time you were
11 working with the California office?

12 BY WITNESS HEDGES:

13 A That's correct.

14 Q Now, you said here that as project manager
15 for WCC you supervise other task leaders and staff
16 engineers.

17 Are those WCC people?

18 BY WITNESS HEDGES:

19 A That's correct. WCC people.

20 Q Mr. McKay, I want to ask you first, you say
21 you're the corporate manager for quality assurance, QA,
22 at PTL.

23 BY WITNESS MCKAY:

24 A That's correct.

25 Q Could you explain to us what PTL is; the

1-9

1 full range of what it does?

2 BY WITNESS MCKAY:

3 A PTL is an independent inspection-testing
4 company. It has been in business for approximately 100
5 years. We do inspection and testing of various materials,
6 including construction materials.

7 We do a wide range from concrete, soils,
8 structural steel, nondestructive examination, specialized
9 testing on consumer products.

10 Q How long have you been with PTL?

11 BY WITNESS MCKAY:

12 A A little over 19 years.

13 Q In this work that PTL does, is it -- in the
14 case of nuclear power, at least, it's involved in the
15 inspection of these plants to federally, I guess,
16 essentially endorse the standards.

17 Is that a common function for PTL?

18 BY WITNESS MCKAY:

19 A Yes, it is. We have projects all over the
20 United States.

21 Q What are you referring to?

22 BY WITNESS MCKAY:

23 A I'm referring to nuclear projects.

24 Q I'm really asking a broader question, as to
25 whether PTL is involved in inspections for compliance

1-10

1 with federal standards in other areas as well.

2 BY WITNESS MCKAY:

3 A Yes, we are. We do work associated with the
4 Department of Energy, with the Department of Defense,
5 various state highway departments; that type work.

6 Q What is your role as corporate manager for QA?
7 What's the scope of that position?

8 BY WITNESS MCKAY:

9 A It's the over-all responsibility to develop
10 and to assure implementation of the PTL quality
11 assurance program.

12 Q Across the board in all of these programs?

13 BY WITNESS MCKAY:

14 A Across the board, yes.

15 Q Are you familiar with the Federal Mobile Home
16 Construction & Safety Standards Program?

17 BY WITNESS MCKAY:

18 A No, I'm not.

19 Q You are not. You're not familiar with
20 whether PTL was involved in that?

21 BY WITNESS MCKAY:

22 A PTL was involved with it, but I personally
23 am not familiar with that particular code.

24 Q You're not familiar with the code?

25 / / /

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1 BY WITNESS MCKAY:

2 A That's right.

3 Q Are you familiar with PTL's involvement?

4 BY WITNESS MCKAY:

5 A Well, I --

6 MR. REIS: I object, Mr. Chairman, unless
7 Mr. Jordan can show the relevancy of the Mobile Home Code
8 to this matter.

9 MR. JORDAN: Obviously the relevancy is not
10 the Mobile Home Code, but the PTL's participation in the
11 program, and I would elicit a few answers from the witness
12 concerning PTL's involvement and the ultimate result of
13 PTL's involvement gets to the quality of PTL as an
14 inspection organization.

15 (Board conference.)

16 JUDGE BECHHOEFER: I think since he already
17 said he didn't know -- had no association with that,
18 we'll sustain --

19 MR. JORDAN: Well, I don't agree with that
20 characterization of the record, Your Honor.

21 He said he didn't know the Mobile Home Code.
22 He's familiar with PTL's involvement in the program, I
23 understand; that was my understanding of what he said.

24 WITNESS MCKAY: What I said was I know that
25 PTL was involved in the Mobile Home Certification Program.

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1 I personally had nothing to do with that particular
2 program and do not know any details.

3 JUDGE BECHHOEFER: Yes. I think with that,
4 we'll sustain the objection for further questions.

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2
1 BY MR. JORDAN:

2 Q You say you've worked for STP since March
3 of 1976, when you became PTL site manager. What was
4 that role as site manager, as distinct from whatever you
5 went into for which you don't seem to give a title, in
6 July of 1976?

7 BY WITNESS McKAY:

8 A Are you referring to the time that I ar-
9 rived on the site? At that particular time I was to
10 coordinate the arrival of equipment, coordinate getting
11 the personnel down on site.

12 I was assisting in the development of the
13 procedures that we used to test the soils and the
14 concrete. It was overall manager of that particular
15 project at that time.

16 Q What are the range of PTL's activities at
17 the site?

18 BY WITNESS McKAY:

19 A We test and inspect the earthwork. We also
20 test the concrete and provide batch plant inspection.

21 Q I'm sorry. Provide?

22 BY WITNESS McKAY:

23 A We test the concrete and provide batch --
24 concrete batch plant inspection.

25 Q By earthwork are you referring to backfill

1 or earthwork across the board.

2 BY WITNESS McKAY:

3 A I'm referring to backfill.

4 Q And are those the matters that you were
5 setting up when you were at the site for the few months
6 in March '76?

7 BY WITNESS McKAY:

8 A That's correct.

9 Q Can you tell us what -- Can you divide
10 for us the extent of your involvement -- PTL's involve-
11 ment in the three areas you mentioned: concrete in-
12 spection, batch plant inspection and backfill?

13 BY WITNESS McKAY:

14 A I'm not sure what you mean.

15 Q How do they break down in terms of the
16 percentage of -- What's the makeup of your involvement?
17 Is it ten percent backfill, 50 percent backfill?

18 BY WITNESS McKAY:

19 A I would say it's fairly close to 50/50.

20 Q Fifty percent backfill and 50 percent the
21 rest?

22 BY WITNESS McKAY:

23 A That is approximately correct.

24 Q Mr. Pettersson, when did you obtain your
25 degree from the Technological Gymnasium?

2-3

BY WITNESS PETTERSSON:

A. In 1959.

Q. You state that you spent approximately 11 years as a geologist and geotechnical engineer in the U. S. before coming to Brown & Root. Would you tell us what that period of time involved -- what you were involved in.

BY WITNESS PETTERSSON:

A. Yes. I spent approximately 11 years as a geologist -- civil and geotechnical engineer, both in the United States and in Sweden, so the 11 years pertains to both of these countries.

And I came to the United States in 1968. In Sweden I worked for the Swedish Highway Department as a construction supervisor.

I worked for the Highway Department also as an instructor in surveying and other subjects pertaining to earthwork construction.

After that, I had obtained my degree in geology, with geotechnique. In 1963 I joined a geotechnical engineering consulting firm in Sweden.

I worked as an engineering geologist basically on the investigation of gravel deposits and deposits for concrete manufacturing, backfill and other purposes.

1 I also performed quite extensive seismic
2 investigations.

3 I also worked on preparation of permit
4 documents for exportation of gravel deposits, in ac-
5 cordance with the Swedish Natural Protection Law.

6 I moved to the United States in 1968. I
7 worked for a brief period as a geotechnical engineer in
8 New York. I worked on land stabilization projects
9 there.

10 Q I'm sorry. Land stabilization?

11 BY WITNESS PETTERSSON:

12 A Land stabilization, yes.

13 In 1969 I moved to St. Louis, Missouri and
14 joined the company of Jlaughtner and Parsell. I worked
15 with them as a geotechnical engineer, as a group leader
16 for geotechnical investigations of a variety of pro-
17 jects.

18 And in 1974 I moved to Brown & Root.

19 Q I take it the South Texas Project is your
20 first involvement with a nuclear power plant?

21 BY WITNESS PETTERSSON:

22 A No. I have previously been involved in one
23 nuclear power plant. That is the Union Electric Calloway
24 Plant in Missouri.

25 Q Mr. Logan, one matter. I noticed in your

1 description of jobs you have been in, at Page 4 --
2 Actually it's not on Page 4 because it's not in here.

3 Can you tell us what you did from June of
4 1978 to July of 1980?

5 BY WITNESS LOGAN:

6 A Yes, sir. You said June of '76?

7 Q I said June of '78.

8 BY WITNESS LOGAN:

9 A I'm sorry, '78.

10 Okay. In June of '78 I was assigned as a
11 site supervisor for the Allens Creek project. And in
12 that capacity I went back to the home office and re-
13 viewed specifications, began to write site procedures
14 and began to review EBASCO site procedures.

15 At that time we thought there was a pos-
16 sibility that we might start that project at the end
17 of that year.

18 After approximately a year we realized that
19 it wasn't going to occur that quickly. Then I went
20 to W. A. Parish primarily for training.

21 That was in about July of 1977. I still
22 held the title of site supervisor for Allens Creek.

23 And ... let's see ... from about July of
24 '79 until January of 1980, I was at Parish as sort of
25 an observer. I aided all disciplines in their

2-6

1 surveillance of activities at Parish.

2 It was to give me a broader overview of
3 other disciplines.

4 Then in January of 1980 I temporarily was
5 transferred back to the South Texas Project where I
6 described what I did there.

7 I think that's your question.

8 Q That answers the question, yes. Thank
9 you.

10 Mr. Hedges, you say 16 years of experience
11 in geotechnical engineering aspects of nuclear power
12 plants. And you note two particular facilities.

13 Can you tell us what other facilities you've
14 been involved in -- nuclear facilities?

15 BY WITNESS HEDGES:

16 A Yes, I've been involved in a number of
17 facilities.

18 I started at Turkey Point, did the initial
19 siting studies at Turkey Point in 1964. Following
20 that I worked on the three-unit Oconee Plant up near
21 Seneca, South Carolina; the Hatch Plant in Central
22 Georgia; Calvert Cliffs; Millstone-2; Davis-Besse;
23 Farley Plant in Alabama; the Grand Gulf Plant in
24 Mississippi; the SNUPPS plants, which were a collection
25 of five or six plants (if I recall), which were trying

1 to establish a standard design; the South Texas Plant.

2 And in addition to that, I have done a
3 number of siting studies in Texas, New Mexico, the states
4 of Washington and Oregon for nuclear power plant sites.

5 Q Were you involved in the siting studies for
6 the South Texas Project?

7 BY WITNESS HEDGES:

8 A My involvement, as I said earlier, started
9 in '73 after the site -- general site area had been
10 selected.

11 Q The implication of what you say is that you
12 were involved in choosing the specific site from the
13 general; is that correct?

14 BY WITNESS HEDGES:

15 A I didn't quite understand you.

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1 BY MR. JORDAN:

2 Q You said the general site area had been
3 selected. I don't know what the general site area is.
4 I conclude, therefore, that you were involved in
5 determining the specific site from the general site;
6 is that correct?

7 BY WITNESS HEDGES:

8 A The general site had been selected. When I
9 started on the project, there were some specific
10 locations regarding the buildings; and this is movement
11 of the buildings, plus or minus 50 feet, or maybe 100
12 feet, of where they are currently located today.

13 Q Okay. I took the term "general site area"
14 to mean something like South Texas or Brazoria County.
15 But it's much more specific than that, correct?

16 BY WITNESS HEDGES:

17 A Yes. When I got on the job, the siting was
18 essentially established, with the exception of minor
19 adjustments to the plant location.

20 Q Mr. McKay, you were for a period of time
21 the district manager for PTL in Roanoke. What was the
22 period of time, and what were your duties in that
23 position?

24 BY WITNESS MCKAY:

25 A That went through 1966 to late in 1973.

2-9

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1 Q And your duties?

2 BY WITNESS McKAY:

3 A And the duties there were the overall manage-
4 ment of the Roanoke District Office, which included
5 soils investigation, concrete testing, structural
6 steel.

7 Q For what region?

8 BY WITNESS McKAY:

9 A The Roanoke region covered the western half
10 of the state of Virginia.

11 Q Now, you have eight years associated with
12 PTL contracts for nuclear power construction. That's
13 1973 to present?

14 BY WITNESS McKAY:

15 A That's correct.

16 Q And is your association essentially the same
17 that you've described, as your association with this
18 contract?

19 BY WITNESS McKAY:

20 A No, it's not. I started out in the latter
21 part of 1973 as a site discipline supervisor at the V. C.
22 Sumner Nuclear Station, right outside of Columbia,
23 South Carolina.

24 I was there until I came down here to South
25 Texas

2-10

Q I see.

Panel ... whoever wants to answer it ...
I would like some clarification to your answer on
Page 7, which is also Answer 7.

You describe how backfill is placed at STP.
My question is -- And in doing that, you've described
the process of actually putting in the backfill.

My question is: What are the steps up to
the point where you start putting in the backfill?

BY WITNESS PETERSSON:

A Do you mean steps involved in the overall
construction activities, or steps in preparation directly
related to the backfill?

Q Well, I mean overall construction activities
related to the backfill. I'm not asking -- For example,
I'm not asking about screening the backfill material,
or that kind of thing.

BY WITNESS PETERSSON:

A Okay. Well, let me try to put it in the
overall framework. We have an excavation in which the
buildings are placed. It's approximately 70 feet in
the area of the reactor containment building.

It's some 40 feet -- like the mechanical
auxiliary buildings which are found at a higher eleva-
tion.

2-11

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1 So when the excavation has been completed
2 and we are at the proper foundation elevation for place-
3 ment of the backfill, the first operation is, of course,
4 that the subgrade is in accordance with the specifica-
5 tions.

6 Then the next step that leads directly into
7 what we are describing here in the testimony ... the
8 backfill which comes from an outside source is delivered
9 to the site, stockpiled, and then brought down into the
10 area for placement.

11 It is brought in on trucks. It is dumped
12 and then normally spread with a small bull dozer. And
13 then the next step, of course, is that the specification
14 criteria are checked.

15 And then the compaction starts.

16 (Counsel conferring.)

17 Q This seems to be Pettersson, Hedges and
18 Logan, Page 8. You state that specification require-
19 ments -- this is Lines 12 to 14, or so.

20 "Specification requirements were developed
21 jointly by Brown & Root and WCC."

22 Can you tell us who were the individuals
23 involved in that specification requirement develop-
24 ment?

25 ///

1 BY WITNESS PETTERSSON:

2 A Okay. Let me first answer for Brown &
3 Root.

4 I was personally involved in development of
5 these requirements in late '74 when I arrived at Brown &
6 Root ... and '75.

7 Prior to that, other Brown & Root geotechnical
8 personnel had been involved in the conceptual outline
9 of it.

10 The name of the person is Steve Garland.

11 Q Garland?

12 BY WITNESS PETTERSSON:

13 A Garland, yes.

14 BY WITNESS HEDGES:

15 A On Woodward-Clyde's behalf, we made recom-
16 mendations through our engineering reports to Brown &
17 Root as to what we felt certain criteria should be.

18 These recommendations were then taken by
19 Brown & Root and tailored into a specification format.

20 Q These recommendations were made under your
21 personal -- your personal recommendation?

22 BY WITNESS HEDGES:

23 A No. These recommendations were made when
24 the project was still being performed by Woodward-
25 Clyde Consultants in its Oakland office -- made by the

1 engineering staff out there.

2 Q Those were the people you worked with in
3 developing the recommendations?

4 BY WITNESS HEDGES:

5 A I had worked with these people. I did not
6 work specifically with them to develop this set of
7 recommendations for this set of proposed specifications.

8 Q Did you review their recommendations and
9 these specifications?

10 BY WITNESS HEDGES:

11 A Not at the time they were made, no, I did
12 not.

13 Q Have you since?

14 BY WITNESS HEDGES:

15 A Yes. I reviewed them as soon as we became
16 active in the project ... as I became active as the
17 project manager.

18 Q And you endorsed them or accepted them at
19 that time?

20 BY WITNESS HEDGES:

21 A I agree with them, yes.

22 - - -

3-1

1 BY MR. JORDAN:

2 Q It notes farther in the same paragraph that
3 HL&P then reviewed and approved all specifications.

4 Can you tell us -- I can imagine there may
5 have been many people. I am interested in the responsible
6 people, the decision-makers who were involved in that.

7 BY WITNESS LOGAN:

8 A Unfortunately, that was before my time. I do
9 know the positions. These would be the engineering people
10 working under whoever was the Project Engineer at that
11 time. It might have been John White.

12 I don't know the specific individuals involved.

13 BY WITNESS PETTERSSON:

14 A Excuse me. I was directly interfacing with
15 HL&P at that time. The Engineer I was directly inter-
16 facing with his name was Cal Stripling for HL&P.

17 Q On Page 9, at the bottom there is an
18 explanation that under a construction specification
19 uncompacted lifts of 24 inches are permitted to be used
20 at the option of construction if the adequacy of the
21 backfill compaction is demonstrated by a documented test-
22 field program.

23 How would that documentation and that test-
24 field program be performed?

25

1 BY WITNESS PETTERSSON:

2 A Okay. The specification contained the
3 provisions described there in the testimony. Namely,
4 that 18 inches could be used without -- could be used
5 by construction without any further qualifications, if
6 construction, however, would have elected to go to thicker
7 lifts. Namely, 24 inches, the construction program would
8 have been mandatory. A test-field program would have been
9 mandatory.

10 Q My question is what would that test-field
11 program involve?

12 BY WITNESS PETTERSSON:

13 A If such a test-field program would have been
14 required, is that a question?

15 Q Yes.

16 BY WITNESS PETTERSSON:

17 A That program would have been a typical test-
18 field program which consists of placement of two or
19 several lifts of backfill material.

20 It would have been compacted in accordance
21 with the proposed construction procedures.

22 The density would have been measured. The
23 gain in density would have -- versus number of roller
24 passes would have been noted.

25 That would have been the general outline of

such a program.

BY WITNESS HEDGES:

A May I add something there?

Q Yes. Please do.

BY WITNESS HEDGES:

A Woodward Clyde recommended that the 18-inch lift could be used for the material that was anticipated in use without a test program.

At the time our recommendation was made there was some thought that they might want to use a thicker lift. That is, the 24-inch lift. So our recommendation did state 18 inches, with no proviso for a test-field, or if they wanted to go to the thicker 24 inch it was suggested that they make the test-field.

Q On Page 10, at the top, it states: "Based on additional recommendations by WCCA specification was developed requiring at least one field density test for every 20,000 square feet of unrestricted backfill lift."

My first question, this is not the test we were just talking about?

BY WITNESS PETTERSSON:

A No. This would be the required frequency for in-place density testing for the acceptance of the material during construction of the backfill.

Q Is that the same -- So that for every 20,000

1 square feet you have to do one field density test. How
2 is that test performed?

3 BY WITNESS MC KAY:

4 A I guess I can answer that. That test is
5 performed by a sand cone method. It is a stated ASTM
6 method, ASTM D-1556, -57, I forget what it is right now,
7 but it is an ASTM standard test method.

8 We use a sand of known density, and you use a
9 calibrated sand cone as such, and you remove the material
10 from the ground, pour the known density sand into the
11 hole, and from that you can determine the volume, and you
12 weigh the sand, take the moisture content, and determine
13 the dry density.

14 Q So you do one of those for a 20,000 square-
15 foot area?

16 BY WITNESS MC KAY:

17 A That's correct.

18 Q Do you do it on the edge of the 20,000 square-
19 foot area?

20 BY WITNESS MC KAY:

21 A They are taken at random on an unbiased
22 location.

23 Q So it could be anywhere?

24 BY WITNESS MC KAY:

25 A It could be anywhere within that 20,000 square-

1 feet.

2 Q Now, among the requirements as noted on Page 10
3 was that for every fourth field density test, at least one
4 laboratory maximum/minimum test and one gradation test was
5 to be performed.

6 Was the requirement to do that every fourth
7 field density test complied with at STP?

8 BY WITNESS MC KAY:

9 A Yes. It was.

10 Q So there was never an instance where the fourth
11 field density test did not also involve a maximum/minimum
12 and a gradation test?

13 BY WITNESS MC KAY:

14 A There may have been times when because we were
15 working in more than one area that as many as six tests,
16 maybe even seven tests were taken before the actual field
17 density test was -- or the max/min test was performed,
18 but on the average one and four, yes.

19 Q What do you mean by working more than one area?
20 In other words, they might have done two -- you might
21 have done two tests in the area where the Methox Building
22 was going to go, and four tests in an area of the
23 Containment Building, or something of that sort?

24 BY WITNESS MC KAY:

25 A There may have been fill being placed

simultaneously in more than one area, so we would have a true taking of tests in both areas at the same time.

Q There is a discussion on Page 12, B&R Site Geotechnical Engineering Representative evaluating prior program and deciding that a minimum of 12 lifts -- I'm sorry, 12 roller passes be incorporated in the construction procedures, and then a decision that that was needed only on the surface, and that 8 could be used below that.

Who was the B&R Site Geotechnical Engineering Representative?

BY WITNESS PETTERSSON:

A There was an engineer reporting to me, assigned to the site.

Q Did you agree with his recommendation?

BY WITNESS PETTERSSON:

A I reviewed the conclusion that he had reached, and had been presented to construction.

I also reviewed construction's procedure as they were written, and I recognized that the Geotechnical Engineer had based his judgment on the overall test results without recognizing the difference in densification between lifts that are embeded within the backfill. That is, lifts that would receive further densification by compaction, or subsequently placed overlaying lifts.

Construction, on the other hand, did recognize

-7
1 this difference, and, therefore, they made the judgment
2 that in order to have a feasible or the most feasible
3 construction procedure the construction procedure should
4 recognize the densification of the compaction, and
5 subsequently place lifts, and, therefore, separate out
6 the two conditions. Namely, that 8 passes on lifts that
7 would be embedded receiving further compaction, and 12 on
8 the surface.

9 And when I reviewed the construction procedures
10 and the conclusions presented by my Site Engineer, I
11 concurred with construction. It was a -- Construction's
12 decision was based on if you want to further refine
13 evaluation of the results, and I concurred.

14 Q On that point I would like to get some more
15 information on the effect of rolling a subsequent lift on
16 the lift that is underneath.

17 My question is: Let's assume that we have
18 rolled -- Let's assume there have been six lifts placed
19 in an area, just for purposes of a figure. When you are
20 rolling that top lift, what is the depth to which it has
21 the effect that you have described of increasing density?

22 BY WITNESS PETTERSSON:

23 A Well, the significant effect is to a depth of
24 about two to three feet, so you can -- Well, the 24 to
25 30 inches and it is felt you can clearly recognize it to

1 about three feet.

2 There is an inference to a larger depth, but
3 that is not a very significant factor, so about three feet.

4 Q And how many lifts is that?

5 BY WITNESS PETTERSSON:

6 A About two lifts would be the 36 inches,
7 maximum, two-inch maximum lift thickness.

8 Q So --

9 BY WITNESS PETTERSSON:

10 A So in effect the condition we are talking about
11 probably take typically to a depth of two and half lifts.

12 BY WITNESS HEDGES:

13 A May I add there is research that shows there
14 is in effect, as Pettersson pointed out, beyond three feet
15 the research is shown sometimes the effect goes down six
16 and seven feet.

17 Q Now, the three-foot figure you were giving,
18 Mr. Pettersson, was that included at the top, the top
19 lift; is that correct? The depth?

20 BY WITNESS PETTERSSON:

21 A Well, yes, when you roll the top lift, of
22 course, you still have an inference down about three feet.
23 However, it is recognized, and this has been explained in
24 great detail by our independent expert committee that the
25 very surface gets in the upper few inches will not be
equally densified.

4-1

1 BY MR. JORDAN:

2 Q Toward the bottom of Page 12 you're talking
3 about once the rolling or the initial minimum amount of
4 rolling has been done, it's appropriate to begin in-place
5 density testing.

6 Is this by the sand cone method that was
7 described?

8 BY WITNESS PETTERSSON:

9 A Yes, sir.

10 Q So at that point you get to -- You've
11 finished a lift. You do one test of passes. Then you
12 go to the next lift?

13 BY WITNESS LOGAN:

14 A That's true. If it doesn't pass, then it's
15 rolled some more until it does. We just keep testing
16 after more rolling, until it does pass.

17 Q Now you have a reference to the first 20
18 field density tests. Is that the first 20 lifts, or is
19 that the first of -- the first 20 of the tests that are
20 done every fourth lift?

21 BY WITNESS PETTERSSON:

22 A No. These were the first 20 tests obtained
23 in a non-restricted area at the beginning of the place-
24 ment in unrestricted areas.

25 Q Do you know if it's the first 20 lifts? It

1 sounds like it ought to be the first 20 lifts to me.

2 BY WITNESS PETTERSSON:

3 A That would be the maximum. Of course, there
4 could have been -- I'm not certain about this. But
5 there could very well have been some large lifts in the
6 beginning that had several tests.

7 So it would be 20 or fewer lifts.

8 Q What is a large lift?

9 BY WITNESS PETTERSSON:

10 A In this instance I'm comparing it to the
11 criteria of one test per 20,000 square foot. So if we
12 had a 40,000 square foot lift, obviously we had two or
13 more tests in that lift.

14 Q On Page 13, towards the middle, discussing
15 what PTL inspectors are supposed to be doing, providing
16 continuous inspection of the placement and so on, it
17 says they're required to observe the type of material
18 used, lift thickness and operation of compaction.

19 Can you describe for us exactly what the PTL
20 inspectors do?

21 BY WITNESS MCKAY:

22 A They observe the material coming in to be
23 placed on the fill.

24 Q In other words, they look at it?

25 ///

1 BY WITNESS MCKAY:

2 A Yes. They visually look at the material.
3 The material is then spread out, and they check the
4 elevation of the lift thickness -- of the lift, to make
5 sure that it's 18 inches or less.

6 Q All right. Now could we do this in pieces?
7 How do they do that? Crouch down and look at it?

8 BY WITNESS MCKAY:

9 A They use some hand levels sometimes. They
10 use a rod which penetrates down through the lift thick-
11 ness -- through the loose lift down into the hard
12 compact lift underneath.

13 They have used a flat edge across the lift
14 being placed and measured down to the lift below. But
15 it is definitely measured.

16 After that point the compaction effort
17 begins. Our inspectors verify that at least the eight
18 passes required by the construction procedure have
19 been completed.

20 Q So do they watch the eight passes being
21 done?

22 BY WITNESS MCKAY:

23 A Yes, they do.

24 Q Okay, then what?

25 ///

BY WITNESS MCKAY:

A All right. After that, it's up -- as a construction option whether or not to request an in-place density test at that time.

If construction puts additional passes on, our inspectors verify the passes were applied uniformly across the whole fill, not just in one area.

Q Okay. And then what?

BY WITNESS MCKAY:

A At the time construction says they're ready for in-place density tests, our inspectors go out there, randomly select the location and take the in-place density test.

Q Is that something they take back to the laboratory or that they do right there?

BY WITNESS MCKAY:

A They take the sample back to the laboratory to obtain the moisture content of the material.

Q I take it, on Page 15 there's a reference -- it's the next-to-the-last sentence of the paragraph that begins on the previous page and says, "When compaction was completed and they were satisfied, they indicated on the checklist that the compaction effort was acceptable under the applicable construction procedure."

4-5
1 Now, that was something that was done before
2 any density tests were actually taken?

3 BY WITNESS MCKAY:

4 A No. The checklist was completed after the
5 particular lift was accepted, including the taking of
6 the in-place density test.

7 The lift was not accepted until the in-place
8 density test met the requirements.

9 Q Okay. It doesn't say that in here. You
10 are saying that the words, "they were satisfied," means
11 they were satisfied by virtue of a density test?

12 BY WITNESS MCKAY:

13 A That is correct. And that a minimum of
14 eight passes were placed on the fill, and the fill --
15 loose-lift thickness was no more than 18 inches.

16 Q Mr. Logan, turning to HL&P's surveillance
17 role, Pages 16 and 17, it says you used checklists in
18 this process.

19 Could you describe for us what an HL&P
20 surveillance person would be doing with those checklists?

21 BY WITNESS LOGAN:

22 A Yes, sir. There are two checklists, as
23 I describe in the testimony here. And the one dealing
24 with field surveillance -- the surveillance person would
25 go to the field and find the activity either about to

4-6

1 begin or in progress. And he had specific requirements
2 listed on the checklist that came from the specifications,
3 the procedures, et cetera.

4 And he would check the operations going on
5 to those questions to see that they met the required --
6 whatever the requirements were.

7 There was -- It covered both the con-
8 struction activities ... PTL's activities.

9 Q And so it's the same idea in the laboratory
10 as in the field?

11 BY WITNESS LOGAN:

12 A Yes, it is.

13 Q Did they examine all of the documents that
14 had been produced up to that date?

15 BY WITNESS LOGAN:

16 A Yes, sir.

17 Q Now, when did HL&P undertake these sur-
18 veillances? How was it decided that it was time to do
19 a surveillance?

20 BY WITNESS LOGAN:

21 A We had a requirement that it be done a
22 minimum of once a month. But there was no -- We
23 found that we could not schedule a particular day, so it
24 was more or less just done any time during the month
25 whenever the person who was assigned to run the

4-7

1 checklist felt like he could do it.

2 Many times when we tried to schedule these
3 back in the beginning of the project, it would be raining
4 or something, and no activity would be going on.

5 So we quit scheduling them and started
6 running them on a random basis.

7 Q Still once a month, however?

8 BY WITNESS LOGAN:

9 A That was the minimum amount, yes, sir.

10 Q On Page 21 you note that a stop work order
11 was issued in 1976, when B&R's QA auditors discovered
12 that PTL had not correctly calibrated their sand cones.

13 Describe how that discovery occurred.

14 BY WITNESS McKAY:

15 A I believe it was discovered in a regular
16 Brown & Root audit.

17 Q In other words, they went and looked at the
18 sand cone?

19 BY WITNESS McKAY:

20 A That's correct.

21 Q Did they determine when the sand cones went
22 out of calibration?

23 BY WITNESS McKAY:

24 A It wasn't that they were out of calibration.
25 The problem was that the weight of the sand remaining in

4-8

1 the cone portion of the sand cone jug was not changed
2 when the density of the standard sand changed.

3 Q What's the standard sand?

4 BY WITNESS MCKAY:

5 A That's the sand that's used to determine the
6 volume of the hole where you remove the soil from when
7 you take the in-place density tests.

8 Q What is the material that wasn't changed
9 when the standard sand changed?

10 BY WITNESS MCKAY:

11 A It was that -- There is a weight that is
12 subtracted from the standard sand that's used to fill
13 the hole that remains in the cone portion.

14 That weight should change every time the
15 density of that standard sand changes, and this was not
16 done.

17 Q I see.

18 - - -

1 BY MR. JORDAN:

2 Q So you -- Did you then trace that problem
3 to the date -- to a date on which the standard sand
4 had been changed?

5 BY WITNESS McKAY:

6 A Yes. We had a record of when -- of the
7 density of the standard sand all the way back, and all
8 test results were reviewed.

9 Q It says at the bottom of the page: "B&R
10 QA/QC Department became more closely involved in the
11 daily management and surveillance of PTL's on-site
12 work."

13 Now, is this a close involvement that began
14 in 1976?

15 BY WITNESS McKAY:

16 A Yes. This began about August or September
17 of 1976.

18 Q Could you tell us how they became more
19 closely involved -- B&R, that is?

20 BY WITNESS McKAY:

21 A They assigned a QA -- I don't know whether
22 he was an inspector, auditor or whatever -- to our
23 facility on site.

24 Q And he looked at your documents every
25 day?

1 BY WITNESS MCKAY:

2 A I wasn't on site at that particular time.
3 But my understanding was that he reviewed our documents.

4 BY WITNESS LOGAN:

5 A I can answer that, Mr. Jordan.

6 Q Please do.

7 BY WITNESS LOGAN:

8 A The Brown & Root -- There was actually
9 more than one Brown & Root QA person involved. They
10 had what they called a QA subcontract coordinator. He
11 was stationed full time at PTL.

12 And then he had two or more inspectors work-
13 ing for him that closely followed all of PTL's acti-
14 vities and reported on those in monthly surveillances.

15 Q At Pages 25 and 26 you're discussing what
16 occurred as a result of the NRC's findings and the fact
17 that you were asked to begin a soil test boring program,
18 to evaluate the overall backfill quality.

19 Were all of you individuals involved in
20 that program?

21 BY WITNESS PETTERSSON:

22 A I was involved from Brown & Root. Mr. Hedges
23 from Woodward-Clyde, and then Tim Logan here was involved
24 from HL&P.

25 Mr. McKay was not involved.

4-11

Q Okay. Those of you who know then, how did you determine where to do the testing that you were to do in that program?

BY WITNESS PETTERSSON:

A We used certain general criteria for our evaluation. We tried to distribute the borings as uniformly as we could in a non-biased manner, to get representative test results for all of the backfill.

And naturally, we were drilling outside of the buildings that are in place.

The program that we established ... where a pre-determined location involved 15 borings, in the first step with provision for drilling additional borings, based on what we had found in the pre-established boring locations.

So in the first phase of the boring program, we did a total of 21 borings.

Q The figure you said a moment ago was 15, not 50?

BY WITNESS PETTERSSON:

A One-five, yes.

Q Now, what was the square footage of the area where backfill had been placed?

BY WITNESS PETTERSSON:

A I can't answer that right offhand.

1 Q You don't have any idea how many square
2 feet of backfill were placed out there at that time?
3 Somewhere between 20,000 and --

4 BY WITNESS PETTERSSON:

5 A I can tell you that it's over half a million
6 cubic yards. I can't translate that into a square
7 footage area.

8 Q That's cubic yards of material, correct?
9 BY WITNESS PETTERSSON:

10 A Yes, that is correct.

11 Q You can't tell us -- You can't draw a
12 circle around the area where backfill was placed and
13 tell us what the square footage of that circle is?

14 BY WITNESS PETTERSSON:

15 A Well, we can, of course, talk about the
16 overall dimensions of the excavation. I believe the
17 north/south dimension is like 400 feet. The east/west
18 is about a thousand feet, something on that order.

19 Q So we're talking around 400,000 square
20 feet?

21 BY WITNESS PETTERSSON:

22 A That might be a good number. Let's call it
23 half a million square feet, for talking purposes.

24 Q All right.

25 Now, did you obtain the services of a

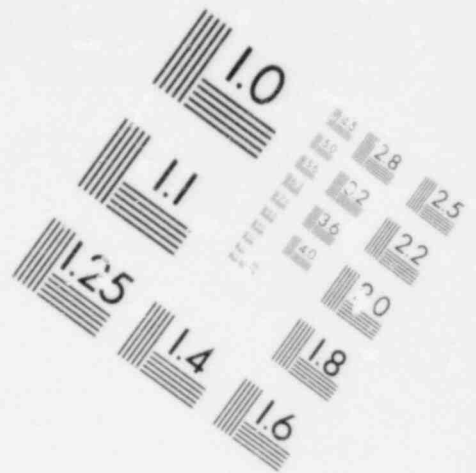
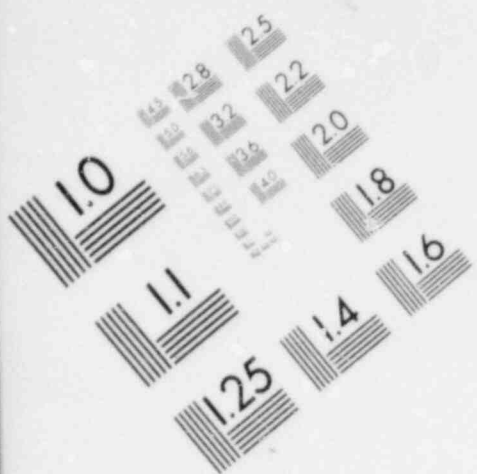
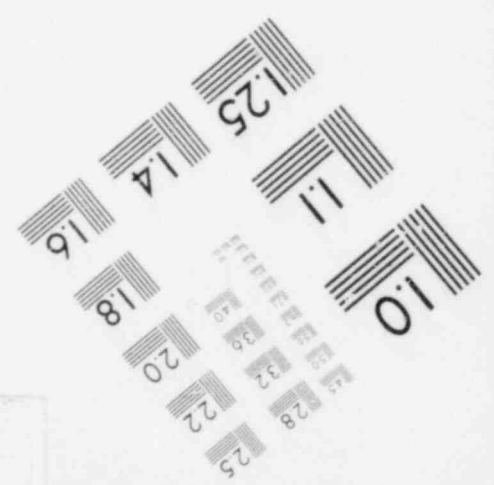
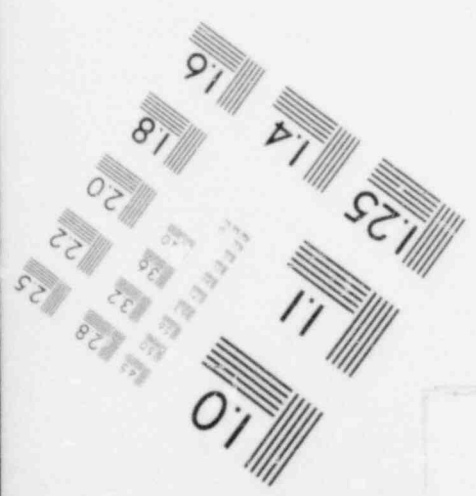
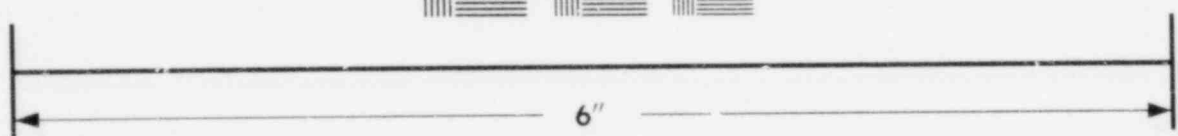
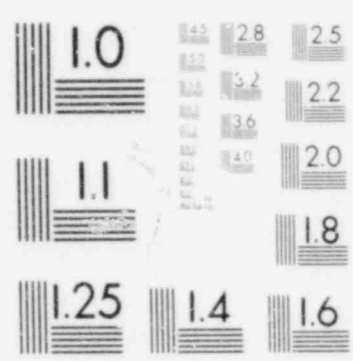


IMAGE EVALUATION
TEST TARGET (MT-3)



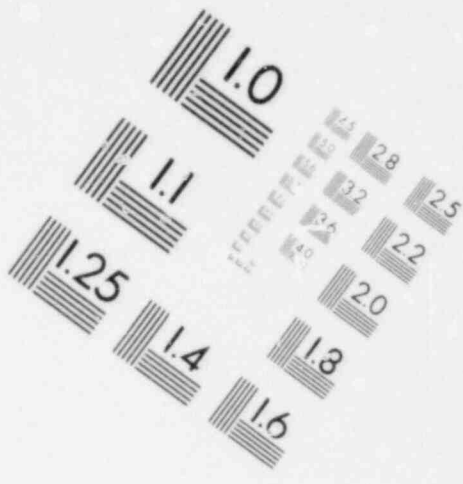
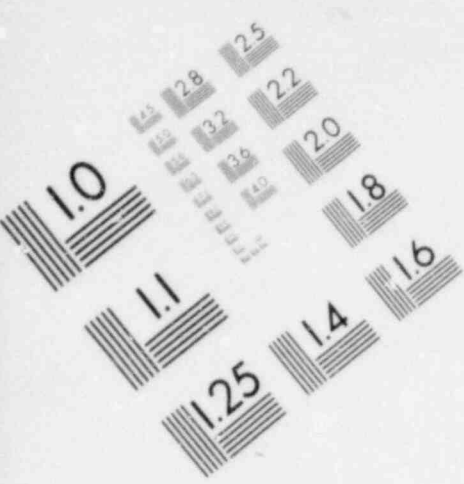
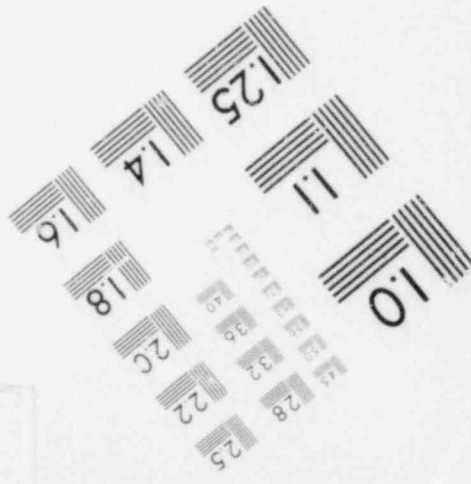
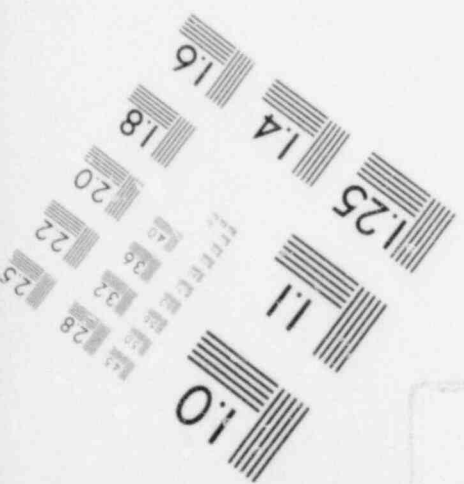
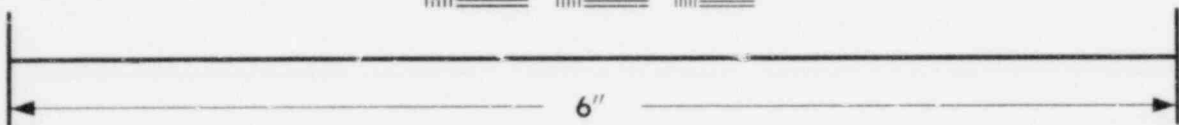
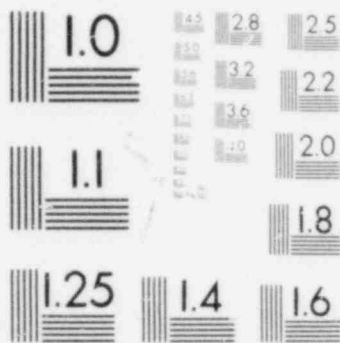


IMAGE EVALUATION
TEST TARGET (MT-3)



1 statistician or somebody with statistical expertise to
2 assist you in determining how to do your random un-
3 biased boring program?

4 BY WITNESS PETTERSSON:

5 A The location of the borings -- we like to
6 use the term they were unbiased -- they were selected
7 by us as being experienced geotechnical engineers on
8 our judgment.

9 Q The answer to my question, therefore, is
10 no?

11 BY WITNESS PETTERSSON:

12 A That is correct. There was no statistician
13 involved in the original establishment of the boring
14 program.

15 BY WITNESS HEDGES:

16 A I'd like to add something to that. At
17 the location of the 15, then the 6, which constituted
18 the 21 borings of the first phase, were selected in a
19 manner to give even distribution around the planned
20 plant area.

21 The 21 borings -- from the 21 borings we
22 obtained 288 standard penetration data. These were the
23 data that were subsequently analyzed.

24 - - -
25

5-1

1 BY MR. JORDAN:

2 Q On Page 30, the discussion indicates that
3 the backfill placed for the essential cooling water
4 system had not had the relative density tests performed
5 as a result of a PTL and B&R QA misinterpretation of an
6 STP specification.

7 Can you tell us what that specification
8 stated?

9 BY WITNESS PETTERSSON:

10 A Yes, I can. What we are dealing with in here
11 are the performance of the maximum-minimum density tests
12 performed in the laboratory, to which they have a
13 relative density acceptance criteria for the field tests.

14 This provision requires that one laboratory
15 test should be obtained for every fourth, and that
16 pertains to all the Category I structural backfill.

17 And the misinterpretation was that PTL did
18 not apply this criteria for that essential cooling water
19 piping system, which is a Category I system.

20 Q Mr. Hedges, on Page 32 you note that you
21 have found the in-place backfill at STP generally equal
22 or better than for -- and so on -- backfill you've
23 evaluated at other nuclear power plants.

24 Can you tell us which those nuclear power
25 plants are that are either equal -- have backfill of

5-2 1 either equal or lesser quality than STP?

2 BY WITNESS HEDGES:

3 A Yes, I can. I can give you some discussion
4 on that. That's an answer to a question soliciting my
5 opinion of the testing and over-all quality of the
6 in-place backfill at South Texas.

7 I feel that the in-place density at South
8 Texas is extremely good. This is demonstrated in more
9 ways than one, especially by the high average, or mean
10 density.

11 I've been involved in backfill on commercial
12 plants and nuclear plants that have had more difficulty
13 in the construction of the backfill.

14 In one plant that I can think of, at the
15 Turkey Point Plant, they were using a local limestone,
16 lime-sand material, which was much, much more variable.
17 The construction effort and the testing effort was much
18 more difficult in order to get the quality, though the
19 quality was obtained.

20 The same at Calvert Cliffs. At Calvert
21 Cliffs they were using native material which was silty
22 clays, clay sands. They also used imported material of
23 fine clean sand, sandy gravels.

24 With the multitude of materials, there was
25 deliberate testing programs had to be set up for each

5-3

1 material, whereas at South Texas there was one very
2 consistent material which allowed a much more consistent
3 operation.

4 Q So you compare it to Turkey Point and
5 Calvert Cliffs?

6 BY WITNESS HEDGES:

7 A Well, that's two. I've been involved in the
8 backfill at Millstone 2, Davis-Besse Unit 1, Hatch and
9 Farley, and the type of material, the uniformity of this
10 material has been a benefit to this job, whereas other
11 plants have used a whole lot of different types of
12 material which have been very difficult to construct and
13 control.

14 Q And so you consider the quality of the back-
15 fill job at STP to be better than at the other plants
16 that you've mentioned?

17 BY WITNESS HEDGES:

18 A It's a very high quality, as is known by
19 the average density, which is 95 percent relative density.

20 I don't mean to imply that the other plants
21 don't meet their quality; they do in fact meet their
22 quality.

23 Q You say here that it is higher quality. I'm
24 asking you which ones -- for which ones is STP higher
25 quality?

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✓

1 BY WITNESS HEDGES:

2 A I would say it's the highest quality of any
3 plant I have worked on, and that includes the plants I
4 have just listed, and the plants I listed earlier in
5 this testimony.

6 MR. JORDAN: That's my cross.

7 JUDGE BECHHOEFER: Let's take a break for 15
8 minutes.

9 (A short recess was taken.)

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JUDGE BECHHOEFER: Back on the record.

CROSS-EXAMINATION

BY MR. SINKIN:

Q On Page 12, Mr. Pettersson.

BY WITNESS PETTERSSON:

A Yes.

Q You testified that you discussed with the Brown & Root Site Geotechnical Engineering the recommendation on the 12 roller passes.

Can you tell me who the person was that did not recognize that lower levels would be compacted while upper levels were being compacted?

BY WITNESS PETTERSSON:

A Well, the name of the person was Justin.

Q Excuse me?

BY WITNESS PETTERSSON:

A Justin.

Q J-u-s-t-i-n?

BY WITNESS PETTERSSON:

A Yes.

Q That's his last name?

BY WITNESS PETTERSSON:

A Yes. That's his last name.

Let me clarify here. It was not that he did not recognize this. It was an opinion on his part that

only given one criteria he certainly recognized that --
the difference in compaction.

Q Let me explore this compaction with you just
a little further.

You said that while the uppermost lift is
being rolled that there will be compaction running up to
three feet in depth, and I believe there was later some
discussion that that might run as far as six feet in depth.

BY WITNESS PETTERSSON:

A That is correct.

Q The three feet starts at the top; in other
words, you are talking about the lift you are actually
compacting that is 18 inches?

BY WITNESS PETTERSSON:

A When we are talking about depths like this,
it is always from the surface that is being compacted at
that instance.

Q Let me try a hypothetical and see if you can
estimate something for me.

Let's assume that you do the first lift, and
you achieve 80 percent compaction. You then put the second
lift on, and you do your 8 roller passes on the second
lift.

There has been some further compaction of the
first lift. Can you estimate for me how much more that

lift is compacted beyond the 80 percent?

BY WITNESS PETTERSSON:

A Yes. I can make an estimate for you. If you have achieved 80 percent, and then put on 8 more roller passes on the surface, I would estimate that the further densification is on the order of 10 percentage point, approximately.

Do you have an opinion on that?

Q Let me just clarify. When you say "10 percent" you mean it would now be 90 on the first lift?

BY WITNESS HEDGES:

A No. Now, we are talking about your underlying second lift.

Q We are using first and second differently. All right. That's fine. The underlying lift is better.

BY WITNESS HEDGES:

A Okay. To clarify some of the terminology, the top lift is the lift they are working, regardless of its vertical position in the ground.

And, if I understand, you were talking about a lift below the working lift. We've got a two-lift system. The first lift was 80 percent. Then you put down another lift, and you are compacting on that.

In compacting that top lift the underlying lift would probably go from 80 to 90, or 90 plus.

Q All right. Now, let's add a third lift; compact that third lift, what does the most underlying lift now look like?

BY WITNESS HEDGES:

Okay, the second or middle lift would go from 80 to, say, 90. The third or bottom lift would go from the 90 that it had previously achieved to maybe 90 plus. This would be maybe 91, 92.

The point being there is some increase in that third lift. Had there been a four-lift system there would have been some minor increase in that fourth lift. There has been a lot of research done on this, and this effect diminishes with depth, but it does have an influence down six or seven feet.

Q On Page 24, and it is the panel, apparently, that answered this question, at the bottom there is further discussion of this incremental gain in density, and it states that the incremental gain rapidly diminishes for each roller pass beyond 8.

Is that the incremental gain of that top lift, the uppermost lift; is that what we are discussing there?

BY WITNESS PETTERSSON:

A That is an incorrect statement. If you compact a backfill with a number of roller passes, the loose part of the densification, which is bringing it up from the

1 loosest state of the test when you have placed it up
2 toward its maximum density take place during the very
3 first roller passes.

4 Q The second part of the sentence says, "The
5 overall density in an embedded lift is greatly increased
6 after eight passes on the overlying lift.

7 BY WITNESS PETTERSSON:

8 A Yes. That is correct.

9 As we discussed, if you have obtained 80
10 percent in the lift, and you put on the additional roller
11 passes on the surface lift, you are gaining something on
12 the order of 10 percent relative density, which is at that
13 level of densification a significant increase.

14 Q But is that 10 percent achieved during the
15 first 8 passes on the upper lift?

16 BY WITNESS PETTERSSON:

17 A Yes. As an order of magnitude, yes.

18 Q Can density of more than 100 percent be achieved
19 on compaction?

20 BY WITNESS PETTERSSON:

21 A Yes. Yes, it can.

22 As explained by the expert committee, the
23 maximum density, the 100 percent relative density, is
24 established by laboratory testing, which imparts certain
25 energy into the sample by certain vibration of frequency

1 certain amplitude.

2 That establishes a criteria for what happens.
3 Now, the densification that is achieved by the rollers
4 takes place by another type of energy impacted at different
5 frequency.

6 So, it is possible by using certain rollers,
7 like the rollers we have on South Texas, which are heavy-
8 duty rollers, that you can achieve a higher density than
9 what you use in the laboratory to establish your acceptance
10 criteria. That is quite possible.

11 Q Can you tell me what were the highest density
12 that you could achieve be on Category I backfill?

13 BY WITNESS PETTERSSON:

14 A We have measured values that are on the order
15 of 101 to 130 percent, thereabouts, and maybe --

16 Steve, do you want to

17 BY WITNESS MC KAY:

18 A We have found this to happen on other projects,
19 as well as South Texas Project. With the different types
20 of compacting equipment that is used on the fill itself
21 will sometimes produce much higher densities than what you
22 can produce in the laboratory.

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1 WITNESS HEDGES: I'd like to amplify that.
2 It's quite often in sands that you do have relative
3 densities of 110, 120 occurring quite frequently.

4 BY MR. SINKIN:

5 Q Mr. Hedges, I believe it was in your testi-
6 mony that you talked about the high mean or average
7 density -- mean or average density at STNP. I don't
8 remember whether you said mean or average.

9 BY WITNESS HEDGES:

10 A In this sense mean and average are
11 synonymous. It is a high mean. Ninety-five percent
12 relative density at mean for the entire Category I
13 plant area.

14 Q Fine.

15 Mr. McKay, in your background on Page 3 you
16 say that you selected PTL personnel for the South Texas
17 Nuclear Project site; is that correct?

18 BY WITNESS McKAY:

19 A That's correct.

20 Q Did you select a Mr. Hines?

21 BY WITNESS McKAY:

22 A I believe I recollect that name. Paul
23 Hines, I believe.

24 Q I believe that is correct.

25 Do you recall the reason for his removal?

7-2

1 BY WITNESS McKAY:

2 A No, I do not.

3 Q If I were to tell you that Mr. Hines' removal
4 had something to do with document falsification, would
5 that refresh your memory at all?

6 BY WITNESS McKAY:

7 A No, it would not.

8 Q Do you know by whom Mr. Hines was employed
9 after he left PTL?

10 BY WITNESS McKAY:

11 A No.

12 Q Did any of the panel work with a Mr. Doug
13 Robertson?

14 BY WITNESS PETTERSSON:

15 A Yes, sir. Mr. Robertson worked for me when
16 he was the lead geotechnical engineer on the site.

17 Q And his area of work -- I'm sorry, Mr.
18 Hedges, did you want to add something?

19 BY WITNESS HEDGES:

20 A Yes. When we had people in the field, they
21 coordinated and interphased with Douglas Robertson.

22 Q Okay. That's Woodward-Clyde people?

23 BY WITNESS HEDGES:

24 A Woodward-Clyde people coordinated with
25 him.

1 Q Fine. And the character of his work -- the
2 nature of his work, Mr. Pettersson? What did he do?

3 BY WITNESS PETTERSSON:

4 A Mr. Robertson had several functions as a
5 geotechnical engineer. We have an ongoing program --
6 we have had ongoing programs on the site from the out-
7 set.

8 These programs include monitoring heave
9 settlement, ground water conditions, these type of
10 phenomena.

11 That was part of his work.

12 Mr. Robertson also had responsibilities for
13 coordinating Woodward-Clyde's on-site functions, like
14 Mr. Hedges just mentioned.

15 In addition to this, Mr. Robertson had an
16 overall reporting function to me regarding the offwork
17 activities on site, as affecting the geotechnical
18 programs.

19 Q Did Mr. Robertson perform any work in areas
20 other than geotechnical areas?

21 BY WITNESS PETTERSSON:

22 A For the first several years Mr. Robertson
23 was doing -- In the very beginning Mr. Robertson was
24 doing entirely geotechnical work.

25 And he did that for several years. When there

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1 was an increased engineering site involvement within
2 the civil structural discipline, Mr. Robertson also
3 performed coordinating functions between the Houston
4 engineering group and the site activities.

5 Q Could you elaborate just a little bit on
6 what you mean by "coordinating functions"?

7 BY WITNESS PETTERSSON:

8 A Yes, I can.

9 For example, we had at that time in place
10 a program which was a request for engineering
11 actions. When as use would come up on site that would
12 require engineering resolutions or input, Mr. Robertson
13 would be coordinating such information between Houston
14 and the site.

15 Q Did he perform any other functions?

16 BY WITNESS PETTERSSON:

17 A Yes. We are now moving forward in time.
18 I believe, again, the time frame was '78 ... '79.
19 Mr. Robertson had wide responsibilities as the site
20 engineering persons increased.

21 And then Mr. Robertson left Brown & Root
22 about a half year ago. And then in the -- I believe
23 the later part of 1980 -- well, maybe the -- I'm not
24 certain about the date.

25 But during 1980 he had left the engineering

7-5
1 staff and was performing the function as a construction
2 chief engineer.

3 Q What was he doing?

4 MR. GUTIERREZ: Objection --

5 MR. GUTTERMAN: Mr. Chairman, I will object
6 to that. We're getting very far afield from the scope
7 of the direct testimony.

8 It doesn't appear that we're discussing
9 backfill anymore at 11.

10 MR. GUTIERREZ: Mr. Chairman, the Staff
11 would object, unless Mr. Sinkin can make some showing
12 as to the relevancy of Mr. Robertson and detailed
13 questions relative to Mr. Robertson's particular job
14 functions on the site.

15 The Staff wouldn't see the relevancy.

16 MR. SINKIN: Well, Mr. Chairman, the Inter-
17 venors have a contention that deals specifically with
18 the work of Mr. Doug Robertson. We have here people
19 who are familiar with his work and what he did.

20 And I'm using this opportunity to explore
21 with them what what work was.

22 MR. GUTTERMAN: Mr. Chairman, could I
23 respond to that, please?

24 JUDGE BECHHOEFER: Yes.

25 MR. GUTTERMAN: I'd like to point out that

1 Applicants have submitted some direct testimony and the
2 witness will be presenting that testimony on the con-
3 tention Mr. Sinkin is discussing at some later time
4 in this hearing.

5 This panel is not here to talk about Mr.
6 Robertson. They're here to talk about backfill.

7 If Mr. Sinkin wants to get testimony from
8 one of these witnesses on that contention, Mr. Sinkin
9 can call that person as a witness at some later time
10 as his witness.

11 MR. SINKIN: Mr. Chairman, I'll withdraw
12 the question.

13 BY MR. SINKIN:

14 Q Let me just ask then, when did Mr. Robert-
15 son --

16 JUDGE BECHHOEFER: You say you're with-
17 drawing --

18 MR. SINKIN: I'm withdrawing the question.

19 JUDGE BECHHOEFER: Okay.

20 BY MR. SINKIN:

21 Q When did Mr. Robertson cease to be involved
22 in the geotechnical engineering functions?

23 MR. GUTIERREZ: Staff would again object
24 on the same basis.

25 (Bench conference.)

1 MR. SINKIN: I'm just trying to wrap it up,
2 Mr. Chairman. I've got all of the rest of it.

3 MR. GUTIERREZ: On that basis we'll withdraw
4 our objection.

5 MR. GUTTERMAN: I'm not sure I remember
6 what the question was.

7 MR. SINKIN: The question was: When did
8 Mr. Robertson complete his responsibilities in the geo-
9 technical engineering area?

10 WITNESS PETTERSSON: For the geotechnical
11 engineering work, in 1978 we had other persons fulfilling
12 his previous functions.

13 BY MR. SINKIN:

14 Q Do you know a month, by any chance?

15 BY WITNESS PETTERSSON:

16 A I don't recall the precise month. I believe
17 it was like in June. I might be mistaken there, but it
18 was somewhere in the middle of the year.

19 Q On Page 15, I think, Mr. McKay, you may be
20 the one to answer this. You are one of the ones on the
21 question.

22 Around -- Well, the entire paragraph be-
23 ginning on Line 21 that goes into the field density
24 tests.

25 And it says if the tests reveal a relative

7-8

1 density of less than 80 percent, or less than an
2 average -- 84 percent average, additional rolling had
3 to be performed until acceptable test results were
4 achieved.

5 Is the reverse of that statement true,
6 if a test revealed 80 percent or an average of 84 per-
7 cent, then the rolling was ended?

8 BY WITNESS MCKAY:

9 A That is correct.

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1 WITNESS PETTERSSON: Can I amplify that
2 answer a little bit?

3 MR. SINKIN: Certainly.

4 WITNESS PETTERSSON: The rolling continued
5 on some occasions until the test results had been
6 reported by PTL to the construction personnel.

7 BY MR. SINKIN:

8 Q Let me understand that. If there someone
9 standing right near the roller who is doing the test?

10 BY WITNESS PETTERSSON:

11 A Yes, I can explain further to you. The field
12 test is obtained, and as Mr. McKay said in an earlier
13 statement, it is required -- it's necessary to take
14 the sample back to the laboratory for the moisture
15 determination before you can determine what the precise
16 results are.

17 This takes some period of time -- maybe half
18 an hour or so, maybe an hour. During that period, on
19 some occasions, there is additional rolling performed.

20 BY WITNESS LOGAN:

21 A I would like to make one other clarifying
22 statement.

23 On your question about the reverse of the
24 question, it's not 80 or. It had to be past both 80
25 and 84.

7-10

Q Oh, all right.

Was it the usual practice that whoever was rolling a given lift would keep on rolling until they got back with the results, or would they go on and do another lift?

BY WITNESS PETTERSSON:

A I would say it was a common practice.

Q Common practice.

On Page 25 -- the panel has answered this question ... talking about the PTL replacing its defective equipment used for the maximum density tests.

It says, "The untested backfill samples which had been collected during the period when the equipment was not functioning were subsequently tested and accepted."

Can you explain to me how many samples there were and how they were stored during the period they were waiting for adequate equipment?

BY WITNESS McKAY:

A I'm not sure of how many samples --

BY WITNESS LOGAN:

A There were 15 samples.

BY WITNESS McKAY:

A Okay. There were 15 samples. These were stored in containers, sealed and identified as to the

1 location and date that they were obtained.

2 Q In discussing the soil boring program,
3 I'm not quite sure who was testifying, but you spoke
4 about drilling outside of the buildings in place. Was
5 any boring at all done that would actually go under a
6 building?

7 BY WITNESS PETTERSSON:

8 A No, we did not obtain any borings that would
9 actually go under a building. The only clarification
10 there might be, that the diesel generator building --
11 Unit 2 is, of course, not in place; and we had one
12 boring in that area.

13 But there was no boring under an existing
14 building.

15 Q The building hadn't been built yet?

16 BY WITNESS PETTERSSON:

17 A That's correct, yes.

18 MR. SINKIN: Mr. Chairman, I distributed
19 various documents on which we intend to cross-examine
20 this panel.

21 And this morning counsel for the Applicants
22 has given me three other documents that are apparently
23 responses to one of the documents that I was going to
24 introduce.

25 At this time I would like to mark for

7-12 1 identification -- maybe we'll take them one at a time.

2 The first document is a May 30, 1980 letter
3 from Mr. E. A. Turner to Mr. Sidell at the NRC that I
4 would ask be marked for identification as CCANP Exhibit
5 No. 23, I believe it is --

6 MR. GUTIERREZ: I believe it's Exhibit
7 24.

8 MR. JORDAN: The situation is that 23 was
9 not admitted, but it has been marked for identification,
10 so it would be 24.

11 MR. SINKIN: It remains marked for identi-
12 fication, okay.

13 I'm learning a little law here, anyway.

14 So then this would be marked for identifi-
15 cation as CCANP Exhibit No. 24.

16 I would ask that counsel for the Applicants
17 show the letter to the panel.

18 I think I have some additional copies, if
19 that would be helpful.

20 (The document above-referred to
21 was marked for identification as
22 CCANP Exhibit No. 24.)

23 SINKIN: I'll give you a chance to review
24 the document.

25 (Pause.)

7-13

1 BY MR. SINKIN:

2 Q Have you all had a chance to review the
3 document now?

4 BY WITNESS PETTERSSON:

5 A Yes, we have.

6 Q Are you familiar -- any of the panel --
7 familiar with this particular document?

8 BY WITNESS PETTERSSON:

9 A Yes, I am familiar with the document, and
10 Mr. Hedges and myself are familiar with the subject
11 that rests therein.

12 Q In this letter there are four areas identi-
13 fied where densities are potentially below the 80
14 percent relative density that the specification called
15 for.

16 Are those the four areas found in your
17 testimony on Page 26 at Line 10?

18 BY WITNESS PETTERSSON:

19 A Yes, sir.

20 Q Are those four areas that were not found at
21 the time the construction was done, but were found
22 later?

23 BY WITNESS PETTERSSON:

24 A That is correct. These areas were located
25 by the boring program.

Q I'd like, if you could and the last page of the document may help you do this -- it has a chart showing the locations of the buildings and the borings.

I'd like you, if you could, to give me as much detail on the location of the four areas. They are roughly located on that map.

I would be interested in how close they were to the buildings in question.

BY WITNESS PETTERSSON:

A Yes, sir. The areas we are concerned about -- I want to be sure I use the same area designations -- Area 1 is at Boring 204, which you will find immediately west of the Unit 2 containment building.

The area is adjacent to the so-called tandem gallery access shaft and is within the deep local excavation in which the containment building was constructed.

The area extends from this tandem gallery access shaft which protrudes to the west from the containment building a distance of about 30 feet, approximately.... the overall dimension.

It is an L-shaped area. The overall east/west dimension, which includes a portion yet south of this access shaft ---the overall dimension is about 70 feet.

7-15

1 Likewise, in the north/south direction of
2 this L-shaped area, it's approximately 70 feet.

3 But the area is confined essentially between
4 this access shaft and the excavation slope.

5 The next area -- Before I leave --
6 Yes.

7 Q Before you leave Area 1, I just want to get
8 it clearly in my mind. When you talk about the
9 dimensions of 70 feet and 70 feet, you're talking about
10 surface measurements?

11 BY WITNESS PETTERSSON:

12 A I am talking about horizontal dimensions
13 at the depth of approximately 70 feet. That is the depth
14 for this --

15 Q That's where it was found?

16 BY WITNESS PETTERSSON:

17 A Where it was found, yes, sir.

18 Q And how thick was it?

19 BY WITNESS PETTERSSON:

20 A It has a varying thickness. The deepest
21 portion of this lift -- We're talking about one lift
22 now specifically, which is the first lift immediately
23 above the subgrade -- was approximately two feet at the
24 southernmost end, tapering off to approximately one foot
25 at the northernmost boundary.

7-16

1 There were in the same area isolated density
2 indication of slightly higher elevation. But this
3 lift at the bottom was approximately two foot thick.
4 Maximum.

5 Q Maximum. And then it tapered down to one
6 foot?

7 BY WITNESS PETTERSSON:

8 A It tapered to one foot towards the northern
9 boundary.

10 Q How many lifts were placed above that
11 lift? You said this is the lowest?

12 BY WITNESS PETTERSSON:

13 A All together we had approximately 70 feet
14 of backfill, and I would venture to guess that we
15 probably have maybe 50 lifts on top of that.

16 Q Okay. Moving to Area 2 --

17 BY WITNESS PETTERSSON:

18 A Yes. Area 2 is located to the northwest of
19 the Unit 2 containment building.

20 It is -- I would have to give you some
21 approximate dimensions or distances from the building.
22 I would say it's about 50 feet from the building.

23 It's an isolated area within the backfill.

24 - - -

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8-1

1 I will recall that this area was determined
2 to be something like six by ten feet.

3 Do you remember more precisely?

4 BY WITNESS HEDGES:

5 A About six feet wide and ten or twelve feet
6 long.

7 Q And how deep?

8 BY WITNESS PETTERSSON:

9 A One lift.

10 Q As I look at the chart, at the back, No. 1
11 and No. 2 are Nos. 204 and 205.

12 BY WITNESS PETTERSSON:

13 A Yes.

14 Q And they appear relatively close together.
15 Of course, this scale is --

16 BY WITNESS PETTERSSON:

17 A Yes. Yes. On this scale they certainly do.

18 Boring 204 -- well, let me say that they are
19 shown in the correct relative location to each other and
20 relative to the buildings.

21 Boring 204 was within the local excavation
22 for the Unit 2 containment building.

23 Boring 205 is immediately outside the crest
24 of that local excavation, and the horizontal distance
25 between the two borings is probably about 100 feet.

8-2

1 Q Well, I think you may have answered what my
2 question was going to be, but let me try anyway.

3 BY WITNESS PETTERSSON:

4 A Sure.

5 Q They were not part of the same sequence of
6 rolling?

7 BY WITNESS PETTERSSON:

8 A That is correct. And I was also, with my
9 question, when I'm speaking about the local deep
10 excavation trying to explain that the Boring 204 was
11 investigating this fairly large depth for backfill,
12 while 205 was in a more shallow location.

13 Borings 208 and 209 are both on the east side
14 of the Unit 2 mechanical-electrical auxiliary building.

15 The distance from the building is probably
16 between 60 and 80 feet.

17 Q And the dimensions?

18 BY WITNESS PETTERSSON:

19 A Both of these borings had one low blow count
20 indication in each one of them, and we could not -- we
21 drilled adjacent to these, like ten feet away from them.
22 We did not find any more material that was low density.
23 Our interpretation is again that it is an area typically
24 six by ten, six by twelve, and one lift thick.

25 Q One more. Area 4.

1 BY WITNESS PETTERSSON:

2 A Yes. Area 4 is on the west side of the
3 Unit 2 fuel handling building. It was drilled, actually,
4 very close to the building.

5 The fuel handling buildings are also seated,
6 the ower tier of the fuel handling buildings are also
7 seated within the deep local excavation.

8 However, that excavation only extends some
9 five or ten feet out from the building, and we purposely
10 drilled only about five or ten feet away from the building
11 in order to try to get all the way down, and we did, and
12 there we found one lift again close to the subgrade which
13 extended along the building.

14 The width was again five feet, or slightly
15 more. The length along the building was -- I have to
16 confirm this with Mr. Hedges, but I believe it was like
17 30 or 40 feet.

18 Is that it?

19 BY WITNESS HEDGES:

20 A Yes, about 30 feet along the building, as
21 I recall it.

22 Q One lift thick, again?

23 BY WITNESS HEDGES:

24 A Yes, I think so.

25 / / /

8-4

1 BY WITNESS PETTERSSON:

2 A Let me point out for completeness that in
3 that area we had actually two zones. There was also one
4 limited low density indication at a higher elevation.

5 Q I'm sorry; you said there were two what?

6 BY WITNESS PETTERSSON:

7 A Two zones, z-o-n-e-s.

8 Q Okay. And 203 and 204 are both in the local
9 excavation area?

10 BY WITNESS PETTERSSON:

11 A That is correct.

12 Q Were they both part of the same lift?

13 BY WITNESS PETTERSSON:

14 A No, sir, they were not connected.

15 Q Not connected.

16 By the way, in the chart attached to this
17 letter there's a legend that has numbers and buildings,
18 and No. 6 is the diesel generator building, and I can't
19 find No. 6 on the chart.

20 Could any of you help me find the exact
21 location of that building?

22 BY WITNESS PETTERSSON:

23 A Yes, we certainly can. The diesel generator
24 buildings are on the north side of the mechanical-
25 electrical auxiliary building. You will find them at

1 Boring Locations 106 and 206.

2 What I believe happened here is that there
3 was a No. 6 there and the boring symbol covered over
4 the building number.

5 Q I see. Is the diesel generator building the
6 same as the diesel fuel storage building, or is the
7 diesel fuel storage building a separate building?

8 BY WITNESS PETTERSSON:

9 A I believe that's a separate building. I'm
10 not really certain about the arrangement for storage of
11 the diesel fuel, but this specific building is called
12 the diesel generator building.

13 Q Does anyone else on the panel know the answer
14 to that question?

15 BY WITNESS HEDGES:

16 A Let me ask for a clarification. You're
17 talking about the diesel generator building and the
18 diesel fuel building?

19 Q Right, and I have on occasion seen a reference
20 to a diesel fuel storage building, and I was wondering if
21 that --

22 BY WITNESS HEDGES:

23 A You're not talking about the fuel handling
24 building?

25 Q No.

1 BY WITNESS HEDGES:

2 A Okay. I don't know about the diesel fuel
3 building.

4 Q Mr. Hedges, you were project manager for
5 Woodward-Clyde for five and a half years?

6 BY WITNESS HEDGES:

7 A That's correct.

8 Q During that period were there instances where
9 problems were discovered with backfills, such as
10 contamination or the wrong material used, or incomplete
11 compaction?

12 BY WITNESS HEDGES:

13 A There was one so-called contamination of the
14 backfill that we were involved in. We did a study to
15 show that the contaminated backfill did not have any
16 effect on the settlement characteristics of the building.

17 Q Where was that located?

18 BY WITNESS HEDGES:

19 A North of the -- north and slightly west of
20 the Unit 2 ME Aux building.

21 Q The mechanical-electrical auxiliary building?

22 BY WITNESS HEDGES:

23 A Yes.

24 BY WITNESS PETTERSSON:

25 A E cuse me. Let me answer that location a

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1 little bit further.

2 The contaminated backfill was found on the
3 northern side of the Unit 2 mechanical-electrical
4 auxiliary building at the approximate location where
5 the diesel generator building subsequently would be
6 constructed.

7 Q When was that found?

8 BY WITNESS PETTERSSON:

9 A It was found in the late summer of '78.

10 Q How close to the MEAB 2 building was that?

11 BY WITNESS PETTERSSON:

12 A This contaminated material -- and we
13 determined the extent by a boring program conducted by
14 Woodward-Clyde -- was found to actually extend in under
15 the auxiliary building.

16 At the time when the material was discovered
17 part of the foundation mat for the building had been
18 constructed, and in some areas we had put in the mud seal,
19 which is a concrete mat on which the rebars are placed,
20 and we actually moved the drilling rigs up in the area
21 and drilled actually in the building area.

22 Q And you found contaminated backfill material
23 in the building itself?

24 BY WITNESS PETTERSSON:

25 A Not in the building itself, of course, but

below the foundations, yes.

Q And what did you do about that?

BY WITNESS PETTERSSON:

A Well, the disposition was "use as is," based on Woodward-Clyde's evaluation.

BY WITNESS HEDGES:

A We drilled 15 borings to find the areal extent of this contaminated backfill. The borings showed that it was about three inches thick and it was a sand, clay and lime stabilized clay.

In addition to the 15 borings, we took two more borings to get undisturbed samples. These undisturbed samples were tested in the laboratory in consolidation tests which determines the settlement characteristics of the material.

During the sampling and data from the consolidation tests showed that the material was very hard, actually had a cemented characteristic, and that it would not settle.

Consequently, it did not form a settlement problem or a bearing problem on the -- as part of the structural backfill.

BY WITNESS PETTERSSON:

A A small correction here to -- Mr. Hedges said three inches. I believe the maximum thickness was

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1 actually three feet.

2 Q Is that correct, Mr. Hedges? Three feet?

3 BY WITNESS HEDGES:

4 A Yes.

5 Q Let me understand; you went in and did a
6 boring program. The material you took out in the boring
7 program you tested and you concluded that the material
8 taken out was not contaminated?

9 BY WITNESS HEDGES:

10 A No We took out the contaminated material,
11 the so-called contaminated material.

12 Now, the contaminated material was not the
13 normal structural backfill material. It was a -- it had
14 structural backfill, clay, and lime stabilized clay in it.

15 We took and tested the, quote, contaminated
16 backfill material.

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1 BY WITNESS PETTERSSON:

2 A Maybe I should explain the general term
3 contaminated material. We use that as a generic term for
4 anything, any source material found within the backfill
5 that does not conform to the structural backfill
6 specification requirements.

7 Q Let me continue a little further, Mr. Hedges.

8 BY WITNESS HEDGES:

9 A Let me add: This contaminated backfill was
10 a leftover ramp for construction.

11 Q But the material, itself, was not what was
12 supposed to be there. Category I, I assume, backfill was
13 supposed to be there.

14 BY WITNESS HEDGES:

15 A That's right.

16 Q Did you discover how the ramp material was
17 still there? Was any exploration made to determine where
18 this --

19 BY WITNESS HEDGES:

20 A Our exploration determined the areal extent
21 of this contaminated material that was still in the
22 structural backfill.

23 Q And that material did run under the mud seal.

24 BY WITNESS HEDGES:

25 A It ran under the mud seal area of the ME Aux

1 Building, yes.

2 Q And the decision was not to try and take it
3 out?

4 BY WITNESS HEDGES:

5 A Yes. The decision was not to take it out,
6 because the material proved to be exceptional competent.

7 BY WITNESS PETTERSSON:

8 A Let me clarify that. Of course, the material
9 was not directly under the mud sealer. We had some 10 to
10 15 feet of backfill on top of this material. If it would
11 have been right to the surface we could, of course, have
12 easily have removed it, but there was structural backfill
13 on top of it.

14 Q Could you have removed it without removing
15 the mud seal?

16 BY WITNESS PETTERSSON:

17 A No, It would have required removal of whatever
18 concrete was placed in that area.

19 MR. SINKIN: Mr. Chairman, I would move the
20 admission of CCANP Exhibit 24 into evidence.

21 JUDGE BECHHOEFER: Any objections?

22 MR. GUTTERMAN: Mr. Chairman, I would just
23 suggest that this Exhibit 24 is the second of five letters,
24 all concerned with this same 50.55(e) item and perhaps
25 we could get them all in at the same time.

MR. SINKIN: No problem with that.

JUDGE BECHHOEFER: If we do, we had better identify them.

MR. SINKIN: I don't have the rest of them here with me. I only have this one.

The primary use being made of it was the various areas identified, that's what it was useful for to me, but if you would like to do that on redirect it is no problem.

MR. GUTTERMAN: Perhaps I'm confused, but my recollection was that Mr. Sinkin showed me one other of the five yesterday.

MR. SINKIN: Let me check.

MR. GUTTERMAN: And I have copies of the other three.

JUDGE BECHHOEFER: Is this March 21st letter one of them?

MR. GUTTERMAN: Yes, Mr. Chairman, I believe it.

MR. SINKIN: That is correct, and I would ask that that be marked CCANP Exhibit 25, and that will be two out of the five.

MR. GUTTERMAN: Mr. Chairman, I'm prepared to distribute right now the other three, which are a September 23rd, 1980 letter, a December 12, 1980 letter, and a February 27, 1981 letter, the latter being the final

1 report on this item.

2 JUDGE BECHHOEFER: You may distribute them.

3 Are you going to put Applicant numbers on
4 those?

5 MR. SINKIN: If it would be more convenient
6 for the record I would be happy to just put our numbers
7 on those.

8 MR. REIS: Why don't we --

9 MR. GUTTERMAN: That will be fine.

10 MR. REIS: Why don't we put them in right now,
11 all together, with the CC numbers --

12 MR. SINKIN: CCANP numbers?

13 MR. REIS: CCANP numbers, and, of course, it
14 is recognized that they are letters written by the
15 Applicant, and they are statements made by the Applicant,
16 and not CCANP. But why don't we just put them in so we
17 have them all together.

18 MR. SINKIN: Then yours would be 26, 27 and
19 28.

20 MR. JORDAN: Could we have a clarification of
21 which is 26, 27 and 28?

22 JUDGE BECHHOEFER: The way I have marked them,
23 if no one has any objection, I have just done them
24 chronology.

25 The letter dated September 23 is CCANP 26. The

1 letter dated December 12, 1980, is CCANP 27. And a letter
2 dated February 27, 1981 is CCANP 28.

3 I would at least propose that they be marked
4 that way, if there is no objection.

5 MR. SINKIN: That's fine. ;

6 (CCANP Exhibit Nos. 25 thru
7 28 were marked for
8 identification.)

9 JUDGE BECHHOEFER: Are you going to have them
10 all put in?

11 MR. SINKIN: I would move all of them into
12 evidence, Your Honor.

13 JUDGE BECHHOEFER: Any objection?

14 MR. GUTTERMAN: No objection.

15 MR. GUTIERREZ: Based upon the Applicant's
16 submittal that they are authentic, we have no objection.

17 JUDGE BECHHOEFER: Absent objection, they will
18 be admitted.

19 (CCANP Exhibit Nos. 24 thru
20 28 were received in evidence.)

21 MR. SINKIN: Actually, Mr. Chairman, before
22 proceeding to my next line of questions I wish to
23 distribute another document, based on the most recent
24 testimony, which I will ask be marked for identification
25 as CCANP 29.

(CCANP Exhibit No. 29 was
marked for identification.)

MR. SINKIN: I ask that counsel for the
Applicants give the panel copies of this memorandum for
review.

JUDGE BECHHOEFER: Do you wish to have this
marked?

MR. SINKIN: Yes, as CCANP Exhibit 29 marked
for identification.

(Documents handed to panel.)

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1 BY MR. SINKIN:

2 Q Mr. Pettersson, have you had a chance to
3 review the document, or Mr. Hedges?

4 BY WITNESS PETTERSSON:

5 A Yes.

6 MR. AXELRAD: Mr. Chairman, before we proceed
7 with this further examination I would like to get one
8 matter clarified.

9 I had been our understanding that had been
10 intended to be used for cross-examination of this panel
11 would be provided to us in advance.

12 I don't know how familiar the panel is with
13 this particular document, but we thought that the Board's
14 ruling in that regard was in order to make sure that
15 documents could be authenticated in advance, that examina-
16 tion could take place in the proper fashion, and that any
17 delay in the proceeding could be avoided.

18 I do not understand why this document could
19 not have been provided to us last night at the same time
20 that the counsel for Intervenors gave us the other
21 documents. We would be able to then review and ascertain
22 whether or not they are complete.

23 MR. GUTIERRE: It was the Staff's understanding
24 that any documents that a party wishes to move into
25 evidence should be circulated in advance among the parties

1 for review, and if it is some other party's document for
2 them to authenticate and save time.

3 If Mr. Sinkin does intend to move this into
4 evidence, we agree with the Applicant. On the other hand,
5 if his only purpose is to use it in his cross-examination,
6 it is the Staff's understanding that those documents did
7 not have to be produced in advance, it would seem to
8 undercut some of the purpose of cross-examination.

9 In other words, if he is only using it as an
10 impeaching document.

11 MR. AXELRAD: Well, I would just repeat, that
12 was completely contrary to our understanding of the
13 situation that the Board wanted to accomplish.

14 I might additionally add that I am not certain
15 when these particular documents, or any other similar
16 documents were obtained by the Intervenors, whether or
17 not those documents were supposed to have been provided
18 to us in connection with previous discovery requests. We
19 have not pursued that matter because we were satisfied that
20 we were going to be getting information ahead of time if
21 was going to relate to any of the cross-examination of
22 these panels.

23 We think that the entire purpose of the
24 Board's ruling was to assure that we could get a complete
25 record, as quickly as possible, with avoidance of delays

1 and review of material that had not been previously seen
2 and reviewed by the parties.

3 And it appears to us that a late production of
4 material of this kind can only lead to a delay of the
5 completion of the record in this proceeding.

6 MR. SINKIN: Mr. Chairman, I would respond
7 with a couple of things. First of all, this document was
8 not in our possession during the discovery period and
9 could not have been produced to the Applicants at that
10 time.

11 Secondly, the reason the document is being
12 brought out at this time is that we are not certain that
13 the statements that have been made just now about this
14 incident are consistent with the document.

15 So it is in the nature of an impeachment
16 document, if that is what it turns out to do.

17 MR. JORDAN: I would like to have my under-
18 standing, Your Honor, of the situation with respect to
19 documents which I think parallels the Staff's, and that
20 is that if a document is to be used for impeachment,
21 generally it is not needed -- you don't know whether it
22 is needed until you reach the point of using it for
23 impeachment. So it doesn't really fall under the
24 proposition, anyway.

25 The purpose was to provide documents for

-10 1 authentication in order to speed the admission of documents
2 into evidence. So that does not cover other documents to
3 be used in cross-examination and cannot reasonably cover
4 any impeachment documents, whether they are eventually
5 put into evidence or not.

6 Certainly I am not going to provide documents
7 that I'm going to use on cross-examination that I don't
8 need to provide for authentication purposes. That sort
9 of thing would have been covered under discovery or some
10 other approach earlier on.

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1 MR. AXELRAD: I might just point out one last
2 item, Mr. Chairman. It is strange how two-year-old items
3 suddenly materialize.

4 MR. JORDAN: Well, we agree that it is strange.

5 MR. SINKIN: It is strange, yes; it's strange
6 to us, too, but people seem to think that it's important
7 that we have these things, so we get them.

8 JUDGE BECHHOEFER: Our recollection is pretty
9 much the way the Staff spelled it out, but I might add,
10 if you're going to move this into evidence, we want to
11 give the Applicants a chance to look at the authenticity
12 of it, and we don't want to waste time just trying to
13 authenticate it through questioning the panel, if we can
14 help that.

15 MR. SINKIN: Well, Your Honor, if I moved it
16 into evidence it would certainly be subject to authenti-
17 cation by the Applicants.

18 At the same time, the panel has clearly
19 testified to this very event, at least in my fiew, and
20 we'll determine if that's true, and we may be able to
21 authenticate the document by just asking the panel if
22 they're familiar with it.

23 MR. GUTIERREZ: Mr. Chairman, the Staff would
24 only make the observation that that would certainly
25 circumvent the Board's prior ruling if Mr. Sinkin takes

1 the position that he can impeach and then move it into
2 evidence subject to authentication. It seems like it
3 would not serve the purpose that the Board originally
4 wanted it to serve, namely, to speed up the hearing.

5 JUDGE BECHHOEFER: Right. We wanted to avoid
6 questions merely on authentication.

7 MR. SINKIN: That's fine.

8 JUDGE BECHHOEFER: Right. Okay.

9 MR. JORDAN: The problem, Your Honor, is
10 that we may have to get into authentication in a given
11 instance if it is necessary to put a document in for
12 purposes of impeachment, but the whole -- as Mr. Gutierrez
13 pointed out earlier, the whole point of cross-examination
14 and impeachment would be destroyed if we were required
15 to turn over potential impeachment documents.

16 Now, with respect to those documents, we may
17 have to get into authentication problems, but your choice
18 is between potential use of effective impeachment, which
19 gets to veracity, and the whole story, or a few minutes
20 of convenience, and I don't see much choice there.

21 JUDGE BECHHOEFER: Well, I'm not saying you
22 can't ask questions on it.

23 What I'm saying is, before it gets admitted
24 why waste the time to authenticate it?

25 MR. AXELRAD: Mr. Chairman, I'm not sure I

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1 understand what is happening here.

2 This is not a criminal trial. There is no
3 question of -- has been raised with respect to the
4 credibility or veracity of these witnesses.

5 The entire suggestion that somehow materials
6 are going to be used for impeachment purposes they can
7 then circumvent the entire purpose of what we thought the
8 Board was trying to accomplish, and which we think that
9 the NRC rules were intended to accomplish, that materials
10 are produced on discovery in advance of trial so that all
11 parties are informed as to their information which is
12 going to be used in the course of the proceeding.

13 All of that can be circumvented by this
14 simple approach that the Intervenors are taking. They
15 can now avoid producing any documents for authentication
16 at all simply by claiming that any document they use from
17 now on are all being used for purposes of impeachment and
18 then will be admitted into the record.

19 It appears to us that this is the first of a
20 number of panels that are going to be presented, that
21 are going to be testifying to technical matters, and that
22 the whole purpose of this proceeding and the Board's
23 objectives to get an expedited proceeding will be best
24 observed if each party is to provide in advance the
25 materials upon which it plans to rely for cross-examination,

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1 and the fact that these materials were obtained after the
2 discovery period should not change either the Board's
3 purpose or the way this proceeding should be conducted.

4 MR. REIS: First of all, all parties have an
5 obligation to -- under discovery to continue -- under the
6 rules to continue to provide any new material they get
7 if it falls within a category for which discovery is
8 called for.

9 Secondly, this is not the ordinary NRC
10 proceeding. We do have issues of character and competence,
11 and although in the ordinary proceeding where those are not
12 issues in a proceeding maybe there are some rules on full
13 disclosure ahead of time.

14 Thirdly, the document, if it does come in,
15 subject to later authentication, would come in only for
16 the purpose, of course, to -- of impeaching the witness
17 and not for the truth of any matters stated in the
18 document.

19 Now, if the matter is intended to be used
20 whether in the course of impeachment or other, to prove
21 something in the document as the document itself, that
22 would be a different matter and certainly could not come
23 in for that purpose.

24 MR. SINKIN: No problem with that.

25 MR. AXELRAD: If I can respond to what Mr. Reis

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1 just said, the managerial competence and character of
2 the company is involved here.

3 There has been no indication, that I'm aware
4 of, that any of these witnesses, or technical witnesses,
5 are being -- that their character and competence is at
6 stake here, and therefore the remarks of Mr. Reis that
7 this is not a usual NRC proceeding, I think has no
8 relevance to the production of this information ahead
9 of time.

10 JUDGE BECHHOEFER: We believe the Staff did
11 state the rule the way it should be enforced, but for
12 authentication purposes, though, to the extent you don't
13 have to -- we don't want questions purely for authenti-
14 cation, if you can help it, because that you can try to
15 work out later.

16 MR. SINKIN: Yes. Of course, I probably
17 could have asked all those questions ten times during
18 the course of these objections, but I would like to
19 proceed to ask questions from the document rather than
20 worry about authentication.

21 JUDGE BECHHOEFER: Right. Right.

22 BY MR. SINKIN:

23 Q I believe the panel had time to review the
24 document, being a two-page letter, and the rest of us
25 having spent a considerable amount of time on other

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1 matters, any member of the panel that would care to
2 respond:

3 Was this contaminated material discovered
4 by accident?

5 BY WITNESS PETTERSSON:

6 A Well, I would like to explain the -- probably
7 the entire situation, if I may, from the beginning to
8 the end, about what we previously have stated here in
9 respect to what I now have read in this memorandum.

10 The contaminated material was discovered
11 during cleaning out of a sump. This was previously
12 discussed to some extent by -- in the expert committee's
13 testimony.

14 This sump was located to the -- immediately
15 to the northeast of the planned location for the Unit 2
16 diesel generator building.

17 Sumps like these are commonly used in earth
18 work construction for gathering surface water runoff
19 while construction is going on, for example, for place-
20 ment of the backfill.

21 When it comes time to backfill a sump location
22 like that, one has to clean out whatever sediments have
23 gathered in the bottom of the sump pit.

24 And one also has to clean out any loose
25 material in the site slopes, and construction was doing

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1 this, and in the process of doing so they recognized
2 material in the southern side of this sump, which was
3 not Category I structural backfill.

4 They tried to determine the extent of this
5 contaminated material by further excavation into the
6 south slope of the pit, and eventually they brought in
7 a backhoe to try to explore the extent of the backfill
8 by trenching.

9 They did trench towards the south, towards
10 the -- over the constructed seal slab of the Unit 2
11 mechanical-electrical auxiliary building.

12 As they advanced this trench, they got within
13 a very short distance of the building slab that already
14 was in place.

15 At that time it was decided that it was not
16 advisable to pursue the exploration of the extent of the
17 contaminated material by further trenching.

18 Furthermore, in the bottom of this trench
19 the material was quite wet, it was saturated, and at that
20 time, as very precisely stated in this memorandum,
21 Douglas Robertson, who was at that time still the senior
22 technical field engineer -- and I'd like maybe to take
23 the opportunity here to correct what I said before, that
24 he was moved out of that position in the middle of '78,
25 evidently he was still in that position in October of '78,

1 however, when this memo was written in February of '79
2 Mr. Walter Bray had taken over that position, so that
3 transfer was later in the year than I previously had
4 indicated.

5 At any rate, Douglas Robertson judged that
6 it would be necessary to backfill this trench in order
7 to prevent any further loosening of the backfill.

8 And the way he did that was by just placing
9 backfill loosely into the trench, so at that time every-
10 body knew that we had the trench, we'd lose backfilling.

11 Now, this sump excavation that I previously
12 discussed was subsequently, or immediately after this
13 trenching event, was backfilled in the regular fashion
14 by placement and vibratory compaction.

15 So at that time we recognized two particular
16 conditions. We had discovered this contaminated material
17 in the ramp.

18 We furthermore knew that we had a -- the trench
19 would lose backfill in the bottom.

20 The only way that we could proceed with an
21 exploration of the extent of the contaminated backfill
22 was by taking the borings, and I and Mr. Hedges have
23 previously addressed that boring program to you, and
24 that boring program demonstrated that the contaminated
25 backfill would not be detrimental at all to the foundation

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performance.

I believe that explains it.

Q So the borings were done to determine the extent of the contaminated backfill?

BY WITNESS PETTERSSON:

A That is correct; and the properties of the contaminated backfill.

Q And the properties?

BY WITNESS PETTERSSON:

A And the properties, yes, sir.

Q I believe you testified earlier that those properties were sand, clay, and one other item, maybe some lime?

BY WITNESS HEDGES:

A Lime stabilized material.

Q And would that be --

BY WITNESS HEDGES:

A It was a lime stabilized clay.

Q Okay. And those materials would be what you would expect to find in a ramp, a construction ramp?

BY WITNESS HEDGES:

A Typical roadway materials, yes.

Q That ramp would have been there for what purpose?

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1 BY WITNESS HEDGES:

2 A To allow construction equipment to come down
3 into the excavation to work at that level of the
4 excavation.

5 Q Would procedures at the plant have required
6 the removal of that ramp before backfill?

7 BY WITNESS PETTERSSON:

8 A That is correct.

9 Q Who made the decision that the ramp would not
10 be removed?

11 BY WITNESS PETTERSSON:

12 A That was a decision made by Brown & Root,
13 subsequently approved by HL&P, based on recommendations
14 from Woodward-Clyde.

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1 BY MR. SINKIN:

1 1 2 Q You stated that the sumped excavation was
3 backfilled in the regular manner with a lift and a
4 vibratory --

5 BY WITNESS PETTERSSON:

6 A Yes, that is correct.

7 Q And the trench that had been dug, what was
8 done with that?

9 BY WITNESS PETTERSSON:

10 A The trench that was dug was subsequently
11 compacted by vibrification, as is explained in our pre-
12 filed testimony.

13 And that was also discussed in the expert's
14 testimony.

15 Q Referring to the letter from Mr. Bray, it
16 talks about compaction was not allowed, nor correctly,
17 compaction could not be performed.

18 Are you familiar with what compaction he
19 is saying could not be performed?

20 BY WITNESS PETTERSSON:

21 A Yes, sir, I am --

22 MR. GUTIERREZ: Objection. This document
23 has only been introduced so far as impeachment. He's
24 now questioning him on the substance of what the letter
25 addresses.

11-2 1 MR. SINKIN: He says he's familiar with the
2 particular incident. Rather than go from the document,
3 was there an area in which there was some question about
4 whether compaction could be performed?

5 WITNESS PETTERSSON: Yes. I have to pre-
6 face this before I make the statement -- this will be
7 reference to Paragraph 3 of a document that I don't --
8 that I'm not familiar with.

9 However --

10 BY MR. SINKIN:

11 Q Excuse me, Mr. Pettersson, I'm withdrawing
12 the question as related to the document and just asking
13 you a question, are you familiar with an area --

14 BY WITNESS PETTERSSON:

15 A Yes, sir, I certainly am. What's made
16 reference to here is the bottom of this trench.

17 Q I see. But it was subsequently --
18 BY WITNESS PETTERSSON:

19 A It was subsequently densified by vibrifi-
20 cation.

21 Q Yes.
22 Is this location of this ramp material at
23 all related to any of the four areas we discussed
24 earlier where borings found difficulties?

25 ///

1 BY WITNESS PETTERSSON:

2 A No, sir.

3 Q When you were deciding on your boring program,
4 you were familiar with the incident of the ramp, were
5 you not?

6 BY WITNESS PETTERSSON:

7 A Yes.

8 Q Did you feel there was no reason to do any
9 borings in that area, that you knew what was in that
10 area? Or did you do borings in that area?

11 BY WITNESS PETTERSSON:

12 A Well, yes. After vibrification, we per-
13 formed ten borings to verify that the densification had
14 been achieved.

15 Q That was at the time of the incident then
16 in --

17 BY WITNESS PETTERSSON:

18 A That was at the particular time of the
19 incident ... upon completion of the vibrification.

20 Q Okay. At the time of the subsequent --
21 I'm sure I confused you using "boring program" twice.
22 In the 1980 boring -- the response to the order to show
23 cause boring program, did you go back to that area and
24 take another look?

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1 BY WITNESS PETTERSSON:

2 A We had one boring in the general vicinity
3 of this area. That's Boring No. 206.

4 Q 206?

5 BY WITNESS PETTERSSON:

6 A Yes.

7 Q But no problems were found in Boring No.
8 206?

9 BY WITNESS PETTERSSON:

10 A 206 was a good boring.

11 MR. SINKIN: Earlier, Mr. Chairman, I dis-
12 tributed an I&E Report, 79-02.

13 JUDGE BECHHOEFER: Is that the one you had
14 originally marked as Exhibit 11?

15 MR. SINKIN: Yes. It has been stipulated
16 to already and admitted into evidence, but copies were
17 not available as of this time, so I went and made
18 copies of the document.

19 (Pause.)

20 MR. SINKIN: Has the panel had a chance to
21 review that?

22 I would ask Applicants' counsel. We did
23 give them to you yesterday.

24 MR. GUTTERMAN: I can't find the copy right
25 now.

1 MR. SINKIN: They were the ones that I
2 wrote on that were marked as Exhibit 11.

3 JUDGE BECHHOEFER: Off the record a minute.

4 (Discussion off the record.)

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11-6

1 BY MR. SINKIN:

2 Q Has the panel had a chance to review --
3 Let me call your attention particularly to Page 5,
4 wherein I&E Report 79-02 --

5 BY WITNESS PETTERSSON:

6 A Yes, sir.

7 Q Does that I&E Report, which refers to
8 contaminated backfill in the Unit 2 mechanical electri-
9 cal auxiliary building area refer to the study we've
10 just been discussing?

11 BY WITNESS PETTERSSON:

12 A Yes, sir.

13 Q Just one point of clarification. It
14 refers to a maximum differential settlement between
15 the MEA Building and the Diesel Fuel Storage Building?

16 BY WITNESS PETTERSON:

17 A Yes. I see now the basis for the con-
18 fusion about that term. It is not the Diesel Fuel
19 Storage Building. It is the Diesel Generator Building.

20 Q That's all I have on that exhibit.

21 JUDGE BECHHOEFER: I take it that one is in
22 evidence already.

23 MR. SINKIN: Yes, that has been stipulated
24 to as CCANP Exhibit 11.

25 JUDGE BECHHOEFER: All right.

11-7

1 MR. SINKIN: One final exhibit that was
2 distributed yesterday is a February 3rd letter to Mr.
3 Seyfrit from Mr. Oprea, but signed by Mr. Barker.

4 JUDGE BECHHOEFER: Is that going to be
5 30?

6 (The document above-referred to
7 was marked for identification
8 as CCANP Exhibit No. 30.)

9 MR. SINKIN: I'll give you a moment to review
10 this document.

11 (Pause.)

12 BY MR. SINKIN:

13 Q As I read that letter, there was need to
14 remove more than 11,000 tons of backfill because the
15 Unit 2 mechanical electrical auxiliary building was
16 tilting, and the base mat was curving.

17 Is that how you recall this particular
18 incident?

19 BY WITNESS PETTERSSON:

20 A The need for removing backfill on the south
21 side of the ME Aux building was to create a balanced
22 loading condition for the building foundations.

23 An unbalanced loading condition had been
24 created -- or had been caused by the planned backfill
25 on the south side of the building, which was intended to

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1 have immediately proceeded up around the east and
2 northern part of the building.

3 However, because of the problems that were
4 discovered with the ... central cooling water system
5 pipe being -- requiring re-examination on the welding,
6 the backfill could not be placed as previously
7 scheduled in the area to the northeast and north of the
8 mechanical electrical auxiliary building.

9 Accordingly, a situation developed where we
10 had backfill to the grade at approximate elevation, plus
11 26 on the south side, but only to approximate elevation
12 plus 10 in the vicinity of the northeast corner of the
13 building.

14 That difference in load did cause a tilting
15 of the building to the south, which was discovered to
16 exceed the overall criteria for tilt of the building.

17 Now, the means for correcting this was to
18 remove backfill on the south side of the building.
19 And it's stated in here: removal of 11,000 tons. This
20 amounts to removal to a depth of eight feet -- approxi-
21 mately 1 KSF.

22 In addition to that, we concentrated the
23 continued construction of the building itself,
24 specifically the concrete placements, to the northern
25 half of the building.

11-9

1 These directions, taken together, did bring
2 back the building to a position within the criteria.
3 However, I would like to explain here that the tilt that
4 had occurred to the building at this time did not at
5 all affect the integrity of the building or systems.

6 A situation like this would become a concern
7 at the time when the buildings would be erected and
8 piping systems installed.

9 And what we were worried about was that if
10 we don't correct the tilt to within the criteria in a
11 timely manner -- that is, now as has been done ... this
12 correction could take place later when we would have
13 additional systems installed.

14 And that was the situation that we were
15 avoiding.

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1 BY MR. SINKIN:

2 Q In reference to the mat, that is the base map
3 of the building?

4 BY WITNESS PETTERSSON:

5 A That is correct, that is the base mat of the
6 building.

7 Q And the base mat of the entire building was
8 already in place?

9 BY WITNESS PETTERSSON:

10 A Yes.

11 Q But on the south side it had been backfilled to
12 26 feet, and on the north side it had only been backfilled
13 only plus 10. Plus 26 on the south side.

14 BY WITNESS PETTERSSON:

15 A Yes. The base elevation of the mat is a plus
16 four. The top of the mat is a plus ten. And then, of
17 course, the building walls had been erected on the south
18 side to accommodate the backfilling toleration plus 26.

19 There were also walls on top of the mat on the
20 north side.

21 Q And the problem in placing the proper amount
22 of backfill on the north side was emergency cooling water
23 piping weld problem.

24 BY WITNESS PETTERSSON:

25 A Yes. Of course, on the unforeseen rescheduling

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1 Of the construction activities, and, of course, that
2 specific item prevented the backfilling in that area.

3 MR. SINKIN: I would move CCANP Exhibit 30
4 into evidence, subject to authentication by the Applicant

5 JUDGE BECHHOEFER: That was distributed last
6 night, wasn't it?

7 MR. SINKIN: Yes.

8 MR. GUTTERMAN: Applicants have no objection.

9 JUDGE BECHHOEFER: Staff?

10 MR. GUTIERREZ: The Staff has no objection.

11 JUDGE BECHHOEFER: Without objection, the
12 document will be admitted.

13 (CCANP Exhibit No. 30 was
14 received in evidence.)

15 MR. SINKIN: That concludes my cross-examination
16 Your Honor.

17 JUDGE BECHHOEFER: Let's break an hour and a
18 half for lunch.

19 MR. AXELRAD: I didn't mean to interrupt. I
20 just wanted to ask how long the rest of the examination
21 of this panel is going to take.

22 What I would like to do is be able to plan the
23 rest of the afternoon and the evening, since we are having
24 an evening session tonight, as I understand it.

25 JUDGE BECHHOEFER: That is correct.

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1 MR. AXELRAD: Could the Board some idea, after
2 this panel we will then have Pettersson and White on the
3 FSAR statements.

4 JUDGE BECHHOEFER: That is correct.

5 MR. AXELRAD: Does the Board have any idea how
6 long the completion of this panel, plus the Pettersson/
7 White panel might take on the basis of estimates?

8 JUDGE BECHHOEFER: Wait a minute.

9 (Bench conference.)

10 MR. GUTIERREZ: Your Honor, with respect to my
11 original estimate we might want to add another half hour
12 to that, based on cross-examination so far.

13 (Bench conference.)

14 JUDGE BECHHOEFER: I'll say it looks like we
15 will be through with this panel by the dinner break,
16 perhaps a little before. It is hard for us to estimate
17 correctly.

18 MR. AXELRAD: That's helpful. All I wanted
19 to do is to be sure if we are going to finish with both
20 this panel and the Pettersson/White panel today, we would
21 have to make sure that the next panel would be available,
22 and I would want to make sure everyone understood what the
23 next panel was going to be.

24 I gather we will not go beyond the Pettersson/
25 White panel today.

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JUDGE BECHHOEFER: That's correct.

We would prefer if we get through with that panel slightly early we would prefer to break. I don't think it will be very early at all. It is hard to tell.

MR. AXELRAD: Then we would take up after those two panels, the next panel we would take up, which would be sometime tomorrow morning, I would assume, would be the McKay/Logan panel, as we discussed yesterday?

JUDGE BECHHOEFER: That's correct.

We will be in recess an hour and a half for the lunch break.

(Whereupon, at 12:30 p.m. a recess was taken, to reconvene at 2:00 p.m., the same day.)

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AFTERNOON SESSION

2:00 p.m.

JUDGE BECHHOEFER: Back on the record.

One of the rules we announced yesterday was that this facility does not permit, not only television but it doesn't permit tape recording either, and so a tape recorder should not be used in this facility.

That again is a rule of the facility, not of the Commission, but that's the rule.

Anything before we proceed to the Staff's cross-examination?

(No response.)

JUDGE BECHHOEFER: I guess not.

Mr. Gutierrez.

CROSS-EXAMINATION

BY MR. GUTIERREZ:

A. First, Mr. Pettersson, I'd like to clear up some confusion that was created in my mind from your testimony this morning relative to the settlement, differential settlement in the boring program.

Am I correct in stating that settlement is expected to occur to a certain degree in these structures?

BY WITNESS PETERSSON:

A. That is correct.

Q. Is it also correct that because the backfill

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1 material at South Texas is composed principally of sand
2 composition rather than a clay composition, that
3 settlement would be expected to occur early in the
4 history of these buildings?

5 BY WITNESS PETTERSSON:

6 A Well, if you're speaking about the settlement
7 that's caused by compression of the backfill material
8 itself, I would like to say that that will be -- it's a
9 very, very small amount of settlement that is caused by
10 compression of the backfill, but that small amount will
11 occur very early.

12 As a matter of fact, it occurs almost
13 simultaneously with the load application.

14 Q With the what? I'm sorry.

15 BY WITNESS PETTERSSON:

16 A With the application of the building load.
17 It is essentially an elastic, or completely an elastic
18 deformation which occurs as we are building the structures.

19 Q Okay. Thank you.

20 Also, I was under the impression that there
21 were two areas of differential settlement addressed, and
22 I had the feeling that they were being intermingled this
23 morning. I want to clear something up.

24 First, if you could refer to CCANP's Exhibit 11,
25 wich is I&E Report 79-02, specifically turn to Page 5,

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1 Paragraph C.

2 BY WITNESS PETTERSSON:

3 A Yes, sir.

4 Q Are you familiar with that paragraph, or
5 would you like to read it?

6 BY WITNESS PETTERSSON:

7 A Yes, I have it in front of me here.

8 Q First, the diesel fuel storage building
9 there referred to, is that the same structure that is
10 in some phase of construction or maybe hasn't even been
11 started yet, but is it the same as the building you
12 referred to as the diesel generator building?

13 BY WITNESS PETTERSSON:

14 A That is correct. That is the diesel generator
15 building, and that building has not been started.

16 Q Now, is the differential settlement addressed
17 in that paragraph a postulated design differential
18 between the expected settlement in the diesel generator
19 building versus the MEA Unit 2 building, auxiliary
20 building?

21 BY WITNESS PETTERSSON:

22 A That is correct. The settlement that is
23 addressed in this sentence here is the differential
24 settlement between the mechanical-electrical auxiliary
25 building and the diesel generator building, and the

1 design criteria is one inch differential settlement, and
2 the analysis performed by Woodward-Clyde Consultants
3 showed that the presence of this so-called contaminated
4 material would not contribute to the settlement in any
5 significant manner and would not cause the postulated
6 differential settlement to exceed the design criteria.

7 Q So to make sure I understand what you're
8 saying, as a result of the contaminated material
9 discovered on the north end of the ME Aux building for
10 Unit 2, you had Woodward-Clyde perform a study to see if
11 that would change your postulated design for the
12 differential settlement between the ME Aux 2 and the
13 diesel generator building?

14 BY WITNESS 'PETTERSSON:

15 A Yes, and let me have Mr. Hedges elaborate on
16 that.

17 BY WITNESS HEDGES:

18 A Yes. We made the consolidation test and
19 made a settlement verification analysis and found that
20 the contaminated material would not cause any more
21 settlement than anticipated.

22 In other words, it was not a layer of high
23 compressibility. In fact, it had less compressibility
24 than the sand.

25 Q Thank you. Now I'd like to go to my

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1 understanding of what the second area of differential
2 settlement is, and refer you to CCANP Exhibit 30.

3 BY WITNESS PETTERSSON:

4 A I'm sorry, which letter is that?

5 Q I'm sorry, CCANP Exhibit 30, which is a
6 February 3, 1981, letter.

7 BY WITNESS PETTERSSON:

8 A Yes.

9 Q Now, does that address a different differential
10 settlement problem?

11 BY WITNESS PETTERSSON:

12 A Yes. This is an entirely different program,
13 and it's a different cause, and a different mechanism.

14 As I described in my earlier testimony today,
15 this was caused by a difference in loading on the
16 foundation material for the building.

17 Q Okay. And just so we're clear for the record,
18 the section of this ME Aux building that actually tilted
19 downward, if that's the correct term, was the south side,
20 not the north side?

21 BY WITNESS PETTERSSON:

22 A There was an over-all tilt of the building,
23 and the south end was tilting downwards more. It was
24 lower than the north side.

25 Q Now, not being an engineer, that would suggest

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1 to me that the contaminated backfill on the north side
2 didn't have much to do with the differential settlement.

3 Would you like to address that? Is that
4 correct?

5 BY WITNESS PETTERSSON:

6 A Well, your statement is correct. It had
7 absolutely nothing to do with it, and if you would
8 postulate that it would have something to do with it,
9 the settlement would have gone the other way.

10 Q Now, there was one other suggestion that came
11 to my mind as I was listening to you, and what that is,
12 the ME Aux building did tilt beyond the anticipated
13 differential; is that correct?

14 BY WITNESS PETTERSSON:

15 A Yes. It did tilt beyond the criteria that
16 has been established for differential settlement of the
17 building that applied to the design when the systems
18 that are sensitive to differential settlements have
19 been installed, piping system, other interconnecting
20 systems.

21 The building has not yet been constructed to
22 that point. What we were particularly concerned about
23 was if we at this time had a tilt of the building towards
24 the south exceeding the design criteria, which really
25 pertains to the performance of the building at a later

13-7
1 date, a reversal of this tilt, that is that the building
2 would level itself out after the system would be
3 installed, that could be an adverse condition.

4 Q Let me ask you one other thing.

5 With respect to this differential settlement,
6 does that suggest anything to you about the adequacy of
7 the backfill under that structure?

8 BY WITNESS PETTERSSON:

9 A No, it has no bearing on the adequacy of
10 the backfill.

11 However, on the other hand we have looked,
12 and the expert committee has looked, at the compression
13 that has been experienced, if any, within the structural
14 backfill under this building, and they have concluded
15 and we have concluded -- "we" being Brown & Root and
16 Woodward-Clyde -- that there has not yet been any
17 measurable compression of the structural backfill under
18 the loads that are in place now, which are quite
19 substantial.

20 The most differential settlement that we
21 have observed, when we say that, it means that it's a
22 quarter of an inch or less. That is the accuracy that
23 we can measure it.

24 But this indicates that the backfill is
25 extremely dense with a high modulus of deformation.

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1 Q That would only lead me to ask, if the
2 backfill did not settle, where did the settlement occur?

3 BY WITNESS PETTERSSON:

4 A The settlement occurred within the natural
5 material in place below the structural backfill.

6 Mr. Hedges, would you like to say something?

7 BY WITNESS HEDGES:

8 A Most of the settlement that was anticipated
9 and observed for this plant does occur in the natural
10 soils that are below the excavation and structural
11 backfill, and those settlements are due to the loads
12 imposed by the structures on that underlying material.

13 Q Just to finish up this line, if the tilting
14 was caused by differential loading, has loading been
15 more equitably distributed on this building at this
16 point, and if so, what is the effect, what has the
17 effect been?

18 BY WITNESS PETTERSSON:

19 A There was a program that was implemented
20 about a year ago, which has been reported to NRC, and
21 this program consisted of two elements to correct the
22 loading on the building foundations.

23 The first part was a load removal on the
24 south side of the building. We removed some 11,000 tons
25 of structural backfill, and at the same time we

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1 rescheduled the construction of the building to allow
2 placement of concrete within the northern side of the
3 building, thereby we restored the load distribution,
4 the influence on the underlying soil, and the building
5 rightened itself and is now within our design criteria

6 Q The design criteria being half an inch?

7 BY WITNESS PETTERSSON:

8 A That is correct. Yes.

9 Q What you're saying, currently there is no
10 differential beyond the design criteria, then?

11 BY WITNESS PETTERSSON:

12 A That is correct. The tilt within the building
13 is down to on the order of a couple of tenths of an inch
14 and is well within the design criteria.

15 Q Also this morning, in response to a question
16 by Mr. Sinkin, you said that procedures -- he asked
17 whether procedures would have required the contaminated
18 material on the north side of the MEA building to be
19 removed prior to the placement of backfill, and you said
20 yes.

21 My question is, do you have any knowledge as
22 to how that event was documented? And by that I mean
23 was there a nonconformance report issued as a result of
24 this?

25 / / /

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1 BY WITNESS PETTERSSON:

2 A Yes, sir, there was, and then, of course, the
3 matter was researched and it was discovered that there
4 evidently was a mistake in the identification of the
5 coordinates for removal of this ramp.

6 I must describe to you that we did not by any
7 means leave a large part of the ramp in place. This ramp
8 originally extended in a north-south direction across
9 the entire area for the mechanical-electrical auxiliary
10 building, a length of 500 feet or more.

11 The piece of the ramp that was left in place,
12 I would recall, was on the order of maybe 20 feet, or
13 thereabouts.

14 The reason that it was left in place was
15 that it was removed from one side first, and a specific
16 coordinate was identified in the reporting. Then it was
17 removed from the other side, and again to the same
18 coordinates.

19 However, there was evidently a discrepancy
20 in where these coordinates actually were in the field,
21 and this was addressed in a corrective action report,
22 and as a result of this there was improvement in the
23 system of identifying where the coordinates are in the
24 field.

25 Q You stated that as a result of this incident

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1 there was an NCR and a CAR. Was there also a FREA, Field
2 Request for Engineering Action, or would this be an
3 appropriate situation for that, to your knowledge?

4 BY WITNESS PETTERSSON:

5 A I can't recall if there was an FREA on this.
6 There could have been one regarding the vibroflotation
7 but I'm not certain about that.

8 BY WITNESS MCKAY:

9 A In addition to the corrective action, the
10 PTL inspectors were re-instructed to identify more
11 closely the coordinates, and I think part of the
12 corrective action was to also improve the system that
13 PTL used, provided by construction, to identify
14 coordinates.

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1 BY MR. GUTIERREZ:

2 Q I also had some questions on the boring program
3 you described. You said that there were 21 borings taken,
4 and that you identified areas that did not meet the PSAR
5 commitment of 80 percent relative density.

6 Does that mean that four of 21 areas tested
7 failed to meet specifications?

8 BY WITNESS PETTERSSON:

9 A No. It doesn't mean that at all. There were
10 a total of 288 standard penetration tests taken in this
11 boring program. Out of these 288 tests there were 8 that
12 did not meet the construction quality control criteria
13 percent using common correlation methods.

14 These 8 tests were located in these four areas.

15 BY WITNESS HEDGES:

16 A As Ben said the eight tests were in the four
17 areas, and subsequent investigation showed that these areas
18 were as he described earlier this morning, and very small.

19 Q Just to make this clearing. If there were 21
20 borings, explain for us how there were 288 tests.

21 BY WITNESS HEDGES:

22 A Okay. The boring, it's a standard type of
23 soil test boring. We start off at the top or at the ground
24 surface, and we make a standard penetration test at every
25 two-foot interval as we go down the boring.

4-2 1 Some of the borings were from 40 to 60 feet in
2 depth, so there is a standard penetration test made at
3 each two-foot interval as you go down the Boring. That is
4 how you can get 288 standard penetration test data out of
5 21 borings.

6 Q Thank you.

7 As you were explaining to Mr. Sinkin about the
8 four areas, I couldn't help but notice that they all seem
9 to be either at the lift immediately above the subgrade,
10 or down rather far.

11 Do you attach any significance to that fact?

12 BY WITNESS HEDGES:

13 A Yes. In going back and researching the
14 information from the inspection reports, there are
15 explanations as to why this occurred.

16 For instance, one area the layer was put in,
17 and, apparently, not over compacted because they were
18 afraid of pumping the water from the underlying natural
19 soils up into the sands, which in essence would have
20 weakened the total foundation system.

21 Also, in one of the areas they were right near
22 almost a vertical excavation face, and the vibration from
23 the compacter may have -- they were worried about the
24 vibration from the compacter causing the face to come in
25 on them, so the compaction was done in a static mode.

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1 But as you identify, most of the problems are
2 at the excavation face, or near the subgrade, original
3 subgrade materials.

4 Q Just one point I want to ask you on. Do you
5 have knowledge whether that first layer was static rolled
6 or rolled with a vibrator?

7 BY WITNESS HEDGES:

8 A The one layer I believe was not rolled with a
9 vibrator. It was rolled statically.

10 BY WITNESS LOGAN:

11 A Excuse me. The area known as Area 204, I'm
12 not sure which area that is in the letter, but in --

13 Q Area 1.

14 BY WITNESS LOGAN:

15 A Area 1 it was statically rolled. The EIR
16 reflects that.

17 Q Can you positively state that the four areas
18 were all statically rolled, as opposed to rolled with
19 vibrators?

20 BY WITNESS LOGAN:

21 A No, sir.

22 Q Mr. Pettersson, do you have any knowledge
23 relative to that?

24 BY WITNESS PETTERSSON:

25 A No. I don't any knowledge, and I don't believe

4-4 1 that that was the case. We have talked about the 204
2 area where we know that there was a number of factors
3 contributing to the density condition we had.

4 I have already mentioned to you that the lift
5 was two-foot thick in one end, that was statically rolled.
6 And these things contributed to it.

7 Therefore, we feel that that area, together
8 with the slope condition we are dealing with, or that
9 Mr. Hedges has described, that area is a quite unique
10 situation.

11 In the other areas where we have these
12 dimensions we have mentioned, like six by twelve feet as
13 being our best estimate, or the size of the areas, I
14 certainly feel that likely explanation is precisely what
15 Mr. Stanley Wilson presented in his expert testimony, that
16 you can have areas where you don't have the full drum
17 contact of the vibratory roller, because there are some
18 very minor surface irregularities that were a few feet
19 reduces the contact pressure, but those were pointed out
20 by Mr. Wilson.

21 The dynamic energy must go into the backfill
22 so that, therefore, we could look at the overall areal in
23 the vicinity of this location, you still must have your
24 density. The energy cannot just disappear. And I believe
25 this is, is my personal belief and my point that that was

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1 a likely contribution to areas, in particular Area 205,
2 which was an embedded lift in the backfill. Also likely
3 causes to the area east of the unit between the Aux
4 Building, known as Area 208/209.

5 Q To what extent, if any, did you experience
6 pumping in these areas when you were laying the first
7 lift?

8 BY WITNESS PETTERSSON:

9 A There were two documented cases of pumping.
10 Of course, it's always responsibility of the earth-work
11 inspector to assure that a pumping situation does not
12 develop into detrimental condition on the backfill.

13 Of course, pumping can be a matter of degree.
14 It can go from a slight weaving of the surface because of
15 the elastic deformation due to the roller, or it can go
16 all the way to the point where you actually had the side
17 where it came up from the backfill.

18 And, of course, the earth-work inspectors have
19 the responsibility to assure that nothing detrimental
20 happens. There are in the records that we have reviewed
21 which are the work inspection reports by PTL, two incidents.
22 Both these incidents were corrected.

23 Q Is there any connection, or in your review
24 have you made any connection between the two incidents of
25 pumping and the four areas that were found to be below 80

14-6 1 percent relative --

2 BY WITNESS PETTERSSON:

3 A There is no connection. The two areas that
4 were reported were both remedied.

5 Q And is it your testimony that throughout the
6 project the first layer was static rolled, or just in
7 these four areas you know for a fact that they were static
8 rolled?

9 BY WITNESS PETTERSSON:

10 A Static rolling did occur on a number of
11 occasions near the subgrade in the first lift.

12 This has been addressed by the expert
13 committee, and they conclude and we concur that that is
14 a good workmanship in that situation.

15 It has furthermore been looked into quite
16 extensively by Woodward Clyde.

17 BY WITNESS HEDGES:

18 A The static rolling instances were recorded
19 in the PTL/EIR reports, and static rolling occurred for
20 two cases. One was in subgrade areas where they thought
21 pumping would occur, or where upon the first application
22 of dynamic compaction pumping did occur.

23 In this instance they did not dynamically
24 compact the layer on top of the subgrade. Another
25 instance or set of cases was when the structural backfill
was placed over concrete, such as backfill concrete that

4-7 1 was used for a remedy, or over electrical duct banks.

2 They generally statically compacted the layer immediately
3 above that concrete.

4 There were about 100 cases reported. The vast
5 majority of the cases that had received static compaction
6 were later tested, and showed acceptable tests. There were
7 a couple of areas that were not tested that we made an
8 engineering judgment evaluation on and because of the
9 location and size we decided the areas were acceptable
10 from a technical and engineering point of view.

11 Q Going to the documentation of the backfill
12 placement activity, is it your testimony, Mr. Pettersson,
13 that beyond the recording of the minimum eight roller
14 passes there is no other documentation setting forth the
15 actual number of roller passes performed for any given
16 lift?

17 BY WITNESS PETTERSSON:

18 A Well, we will have to address this in the time
19 period prior to mid 1980. In that time period --

20 Q Prior to April 1980, sometime prior to April
21 1980.

22 BY WITNESS PETTERSSON:

23 A The earth-work inspectors, they did observe
24 that the minimum number of roller passes as defined by
25 the construction procedure had been made, and they reported

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1 this as being acceptable.

2 Beyond that, they did not specifically observe
3 each individual roller pass.

4 Q Now, Mr. McKay, going to --

5 MR. GUTTERMAN: Excuse me. I thought Mr. McKay
6 was about to add something.

7 MR. GUTIERREZ: Oh, okay.

8 WITNESS MC KAY: Yes. I was just about to add
9 to that, that this was our interpretation of the
10 construction procedure. While we did not watch every
11 single roller pass after eight we still remained in the
12 general area and observed that the roller passes were
13 made uniformly. We just didn't count them after eight.
14 That's all.

15 BY MR. GUTIERREZ:

16 Q Well, then going to Page 13 of your direct
17 testimony, Line 16 and following, you state: "Apecifically
18 PTL inspector are to provide continuous inspection of the
19 placement of all backfill material, which means that the
20 inspectors are required to be present in the general work
21 area." That's the gist of what you just testified.

22 BY MR. MC KAY:

23 A That's what I just said, right.

24 Q But with respect to documenting what they
25 observed, they only documented minimum number of roller

4-9

1 passes.

2 BY WITNESS MC KAY:

3 A This was the acceptance criteria set forth
4 in the construction procedure.

5 BY WITNESS PETTERSSON:

6 A We would like to make that point clear, that
7 the construction procedures requires a minimum of eight
8 roller passes.

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1 BY MR. GUTIERREZ:

2 Q Could you cite me a specific construction
3 procedure which expressly states you're only to record
4 the minimum number; or is this some interpretation you're
5 giving of the construction procedures?

6 BY WITNESS MCKAY:

7 A This was PTL's interpretation. I'm not
8 aware of any other procedure that states that you shall
9 record each and every pass.

10 That was within the time frame before
11 April 1980.

12 Q Right.

13 BY WITNESS LOGAN:

14 A I'd like to add to that. There was no
15 procedure requiring recording the exact number of
16 passes.

17 Q Let me rephrase the question. My question
18 was -- I think -- can you cite me to a construction
19 procedure which expressly states you, I&E inspector, are
20 only to record the minimum number; in other words, when
21 eight passes are achieved.

22 BY WITNESS LOGAN:

23 A No, sir. There was no such procedure. The
24 PTL procedure merely required that they indicate whether
25 it was done in accordance with the construction

1 procedure.

2 The construction procedure required the
3 minimum of eight passes. If the minimum of eight passes
4 was achieved, the inspector wrote "Acceptable" on there;
5 and he thereby lived up to the procedure requirements.

6 Q And then on that actual documentation was
7 recorded "Acceptable" or was recorded what he ob-
8 served -- eight -- or what exactly was recorded?

9 BY WITNESS LOGAN:

10 A He recorded a-c-c on his checklist, meaning
11 "acceptable."

12 Q Now, turning to the expert committee report
13 dated February 27, 1981, which is Applicant's Exhibit
14 6, and specifically turning to Page 30 of that report,
15 I wonder -- and this is to either Mr. Pettersson or
16 Mr. Logan.

17 In light of the fact that the expert
18 committee stated that 16, 20 or more passes are pre-
19 sently needed to consistently meet the specification
20 requirements, my question is: In light of that
21 finding by the expert committee, what is your opinion
22 as to the adequacy of these construction procedures?

23 BY WITNESS FETTERSSON:

24 A I think it is that the construction pro-
25 cedures are perfectly correct. When we have imposed eight

15-3 1 roller passes, we have reached a point where we are
2 about 80 percent relative density, or very close to 80
3 percent relative density.

4 Therefore, it provides a feasible point for
5 starting the testing.

6 Furthermore, we know that if eight passes
7 have been imposed, we have uniformity or density with
8 depth.

9 Q And, again, I'd ask you: Could you point
10 me to a particular construction procedure which expressly
11 states eight passes is the point at which testing
12 begins?

13 BY WITNESS PETTERSSON:

14 A Again, the construction procedure which
15 is identified -- the last letter or the number, C-C-P-2,
16 states that at least eight passes shall be performed.

17 And we've got to recognize that this is an
18 end product procedure. And our specification is an
19 end product specification that requires that compaction
20 must continue until the density as determined by in-
21 place density tests have been satisfied.

22 Q Going back to the boring program, could you
23 explain to me, based on your boring program, how you
24 in satisfy yourself that the adequacy -- how you can
25 satisfy yourself of the adequacy of the backfill under

15-4

1 the existing structures without testing it?

2 BY WITNESS PETTERSSON:

3 A Yes. There are several ways by which we can
4 do that.

5 In the first place, our judgment that the --

6 Q I'm sorry?

7 BY WITNESS PETTERSSON:

8 A Our judgment, "ours" being Brown & Root,
9 Woodward-Clyde's, HL&P's judgment that the borings are
10 representative ... the judgment that was verified by
11 the expert committee.

12 Secondly, Woodward-Clyde Consultants per-
13 formed a statistical analysis by which they compared
14 the reported density as determined by in-place density
15 tests of the placements which were penetrated by the
16 borings, in comparison to the statistical distribution
17 of all density tests.

18 And we found them to be almost identical.

19 Q Is what you're saying -- I'm not trying
20 to rephrase your explanation; I'm just trying to under-
21 stand it.

22 Is what you're saying is you look at all of
23 the end (e-n-d) tests, end-process tests which show
24 that 80 percent relative density was achieved, both for
25 the backfill under the structures and the backfill around

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1 the structures, and that you then compared, through
2 some statistical means, the end-process results around
3 the structures as compared to what your paper -- what
4 your documentation shows was the end-process test
5 under the structures, and gathered from that that it
6 was adequate?

7 I realize this is a simplification, but I'm
8 not an engineer?

9 BY WITNESS PETTERSSON:

10 A Yes. Let me try to go over it briefly one
11 more time.

12 We performed statistical analyses of all
13 density tests that had been obtained in the Category 1
14 part of the plant area.

15 Then we created two subsets of that, one
16 being the density tests obtained in lifts that had been
17 penetrated by the borings, and then a still smaller
18 set -- only density tests from the lifts actually
19 tested by standard penetration tests in the borings, and
20 then we compared these sets with the overall distri-
21 bution; and we found them to be almost identical.

22 Q Thank you.

23 BY WITNESS HEDGES:

24 A Let me add to that. When we finished the
25 boring program, and this was the program where we obtained

15-6

1 the 288 standard penetration test data, we feel quite
2 confident that we had a representative set of data for
3 the backfill.

4 Later on, we made a statistical analysis of
5 the field density data. And as Bernt just said, we made
6 another statistical analysis of the density data re-
7 lated to the test borings.

8 Comparing those two statistical analyses
9 showed an amazing equality between the two. This pointed
10 out to us that our boring location and data were, in
11 fact, representative of the plant area because of the
12 massive number of data items in the field density
13 statistical analysis.

14 Q Going to the area or the topic of over-
15 compaction -- and by that I mean -- I think that's how
16 we referred to it this morning ... when you place a
17 lift over an existing lift and then compact that lift,
18 it has an effect on the underlying lift.

19 It was my understanding of this morning's
20 testimony that, Mr. Pettersson, you said that that
21 effect carries down to approximately two to three feet
22 below the surface.

23 BY WITNESS PETTERSSON:

24 A Yes, that is correct. I said that.

25 Q Now, Mr. Hedges, it was my understanding

15-7 1 that you said that research has shown that this
2 influence is felt up to six or seven feet.

3 Now, is there an inconsistency there, or
4 what --

5 BY WITNESS HEDGES:

6 A Yes. The major part of the effort goes
7 down to two or three feet. But from three feet on
8 down to six or seven feet, there is a minor part of the
9 effort that also causes compaction.

10 So both of our statements are correct.

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BY MR. GUTIERREZ:

Q Now, going to Page 12 of the testimony, at Line 12, you say that engineering recommended a minimum of 12 roller passes, and that construction at some later date concluded that a minimum of 12 would only be necessary on the surface lift and that 8 would do.

Mr. Pettersson, can you explain a little bit of how this decision process occurred ... flesh it out a little more?

BY WITNESS PETTERSSON:

A Yes, sir. The Brown & Root architect -- the area representative looked at the information gathered in this informal test program conducted by construction, and he reached his conclusion, as stated in the testimony.

Then this information was given to the Brown & Root construction department for their consideration in writing their procedure. The responsibility for writing the construction procedure rests with Brown & Root construction.

Q My next question goes to the determination by construction. What kind of documentation was set forth by construction in changing what in my mind was a recommendation by engineering.

I mean, is this an issue where a "free"

15-9

1 should have been written, or was a "free" written --
2 BY WITNESS PETTERSSON:

3 A No, not at all. Construction, as I have
4 stated, had the responsibility for writing the con-
5 struction procedure.

6 The engineering recommendations were only
7 furnished by memorandum. It was not at all in any way
8 a specification or design requirement ... nothing like
9 that. It was a memorandum from field engineering to
10 construction.

11 Q Is this a summary of what has been referred
12 to previously as the '76 test fill program?

13 BY WITNESS PETTERSSON:

14 A That's correct.

15 Q Have you had a chance to review that test
16 fill program?

17 BY WITNESS PETTERSSON:

18 A Yes, I have in the past.

19 Q Now, correct me, but was that performed by
20 construction or engineering?

21 BY WITNESS PETTERSSON:

22 A The program was performed by Brown & Root
23 construction. However, there was a Brown & Root geo-
24 technical engineer that was present in the program. He
25 observed it, and he summarized his findings and gave his

1 conclusions in a memorandum.

2 Q With respect to this test fill program,
3 did the test or the memorandum which recited that test
4 identify the type of backfill material tested?

5 BY WITNESS PETTERSSON:

6 A I don't recall that it identified the
7 backfill material by any specific name for the simple
8 reason that at that time we had only one supplier.

9 Q How about the base material which the back-
10 fill was placed over? Was that identified, or if not,
11 is it significant?

12 BY WITNESS PETTERSSON:

13 A Again, I don't believe that the memorandum
14 identified what material the two lifts were placed on.
15 However, my general knowledge is that it was placed
16 on top of previously placed backfill.

17 But I don't believe that that was spelled
18 out in the memorandum.

19 Now --

20 Q As to the second part of that question:
21 Would it not be significant what it was placed on?

22 BY WITNESS PETTERSSON:

23 A That would have some bearing on the results
24 in the underlaying lift. However, when we are discussing
25 these problems here, we must remember that this was an

1 informal test program conducted by Brown & Root con-
2 struction.

3 Therefore, it was directed for them to gain
4 information that they considered of interest.

5 Q To your knowledge, do you remember also that
6 this '76 test fill program was based upon a 16, rather
7 than an 18-inch lift?

8 BY WITNESS PETTERSSON:

9 A Yes, I recall that. However, I consider
10 that difference to be insignificant.

11 Q And, lastly, with respect to this '76 test
12 fill program, how many lifts were placed during the
13 program?

14 BY WITNESS PETTERSSON:

15 A For the specific purpose -- or the informal
16 test program, there were two lifts placed.

17 Q Mr. McKay, this morning in response to a
18 question by Mr. Jordan, he asked you was there ever a
19 time where more than four field tests were performed
20 before a laboratory density test was performed.

21 And I believe your response was there were
22 times where up to six sand cone tests were performed
23 before laboratory maximum and minimum tests were
24 performed.

25 Was that your testimony this morning?

13-12

1 BY WITNESS MCKAY:

2 A Yes, that was the testimony this morning.

3 JUDGE BECHHOEFER: Could you speak a little
4 louder or closer to the microphone.

5 WITNESS MCKAY: Right.

6 BY MR. GUTIERREZ:

7 Q In light of that answer, I'd like to call
8 your attention to item of non-compliance number three
9 in Staff Exhibit 46.

10 (Document shown to witnesses.)

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1 BY MR. GUTIERREZ:

2 Q Have you had a chance to review that?

3 BY WITNESS McKAY:

4 A Yes, I have.

5 Q Now, was the laboratory table broken during
6 the period that this item of non-compliance indicates
7 it was broken?

8 BY WITNESS McKAY:

9 A Yes, that's correct.

10 Q And were laboratory maximum and minimum
11 density tests performed between November 17 and December
12 18 of 1979?

13 BY WITNESS McKAY:

14 A No, that's -- You're right. I had
15 neglected to remember that.

16 Q Now, Mr. Logan, going to Page 9 of the
17 testimony, Lines 5 through 10, the statement is made
18 that the 80 percent requirement -- that being 80 percent
19 relative density requirement was the only commitment
20 incorporated in the PSAR relative to granular backfill
21 compaction.

22 BY WITNESS LOGAN:

23 A As far as I know, that's true.

24 Q Being familiar with -- Are you familiar
25 with Appendix B of 10 CFR, Part 50?

16-2

1 BY WITNESS LOGAN:

2 A Yes.

3 Q Do you think it's a fair statement that you
4 have to read Chapter 17 of the PSAR into any con-
5 struction procedures -- and these are commitments?

6 BY WITNESS LOGAN:

7 A I would assume so.

8 Q In light of that, would you think it's a
9 fair statement to say that in addition to this require-
10 ment, HL&P also committed to establishing and following
11 procedures for any activity affecting safety?

12 BY WITNESS LOGAN:

13 A Yes, sir.

14 Q And that would be in addition to the 80
15 percent requirement?

16 BY WITNESS LOGAN:

17 A That's true. I think what the problem here
18 is is that this is the only technical commitment, i.e.,
19 meaning numerical value and/or strength or something.

20 Q Mr. Logan or Mr. Pettersson, following up
21 on Mr. Logan's statement that the 80 percent relative
22 density was the only technical requirement, was there
23 any average relative density set out in the PSAR --
24 I'm sorry -- minimum or maximum relative density?

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16-3

1 BY WITNESS LOGAN:

2 A I would like to clarify your question a
3 little bit.

4 That's the only technical commitment
5 regarding compaction.

6 Q So there was no minimum set out? There was
7 only an average?

8 BY WITNESS LOGAN:

9 A Oh, no. That 80 percent was the minimum.
10 84 percent was the average.

11 Q Okay. I'm sorry.

12 BY WITNESS PETTERSSON:

13 A Let me clarify this. We're still talking
14 about the PSAR commitment?

15 Q That's correct.

16 BY WITNESS PETTERSSON:

17 A In the PSAR the only statement regarding
18 granular backfill compaction is the 80 percent require-
19 ment.

20 Q Where were your gradation requirements
21 set out for the backfill?

22 BY WITNESS PETTERSSON:

23 A The proposed backfill material was identified
24 or exemplified in the PSAR by typical gradation tests ...
25 all the material that at that time was considered ... and

16-4 1 that also turned out to be the same type of material
2 that was used for the backfill construction.

3 BY WITNESS LOGAN:

4 A I would like to add to that, that the
5 gradation requirement is not a compaction requirement.
6 The compaction requirement is simply the amount of
7 density achieved.

8 Q What circumstance would permit a 24-inch
9 lift to be placed and compacted, if there is such a
10 circumstance?

11 BY WITNESS PETTERSSON:

12 A There are -- Are you talking in general
13 terms or on this project or --

14 Q I'm sorry. On the South Texas Project.

15 BY WITNESS PETTERSSON:

16 A There are no circumstances under which
17 we would permit the 24-inch lift to be placed. If
18 there would be a 24-inch lift placed, that would be a
19 deviation.

20 Can I add something to that?

21 Q Sure.

22 BY WITNESS PETTERSSON:

23 A We have the specification provision that if
24 construction would relate to the 24-inch lift, then
25 they would have to institute a formal test program to

16-5

1 demonstrate the adequacy of the 24-inch lift. And if
2 such a program were implemented, I'm sure that a
3 satisfactory answer could be achieved.

4 Then consideration would be given to allow
5 them to go ahead using 24-inch lifts. Maybe that was
6 what you were driving at.

7 Q Okay. Was there a construction requirement
8 that whenever a backfill is placed, at least one laboratory
9 density test be performed per shift?

10 BY WITNESS LOGAN:

11 A That was a specification requirement, not a
12 construction requirement.

13 Q Now, during the period of time that the
14 laboratory table was broken and unable to be used, how
15 is that dispositioned?

16 BY WITNESS LOGAN:

17 A Well, we took the samples -- or PTL did
18 and saved them back, and we just ran the tests at a
19 later date.

20 I believe that when they were re-run, every-
21 thing passed. We sort of took a chance on having to
22 remove the backfill or do remedial work on it.

23 Q And the results of the subsequent testing
24 of those?

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1 BY WITNESS LOGAN:

2 A Proved that the lifts did indeed pass.

3 BY WITNESS PETTERSSON:

4 A Let me clarify this. In the re-qualifying
5 (if you will), the in-place density test based on the
6 maximum tests that were obtained afterwards ... it was
7 discovered that in fact four of the in-place density
8 tests which previously had been slightly above 80
9 percent became slightly below 80 percent.

10 At that time, this was -- PTL did go out
11 and they still had access to these lifts and re-
12 tested them; and they were found to be acceptable.

13 So Logan was right that everything was
14 found to be acceptable. However, we did require some
15 additional field testing.

16 Q Now, as I understand your procedures,
17 when the vibratory table broke down -- that should
18 have been dispositioned as a nonconforming report?
19 Would that be correct?

20 BY WITNESS MCKAY:

21 A Yes, that is correct.

22 Q And was that done?

23 BY WITNESS MCKAY:

24 A It was not done at the time that the table
25 was broken down. At the time the table broke down,

16-7

1 Brown & Root was notified, and I understand also
2 notified HL&P.

3 The equipment was ordered to replace the
4 table.

5 Q There has been some question, Mr. Pettersson,
6 with respect to the requirement that one vibratory
7 test be done for every four cone tests. Is it your
8 understanding that that means before you go on to the
9 fifth cone test, you should have done one density --
10 one laboratory test; or is it your understanding that
11 it just has to average that way?

12 Do you understand the question?

13 BY WITNESS PETTERSSON:

14 A Yes, I believe I understand the question.
15 The intent was that the -- when you have taken the
16 fourth testing, or performed the -- your laboratory
17 testing, that the results from that laboratory testing
18 should be entered into the sequence of a maximum/minimum
19 laboratory test used in establishing the acceptance
20 criteria.

21 However, these are averaged over 20 tests.
22 And it may or may not be a change in the criteria for
23 the fifth test. That depends on where they are in the
24 sequence.

25 Can you explain that a little more?

1 BY WITNESS MCKAY:

2 A After five maximum/minimum tests are run,
3 then the average of the last 20 are recalculated; and
4 that's the value used to accept or reject the in-place
5 density.

6 BY WITNESS PETTERSSON:

7 A The important thing here is that the testing
8 is performed in the right sequence.

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1 BY MR. GUTIERREZ:

2 Q Can you state positively that laboratory
3 tests were conducted during each shift when backfill
4 was placed?

5 BY WITNESS MC KAY:

6 A Laboratory tests or field-density tests?

7 Q Laboratory tests.

8 BY WITNESS MC KAY:

9 A I couldn't make that statement without going
10 back and checking a whole lot of records.

11 Q Is it because you don't have any knowledge?
12 I guess my question is do you know any instances where a
13 laboratory test was not performed during a shift when
14 backfill was compacted?

15 BY WITNESS MC KAY:

16 A Well, what laboratory test are you referring
17 to, a maximum/minimum?

18 Q Yes, sir.

19 BY WITNESS MC KAY:

20 A There was a time when the table was breaking
21 down. Of course, there was no max/min's run at that time.

22 Q With that exception any others, to your
23 knowledge?

24 A Not to my knowledge. I can't say that there
25 were or were not.

7-2 1 BY WITNESS PETTERSSON:

2 A Let me expand a little bit on that. We have,
3 that's Brown & Root and HL&P, looked at this particular
4 testing provision, and we have concluded -- I have
5 concluded -- that the language of the specification was
6 more stringent than intended.

7 Obviously, it would not be possible to perform
8 a Maximum/minimum laboratory during the same shift as
9 in-place density tests is taken, if for example the only
10 in-place density test taken would be at the very end of
11 the shift, they plainly would not be able to get back to
12 the laboratory and do the work.

13 Q Is that what you represented to the NRC in
14 your FSAR?

15 BY WITNESS PETTERSSON:

16 A That is correct. There has been an amendment
17 to the FSAR I believe in early May.

18 Q What year?

19 BY WITNESS PETTERSSON:

20 A This year, reflecting this condition.

21 Q Well, let me read from the FSAR before the
22 amendment, and you tell me whether this in fact occurred.

23 It says: "Whenever fill or" -- now I'm
24 reading from the FSAR, Paragraph 2.5.4.5.6.2.4, the last
25 paragraph. "Whenever fill or backfill is placed during

7-3 1 a work shift at least one field test and one laboratory
2 relative density tests were conducted during the shift,
3 provided the compaction operation was completed in some
4 area."

5 Is that true?

6 BY WITNESS PETTERSSON:

7 A What I said was that we have looked back at
8 this provision. This provision that you just were
9 reading, did correctly reflect the specification require-
10 ments. We have looked at those specification requirements.

11 And I also said, we discovered that, of course,
12 there would be situations where it would not be physically
13 possible to conform to this requirement, we have identified
14 this situation and we have changed our specification to
15 allow the sample to be obtained at the same time as the
16 in-place density test, and then allow the laboratory work
17 to proceed at some following shift.

18 MR. GUTIERREZ: Mr. Chairman, I might not have
19 anything more, but if we took a short five-minute break
20 I could review all of my notes, and not waste the hearing
21 time.

22 JUDGE BECHHOEFER: Mr. Gutierrez, when we took
23 a break we wanted to take about a 20-minute break. Would
24 you prefer that now, or after you are through. We will
25 take it now if you want.

7-4 1 MR. GUTIERREZ: Yes. Why don't we take it
2 now.

3 JUDGE BECHHOEFER: Okay. We will take a 20-
4 minute recess, until 2:30. We might be late We have to
5 discuss something with one of the judges here.

6 (A short recess was taken.)

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JUDGE BECHHOEFER: Back on the record.

Mr. Gutierrez.

MR. GUTIERREZ: The Staff has no further questions, Your Honor.

BOARD EXAMINATION

BY JUDGE HI'L:

Q I have several questions, and these can be answered by whoever wishes on the panel.

The contaminated material we talked about, is there any substantial amount of that material still left in what is Category I backfill areas?

BY WITNESS PETTERSSON:

A The amount left in place at this specific location that we have been discussing here, I would have to try to characterize it from memory, of course, but it has a maximum thickness of approximately three feet. I believe it has a width of something like 30 feet, tapering off towards the east and west down to a thickness of a couple of inches only, and in the north-south direction I will recall that it is something like 20 feet.

Maybe Hedges can elaborate on these numbers.

BY WITNESS HEDGES:

A I think that is approximately the number, about three feet by ten by approximately twenty, which

18-2

1 would be on the order of 20 cubic yards of material in
2 more than 500,000 yards of structural backfill.

3 Q Is some of it under the ME auxiliary building?

4 BY WITNESS PETTERSSON:

5 A Yes. I think for the purpose here we can --
6 for purposes of describing it to you we can say that
7 approximately half of it is located under the north end
8 of the ME Aux building.

9 Q The term contaminated, I presume that that
10 refers to the fact that it has clay and lime as opposed
11 to the structural Category I backfill that is supposed
12 to be entirely gravel and sand?

13 BY WITNESS PETTERSSON:

14 A Yes. That is correct.

15 The term contamination is used on the project
16 as a description of any type of material in the backfill
17 or in the backfill area that is not the Category I
18 structural backfill.

19 The only exceptions to these would be if
20 there is some identified ramp material on the surface
21 that is identified as such.

22 If anything else is encountered in the
23 embankment it is characterized as contaminated material.

24 Q You indicated that you can compact it perhaps
25 even better than the Category I structural backfill.

18-3

1 BY WITNESS PETTERSSON:

2 A Yes. Mr. Hedges said that, and I believe
3 that's a characterization of the hardness of the material.

4 This material is, if you would like to
5 visualize it, is like roadbed material, which contains
6 some cohesive material and it has been subject to a
7 very large amount of heavy construction traffic for an
8 extended period of time, and you may want to say that
9 it's almost hard like a rock.

10 Q What is detrimental about that particular
11 backfill material?

12 BY WITNESS PETTERSSON:

13 A In a location like this, as far as technical
14 properties goes, nothing.

15 Q What is its bearing strength when it's under
16 fully saturated conditions?

17 BY WITNESS HEDGES:

18 A The bearing strength under full saturation is
19 much greater than the structural backfill.

20 It is not a detrimental material. It is only
21 different than the structural backfill sand that should
22 have been there.

23 The bearing capacity is exceptionally high
24 et or dry. The material will not liquefy. The material
25 does not have any adverse settlement characteristics.

18-4

1 Q Okay. I must confess I take exception to
2 the semantics of the word "contaminated," because it has
3 an implication that it's undesirable, rather than just
4 different.

5 Let me go to another subject.

6 On the distance between tests, you mentioned
7 the, I believe it's 20,000 square feet, you had to
8 perform one test for every 20,000 square feet.

9 If that were performed in a systematic grid
10 it would result in a test, or a grid pattern, rather,
11 that is on approximately 140-foot spacing, is that
12 correct?

13 BY WITNESS PETTERSSON:

14 A Yes, it's 100 by 200 foot, yes.

15 Q It's just the square root of 20,000.

16 BY WITNESS PETTERSSON:

17 A Yes. Sure. That's correct.

18 Q You mentioned that you don't do it in an
19 established systematic group, that you determine, or
20 you locate the test positions randomly.

21 Now, what do you mean by random?

22 I interpret "random" to mean that you flip
23 coins or use a random number generator, or something
24 like that.

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18-5

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

1 BY WITNESS MCKAY:

2 A When we first started the testing program
3 at STP it was a random selection that was determined
4 structly by the technician in the field.

5 Later on there was a procedure change at
6 the request of Brown & Root engineering to use a table
7 of random numbers, and that was the system that was
8 used from that point on.

9 Q You did use a table of random numbers to
10 determine the positions?

11 BY WITNESS MCKAY:

12 A Yes; not initially -- I don't remember
13 exactly when that went into effect, but subsequent to
14 the initial initiation of the testing program, yes, we
15 did use a table of random numbers.

16 BY WITNESS LOGAN:

17 A I'd like to add something, if I might.

18 Q Fine.

19 BY WITNESS LOGAN:

20 A This random location would be picked within
21 the particular area placed, and compacted that day.

22 Q And I presume within the 20,000 square feet?

23 BY WITNESS LOGAN:

24 A Yes, sir. If the lift, or the area placed
25 turned out to be 21,000 square feet, there would be two

18-6

1 tests.

2 Q Sure. The concern I have there is that if
3 it is truly random in your location, rather than getting
4 a test located every 140 feet in both directions, a
5 systematic grid, it's possible if you did it at random
6 that you could get as much as 280 feet between tests.

7 Do you have any data as to the 21 tests
8 that you talked about, do you have any data that indicates
9 how far apart, what was the maximum distance between
10 those tests?

11 BY WITNESS LOGAN:

12 A Are you speaking of the borings now, or the
13 in-place densities?

14 Q Well, either or both.

15 BY WITNESS LOGAN:

16 A Either. On the in-place densities, I believe
17 if you'll refer to the expert committee's report, in the
18 back there are some tables showing cross-sections with
19 locations of in-place densities.

20 Q I don't have that committee report.

21 A Yes, sir. Figures d(2) through d(9) -- I'm
22 sorry, it doesn't go all the way to d(9) -- through d(8),
23 show various segments of cross-sections --

24 Q Can you tell me what page that is? Is it
25 in the back?

BY WITNESS LOGAN:

A. It's right in the back, yes, sir.

- - -

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

1 BY JUDGE HILL:

2 Q D-2?

3 BY WITNESS LOGAN:

4 A D-2 is the first one. That's a planned
5 view, yes.

6 And then if you'll look at D-3, there is
7 a section ... let me see. This section goes through --
8 just south of the Fuel Handling Building, Unit 1. And
9 that's a pretty typical distribution.

10 Q Okay. That answers my questions. You're
11 just looking at that diagram.

12 The concern I had was that there was a
13 potential for having a rather substantial area not
14 covered, if you did it truly on a random basis, that the
15 way it turned out ... why that didn't happen.

16 BY WITNESS LOGAN:

17 A I did a few statistics of my own, and I
18 found that -- I believe that we have averaged a test
19 for about every 259 cubic yards in the backfill, which
20 is a lot less -- 20,000 square feet with an 18-inch
21 lift would represent 1111 yards.

22 And our overall test frequency was somewhat
23 less than 300 cubic yards.

24 I don't believe that's a problem.

25 Q All right.

JUDGE HILL: That's all I have.

BOARD EXAMINATION

BY JUDGE LAMB:

Q Let's see. Three of you gentlemen participated in this answer, so anyone who would like to.

At the end of that first paragraph, which continues over from Page 7, you indicate that the foundations must be able to withstand certain types of loads without excessive settlement; that is -- i.e., the backfill must have sufficient density to provide an adequate safety factor against liquefaction.

Are those two the same? That is, excessive settlement and liquefaction?

BY WITNESS PETTERSSON:

A Yes, that is correct. The liquefaction phenomenon if reoccurring would cause settlement of the structures in that -- while in the liquefied state, the soil would have lost its strength and would not be able to support the buildings, and there would be a sudden settlement.

Q I realize the two can go together. What I'm wondering is whether they are the same. For example, a few minutes ago, Mr. Hedges, I believe you responded to a question by indicating that the

1 so-called contaminated fill would not have excessive
2 settlement ... would not have liquefaction.

3 BY WITNESS PETTERSSON:

4 A Okay. That is a different type of settle-
5 ment. That would be the consolidation settlement which
6 is associated with dissipation of pore pressures from
7 a clay and consolidation.

8 Q All right. Then I didn't understand what
9 you meant here by the term "excessive settlement." So
10 I think I have to be interrupted at the moment, but
11 I'd like to pursue that when I come back.

12 JUDGE BECHHOEFER: We're going to take as
13 short a break as we can take.

14 (A short recess was taken.)

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JUDGE BECHHOEFER: Back on the record.

JUDGE LAMB: Sorry for the interruption, gentlemen. We had to go to a meeting.

BOARD EXAMINATION

BY JUDGE LAMB:

Q We were on excessive settlement, a question I had raised concerning the distinction between excessive settlement and liquefaction, as to whether that was a requirement or a pair of requirements.

I think it developed that my understanding of settlement was not the understanding in this document. Is that correct?

BY WITNESS HEDGES:

A In part, yes. That is correct.

There are two types of settlement that were investigated for this site.

One is consolidation settlement, which is the consolidation of the underlying foundation, and the consolidation of the structural backfill.

Q Now, that's the type that we were discussing earlier under some of the cross-examination. Is that correct?

BY WITNESS HEDGES:

A Yes. I was trying to point out that the so-called contaminated backfill did not have adverse

0-2 1 consolidation settlement characteristics.

2 Also, I wanted to point out that this so-
3 called contaminated backfill did not represent a
4 liquefaction potential.

5 Now, the other type of excessive settlement
6 that we investigated was due to liquefaction. If
7 liquefaction were to manifest itself you could have
8 settlement on the order of many feet, and this would be
9 sudden -- that is, over a period of five or ten minutes.

10 But we did show through our investigations
11 that with this 30 percent relative density or better in
12 the structural backfill that liquefaction is not a problem.
13 Our factors of safety are two and a half to about three
14 and a half.

15 Q The liquefaction is of interest principally
16 with respect to earthquake design?

17 BY WITNESS HEDGES:

18 A Yes. An earthquake does cause liquefaction
19 potential. And, of course, this is one of the many criteria
20 we have to look at in designing the nuclear plant.
21 Liquefaction will not occur without an earthquake ground
22 motion occurring.

23 Q Thank you.

24 On Line 34, 35, you indicate that the Eagle
25 Lake area was determined to be the best source area. This

is for your backfill material. Based on what criteria?

BY WITNESS HEDGES:

A Based on giving us a clean uniform consistent sand. In this Eagle Lake area there is a massive supply, many hundreds of millions of yards of material available, and this area then became a good source, because despite where a material was obtained we knew we could obtain a consistent quality and type of material.

Q Now, on Line 40 you indicate that WCC recommended an 80 percent relative density. We have heard about this before.

Why did you pick 80 percent?

BY WITNESS HEDGES:

A Eighty percent was an acknowledged minimum that many people believed would be acceptable in the licensing process. Eighty percent was selected in our conceptual thoughts about the studies.

We made laboratory tests of the material compacted at 80 percent, and found that it had a very ample factor of safety.

The Woodward Clyde recommendations recommended 80 percent with the consideration that if Brown & Root wanted to they could have some of the tests go to 75 percent relative density and still have a very adequate factor of safety.

0-4

1 Q So that was not based on any analysis specific
2 to this site so much as it was on practice in nuclear
3 construction?

4 BY WITNESS HEDGES:

5 A It was practice. We looked at 80 percent and
6 felt that 80 percent was a good number.

7 Then we made our analysis of the liquefaction
8 characteristics of the site of the structural backfill and
9 found with 80 percent relative density for the Eagle Lake
10 type of sand the factor safety was extremely high.

11 Q Now, at the top of the next page on Page 9 you
12 indicate that the 80 percent requirement was incorporated
13 into the FSAR.

14 BY WITNESS HEDGES:

15 A The PSAR.

16 Q The PSAR.

17 BY WITNESS HEDGES:

18 A I believe the PSAR generically says that 80
19 percent relative density will be the criteria for the
20 structural backfill.

21 Q Is that minimum average 95 percentile, or --

22 BY WITNESS HEDGES:

23 A This was to be a minimum.

24 Q Minimum.

25

0-5

1 BY WITNESS HEDGES:

2 A Excuse me. An average.

3 Q Average?

4 BY WITNESS HEDGES:

5 A Yes.

6 Q Now, Brown & Root picked a level of 80 percent
7 for minimum, as you indicate farther down on Line 24, and
8 an average of 84 percent.

9 What was the reason for moving from the
10 recommendation to this level?

11 BY WITNESS PETTERSSON:

12 A Brown & Root recognized that the 80 percent
13 average relative density that Woodward Clyde had previously
14 provided to us would provide an ample safety factor against
15 liquefaction, and we also recognized that 75 percent
16 minimum would be a very acceptable number.

17 However, we also recognized that all the
18 laboratory testing performed by Woodward Clyde had in fact
19 been performed with 80 percent.

20 Furthermore, it was the opinion of Brown & Root,
21 and engineering, as well as Brown & Root construction, that
22 80 percent minimum relative density could be achieved
23 without any problems using the equipment that Brown & Root
24 was planning on using and used.

25 Therefore, we decided to specify a minimum

20-6

1 relative density equal to the density for which the
2 laboratory testing had been performed.

3 Q Now, the fact that that density was not
4 attained in some areas, do you consider that to be a
5 serious problem?

6 BY WITNESS PETTERSSON:

7 A We don't consider that to be a problem at all
8 in the areas that has been investigated specifically. In
9 other words, generically.

10 And, that has also been substantiated by the
11 independent expert committee that has looked at these
12 specific areas and looked to distribution of densities
13 within the backfill.

14 Q You indicated in your previous answer that
15 80 percent could be easily attained. Do you have any
16 thoughts as to why it was not attained in those areas?

17 BY WITNESS PETTERSSON:

18 A Yes. I do. And we have previously discussed
19 that to some extent here.

20 One reason is that you could have variations
21 in -- minor variations in the density, is the effective
22 transfer of energy from the rollers to the surface being
23 compacted, that if you have minor irregularities you may
24 have somewhat of an uneven drum compact, and you would
25 have these localized areas.

Q-7

1 Secondly, we have in areas like the one that
2 we have been specifically concerned about, Area 1,
3 Boring 204, where we have recognized that there was a
4 set of circumstances that caused it.

5 Q Then you don't view that as a, well, failure
6 of the selection process for the 80 percent initially?

7 BY WITNESS PETTERSSON:

8 A Would you please repeat that question?

9 Q In other words, you don't feel that those
10 occurrences represent a failure in the decision to use
11 the number of 80 percent?

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1 BY WITNESS PETTERSSON:

2 A No. No. Absolutely not.

3 I would like to point out that the average
4 density that has actually been achieved, based on over
5 2,800 in-place density tests, is about 95 percent.

6 Q When the other panel was on, the expert panel
7 some time back, I asked the question I would like to
8 explore now because they were not able to give me the
9 answer I was looking for.

10 That has to do with the reproducibility, the
11 precision, the accuracy of the relative density tests.
12 Perhaps Mr. McKay might -- well, any of you gentlemen who
13 would like to tackle that one.

14 BY WITNESS HEDGES:

15 A Let me start off with that. I have read the
16 testimony that occurred, that Stan Wilson and Tom Kirkland
17 gave.

18 The reproducibility of the field density test,
19 which is the sand cone test, is about one pound a cubic
20 foot. That is, if you had an absolutely uniform tub of
21 material and made three different tests, or had three
22 different people make the same test, that you would come
23 up within one pound a cubic foot of each other.

24 Q How would that look on the relative density
25 scale?

0-9 1 BY WITNESS HEDGES:

2 A Well, this would be about four percent on the
3 relative density scale.

4 Q Now, is that four percent a reasonable estimate
5 based on someone like an ASTM study, or is this based on
6 actual field measurements as they are done in the field?

7 BY WITNESS HEDGES:

8 A This is based on actual field measurements, and
9 experimental laboratory measurements made by such agencies
10 as the Waterways Experiment Station of the Corps of
11 Engineers, and the U. S. Bureau of Reclamation in Denver.
12 And, also, on a lot of Highway Research Board work made by
13 different highway departments around the country.

14 BY WITNESS PETTERSSON:

15 A ASTM also has a special technical publication
16 that addresses this subject, and it shows that one pound
17 would be reasonable estimate on the deviation.

18 BY WITNESS MC KAY:

19 A The ASTM test method is designed to make the
20 test as uniform as possible, and our technicians are
21 trained to run the test the same over and over again each
22 time that they perform the test.

23 Q Mr. McKay, have you ever checked this test
24 for reproducibility, as it is run by your people?
25

0-10

1 BY WITNESS MC KAY:

2 A Normally in the field you can't really check
3 it for reproducibility because you were not working with
4 the uniform material.

5 If you take a test side by side there might
6 be slight differences in the actual density, so it is not
7 possible to do that unless you have controlled conditions.

8 Q So you are not sure of how variable your
9 test results might be?

10 BY WITNESS MC KAY:

11 A Not actually at the South Texas Project. We
12 ran no investigation to that, other than, as I said before,
13 the technicians were trained to perform the tests the same
14 way.

15 BY WITNESS HEDGES:

16 A The variability of these tests is taken into
17 account in the results. There were 2813 tests made, and,
18 of course, the variability would be from the true exact
19 number to a plus to a minus, and that comes out still
20 with that normal variability we have a mean of 95 percent
21 realtive density.

22 That is including the variability both on the
23 high side and the low side.

24 Q What I was really wondering about was the
25 possibility to which some of the numbers which were, let's

0-11

1 say, below your specification could have been attributed
2 to experimental or measurement error, or sampling error,
3 and vice versa; some of the ones above might have been
4 below.

5 BY WITNESS MC KAY:

6 A There is that possibility that if you have a
7 test that comes up with a value of 80 percent subject to
8 test difference to either go higher or lower than that
9 value, but this range would be very small. I think we
10 discussed, you know, in the neighborhood of one pound per
11 cubic foot.

12 BY WITNESS PETTERSSON:

13 A In the statical analysis, of course in the
14 data set that we were working with, the 2800 test we had
15 all these variations, whatever they might have been, built
16 into the data set.

17 If we look at the results, we will find that
18 of the 90 percent confidence limit that we were working
19 to, that it was a very narrow range. If I am quoting the
20 numbers right here, the best estimate below 80 percent
21 was 3.7 percent. With 90 percent confidence limit between
22 3.4 and 4.7 percent.

23 And that indicates to us that we had very good
24 reproducibility of the tests.
25

1 BY JUDGE LAMB:

2 Q When you say an average relative density of
3 84 percent, that's an average of what?

4 BY WITNESS PETTERSSON:

5 A Twen / tests.

6 Q Twenty tests.

7 What happens if -- What did happen or
8 would have happened if relative density did not come
9 to those specifications? What would you do?

10 BY WITNESS PETTERSSON:

11 A The backfill would be subject to additional
12 compaction in the area where we would find that the
13 average density would not meet the 84 percent criteria.

14 Q Did this happen occasionally?

15 BY WITNESS MCKAY:

16 A I don't recall any.

17 BY WITNESS LOGAN:

18 A Oh, yes, it happened quite often. I can't
19 give you any numbers right off the top of my head.
20 There were quite a few.

21 Q Then you sent them back through the rollers?

22 BY WITNESS LOGAN:

23 A Yes, sir. And it would be re-rolled and then
24 re-tested. Some of them went through six re-tests.

25 Q At the bottom of Page 8 you mentioned the

21-2

1 safe shutdown/earthquake. What is that at this loca-
2 tion?

3 BY WITNESS PETTERSSON:

4 A It is 0.1 G.

5 Q I beg your pardon. I'm sorry, I didn't
6 hear you.

7 BY WITNESS PETTERSSON:

8 A It is 0.1 G, one-tenth G.

9 Q 0.1 G?

10 BY WITNESS PETTERSSON:

11 A Yes.

12 Q Thank you.

13 On Page 10 -- At the top of Page 10 you
14 indicate that you were going to run at least one field
15 density test for each 20,000 square feet of unrestricted
16 backfill lift.

17 That means each 20,000 square feet of 18-
18 inch deep layer; is that correct?

19 BY WITNESS PETTERSSON:

20 A All the layers with a maximum thickness of
21 18 inches.

22 Q Right.

23 At the bottom of that page, what is the
24 purpose of the gradation test? Mr. Hedges, perhaps.

25 ///

21-3

1 BY WITNESS HEDGES:

2 A The purpose is to check and make sure that
3 the material is within the construction specifications,
4 which were based on our design recommendations.

5 It's a check of the particle size of the
6 material.

7 Q Particle size and distribution?

8 BY WITNESS HEDGES:

9 A Particle size and distribution, yes.

10 Q Wasn't there a problem at some point with
11 calibration of sieves on that?

12 BY WITNESS McKAY:

13 A That particular question was brought up.
14 It was determined by Brown & Root engineering that it
15 was not necessary to calibrate sieves.

16 Further, PTL wrote a position paper to the
17 NRC -- Was it 1978 ... '79 ... somewhere in that
18 neighborhood -- stating that in our opinion it was not
19 necessary to calibrate sieves for such classification of
20 soil or gradation of aggregate.

21 BY WITNESS PETTERSSON:

22 A I'd like to point out that the expert com-
23 mittee reviewed the same subject, and they concurred
24 that a calibration of sieves would not be necessary.

25 Q Was that required under your specifications --

and requirements under this job?

BY WITNESS MCKAY:

A. No, it was not required under the specifications or our procedures.

Q. Do you have any thoughts on that, Mr. Hedges, with respect to the need or whether or not it was necessary?

BY WITNESS HEDGES:

A. I think that the properties that we were looking for in this structural backfill, the calibration of the sieves was not necessary.

BY WITNESS MCKAY:

A. I might add that the sieves that were used by PTL came with certifications from the manufacturer that they did, in fact, meet the criteria of ASTM-E-11, which is the manufacturing specification for sieves.

Q. Were these new sieves, or had they been used for a long time?

BY WITNESS MCKAY:

A. We had purchased sieves throughout the project. The initial sieves were new, and as the sieves become damaged in any way, they are replaced with new sieves.

Q. On Page 12, the first full paragraph that has been discussed already a couple of times, I have a

1 philosophical question about that paragraph.

2 That has to do with the process of decision-
3 making on that. Did engineering come down -- or pass
4 down a set of plans and specifications and requirements
5 for the backfill?

6 BY WITNESS PETTERSSON:

7 A Yes, we set the requirements, being the
8 required density, the maximum lift thickness, yes.

9 Q All right. Did those specifications and
10 plans also include the minimum number of roller passes?

11 BY WITNESS PETTERSSON:

12 A No, sir, they did not.

13 Q They didn't? So this was not an official
14 position of B&R engineering; is that correct?

15 BY WITNESS PETTERSSON:

16 A That is correct. Our specification only
17 required the formalized test fill program, if con-
18 struction would have elected to go to the 24-inch lifts.
19 However, they were staying with the 18-inch lifts; and
20 there were no requirements like this for the test fill
21 program, and again, no requirements for a specific
22 minimum number of roller passes.

23 Q All right. So the engineering referred to
24 in here is a less formal requirement -- a less formal
25 recommendation?

21-6

1 BY WITNESS PETTERSSON:

2 A Oh, very much so. It is not at all a formal
3 design criteria recommendation. It was not -- It
4 was written by a Staff engineer on site, and its only
5 purpose was to lend some assistance to Brown & Root
6 construction.

Q What I was looking for was whether con-
8 struction had any authority to override engineering in
9 matters of this type.

10 BY WITNESS PETTERSSON:

11 A Well, it is the responsibility of Brown &
12 Root construction to develop the construction procedures.
13 And, of course, if engineering has specific criteria
14 that are presented in design documents, of course, these
15 criteria must be reflected in the procedures.

16 But that is not the case here.

17 Q So the criteria that you had -- that
18 construction had to meet were end point criteria?

19 BY WITNESS PETTERSSON:

20 A Definitely so.

21 Q On relative density, more specifically?

22 BY WITNESS PETTERSSON:

23 A That is correct.

24 Q Mr. Logan, Mr. Hedges -- or maybe both of
25 you, do you have any views on this question of number of

21-7 1 passes? Do you disagree with anything that you
2 heard?

3 BY WITNESS LOGAN:

4 A No, sir. I don't disagree with anything.
5 I would like to add that as long as you achieve the
6 80 percent density, the number of passes is irrelevant.

7 This being an end point specification, it
8 only required the 80 percent density. It did not --
9 There was no reason to require the -- any minimum
10 number.

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BY WITNESS HEDGES:

A We were pleased to see the eight passes because it did give a minimum uniformity throughout the entire structural backfill. But we also wanted that the acceptance criteria would be on an end product, or an end relative density number.

Q So you agree with what you've heard about this --

BY WITNESS HEDGES:

A Correct.

Q The paragraph beginning at Line 12, if I understand the thrust of this, you're saying that relative density tests were not performed in this trench, but that what you did, in effect, was use the results from the rest of the backfill investigation or data to indicate that this probably was all right. Is that correct?

BY WITNESS LOGAN:

A Not exactly.

Q Good. Okay, tell me.

BY WITNESS LOGAN:

A By relative density tests here, we are meaning the maximum/minimum test, not the in-place density test.

The required in-place density tests were

21-9

1 run. The criteria for establishing the 80 percent
2 relative density and 84 percent average were taken from
3 the max/min's that were run in the main plant area.

4 The same material was being used. It was
5 coming out of the same stockpiles.

6 Q I'm not quite sure I understand that still.
7 BY WITNESS LOGAN:

8 A Well ... okay. Maybe B. nt can explain it
9 a little better.

10 BY WITNESS PETTERSSON:

11 A I will give it a try.

12 There was backfill placed coming out of the
13 same Category 1 stockpile of material. The material was
14 placed both in the plant area and as backfill for the
15 ECW piping at the same time.

16 The maximum/minimum relative density labora-
17 tory tests were performed in the laboratory on samples
18 obtained from the plant area.

19 However, they did not perform the same type
20 of laboratory tests on the samples obtained from the
21 ECW pipe area.

22 However, the acceptance criteria was con-
23 tinually established ... as the backfill placement pro-
24 cedure based on the tests from the plant area.

25 And as it was the same backfill, what, in

1 effect, happened was that instead of getting the one
2 in four, there was a slight -- maybe dilution of the
3 frequency of testing for the ECW pipe area.

4 But the tests were there.

5 Q Is this based on the fact that you used the
6 same compaction procedures?

7 BY WITNESS PETTERSSON:

8 A No, no. This is dependent on that you used
9 the same type of material.

10 Q Right.

11 And you --

12 BY WITNESS PETTERSSON:

13 A So, therefore, the same type of material --
14 that being it's the Category 1 structural backfill coming
15 out of the same stockpile.

16 So, therefore, the acceptance criteria that
17 you established in the laboratory, based on the plant
18 samples, would also apply to the ECW pipe area.

19 Q Well, I think I'm beginning -- Go ahead,
20 Mr. McKay.

21 BY WITNESS MCKAY:

22 A Okay.

23 I think what essentially happened was that
24 the density tests that were taken in the ECW area were
25 not included when computing when to take the one in four

21-11

sample for the max/min test in the laboratory.

Q Let me try to paraphrase what I think I've heard. That you took density tests in the trench.

BY WITNESS MCKAY:

A That's correct.

BY WITNESS PETTERSSON:

A Yes, the --

Q That's the point I was missing. You did take the density tests?

BY WITNESS MCKAY:

A Yes.

Q You did not assume those. All right. You took those, and then to calculate relative density, you used the max/min test data from other parts of the plant area because it was the same backfill material?

BY WITNESS MCKAY:

A That's correct.

BY WITNESS PETTERSSON:

A And tested in the same time period.

Q Okay, now I understand. Thank you.

Incidentally, on that page you indicate that the backfill below the pipe ... that you were going to be removing some backfill from the trench, and that the backfill below that will be tested and relative density

21-12

1 tests performed. Was that done? Has that been done?

2 BY WITNESS PETTERSSON:

3 A Well, that program is underway now. It is
4 conducted in conjunction with the re-examination/repair
5 program of the ECW pipe welding.

6 Of course, to gain access to the pipe welds,
7 it is necessary to remove the backfill that the pipes
8 are embedded in.

9 And then we are leaving the bedding that the
10 pipes are resting on in place, and we are re-
11 sampling, re-testing that; and the rest of the backfill
12 around the pipes will be replaced and tested from the
13 start.

14 Q So that hasn't been completed yet?

15 BY WITNESS PETTERSSON:

16 A No, no, sir. It is an ongoing program.

17 Q On Page 31, beginning with the paragraph
18 that starts at Line 23. "The expert committee con-
19 cluded that the foregoing deficiencies are of no
20 technical significance." Does that suggest that they
21 are not important?

22 BY WITNESS McKAY:

23 A No.

24 Q What does it indicate? I'm looking for
25 an interpretation. I want to make certain that I

21-13

1 understand what you're saying in this statement.

2 BY WITNESS PETTERSSON:

3 A The essence of the problems that we have
4 encountered here is whether we were finding a certain
5 lack of tracability and continuity in the reporting.
6 When the tests were studied, the reports that PTL has
7 been providing through the years, we found satisfactory
8 documentation of the construction events.

9 We had sufficient basis to make a technical
10 judgment of the acceptability of the backfill. And this
11 is also stated by the expert committee.

12 However, we had to ... if you will ...
13 overcome certain documentation problems regarding
14 continuity in the reporting; specifically, that there
15 were events that were reported at one point in time;
16 and there was no direct tracability to when the follow-up
17 work was done.

18 When we had completed our search of the
19 documents, when we had studied them, we found the
20 information we needed. But it was not immediately
21 available to us.

22 - - -

1 BY JUDGE LAMB:

2 Q All right. So, Mr. McKay, you feel that this
3 is important?

4 BY WITNESS MCKAY:

5 A Yes, sir, it's important. All documentation
6 is important, and to that end we have --

7 Q Did this represent violations?

8 BY WITNESS MCKAY:

9 A Yes, I would say that there were some
10 violations in that some documentation was not as complete
11 or could not be followed and retrieved in a timely manner.

12 Q Am I correct, then, that this statement
13 indicates your feeling and the feeling of the expert
14 committee, or rather, in this case it was the expert
15 committee, this is not reflected in any structural defects
16 in the backfill in spite of its importance and the fact
17 that it may be a violation?

18 BY WITNESS MCKAY:

19 A That is correct, or that is my understanding.

20 BY WITNESS PETTERSSON:

21 A That is absolutely correct. Yes.

22 There was one older than that that was gathered,
23 one that had been thoroughly studied. There was a
24 preponderance of evidence in all the situations that the
25 test was looked at, and that the expert committee looked

22-2

1 at, that we in fact had a satisfactory backfill.

2 Q Do you agree, Mr. Hedges?

3 BY WITNESS HEDGES:

4 A Yes. I think we had more than a satisfactory
5 backfill. I think we had an excellent backfill.

6 Q Do you agree with that, Mr. Logan?

7 BY WITNESS LOGAN:

8 A Absolutely.

9 Q Have all of you gentlemen read the expert
10 committee report?

11 BY MR. HEDGES:

12 A Yes.

13 BY WITNESS LOGAN:

14 A Yes.

15 Q Does any member of the panel have any
16 significant disagreement with any part of that report?

17 BY WITNESS HEDGES:

18 A No.

19 BY WITNESS LOGAN:

20 A No.

21 BY WITNESS PATTERSSON:

22 A No, I don't.

23 BY WITNESS MCKAY:

24 A No.

25 JUDGE LAMB: Thank you. That's all I have.

BOARD EXAMINATION

1
2 BY JUDGE BECHHOEFER:

3 Q Going back to the discussion that was had
4 concerning the number of laboratory maximum-minimum tests
5 and gradation tests, for every fourth field density test,
6 was not the requirement that there be at least one, as
7 stated on Page 10, at least one maximum-minimum test
8 and one gradation test for every fourth field density
9 test?

10 BY WITNESS PETTERSSON:

11 A That is correct.

12 Q That requirement appeared where?

13 BY WITNESS PETTERSSON:

14 A That appeared in the structural backfill
15 specification.

16 Q Now, is it not true that the -- was it that
17 specification that was later amended to add the word
18 "average"? Or am I misinterpreting something from some
19 other testimony?

20 BY WITNESS PETTERSSON:

21 A The specification still requires this precise
22 testing relationship for all the FSAR that addresses the
23 same provision, yes, the same provision has been amended
24 to allow for an average.

25 However, it is my opinion that the one in

22-4

1 force, that precise criteria, is a very operational
2 criteria for the quality control activities.

3 The inspectors will know precisely when to
4 take the samples.

5 However, from a technical point of view, the
6 strict adherence to that criteria is not significant, in
7 particular as we are averaging the test results and also,
8 as the expert committee has testified, that because of
9 the uniformity of material we have it would be sufficient
10 to have a testing on one in every ten.

11 Q When was the FSAR amended?

12 BY WITNESS PETTERSSON:

13 A The FSAR amendment was made in conjunction
14 with the Show Cause Order response last summer.

15 Q Now, prior to that time, is my understanding
16 correct that there was at least an inconsistency with the
17 existing FSAR commitment?

18 BY WITNESS PETTERSSON:

19 A No, sir. There were no inconsistencies
20 between the FSAR statement and the specification
21 requirement. They were in complete agreement with each
22 other.

23 Q No, I'm talking about actual practice. I
24 think there's been some testimony that there perhaps was
25 one laboratory test for ever -- as much as six or seven

22-5
1 tests.

2 BY WITNESS PETTERSSON:

3 A That is correct, sir. When we reviewed the
4 actual frequency of testing and the relationship between
5 tests, we discovered that in the past there had been a
6 few deviations, only a handful, from this precise
7 criteria.

8 Q But I take it you do regard those deviations
9 as at least inconsistent with that criteria, as it stood
10 before it was amended?

11 BY WITNESS PETTERSSON:

12 A In the actual field activity... in these very
13 few cases, they were only a handful, I believe 700. They
14 were deviating from the specification requirements.

15 However, again, the specification requirements
16 and the FSAR were consistent.

17 Q Right. Now, under the current amendment is
18 there any inconsistency between what the FSAR states,
19 which is somewhat broader than the original one, and the
20 current construction standard that you referred to?

21 BY WITNESS LOGAN:

22 A No, sir.

23 Q There's a statement that the one test in four
24 criteria was conservative by industry standards.

25 What would industry standards be? What

22-6

1 criteria would be --

2 BY WITNESS PETTERSSON:

3 A The industry standards is dependent on what
4 kind of materials that you are dealing with. These can
5 vary from a one-to-one relationship, if you are dealing
6 with a natural deposit with large variations, to maybe
7 only one, or only a series of tests in the beginning of
8 the project.

9 In this particular case, I believe that the
10 industry standard would be normally something like one in
11 ten, which was the number that the expert committee also
12 would find to be a satisfactory number.

13 BY WITNESS HEDGES:

14 A I agree with that. I think in our experience
15 with the industry that it would be one in ten or one in
16 twenty because of the consistency of this material.

17 Q Okay. I want to turn to the discussion of
18 compaction and the number of passes which were -- we've
19 had a considerable amount of discussion about that.

20 Do I understand that there is no specific
21 requirement applicable to this job in any way that
22 requires a minimum number of passes?

23 BY WITNESS PETTERSSON:

24 A The specification, the engineering specifi-
25 cation for the Bechtel construction does not have the

22-7

1 specific number of passes required.

2 The only way that number of passes is
3 mentioned in the specification is that the construction
4 procedures should define the minimum number of passes,
5 and that is precisely what we have, the minimum number
6 of passes are defined by construction in the construction
7 procedures.

8 Q There's no PSAR or FSAR commitment?

9 BY WITNESS PETTERSSON:

10 A That's correct, sir.

11 Q To a given number.

12 Is there any reporting requirement? I was
13 a little confused about the reporting requirements or
14 the reporting practices which were described.

15 Maybe my understanding is incorrect, but I
16 understand that the first eight passes in each case
17 have to be recorded, and then after that, only the fact
18 that the density is achieved, or am I missing something?

19 BY WITNESS McKAY:

20 A What is required is that a minimum of eight
21 passes be observed and be verified by the inspector in
22 the field. This is what he notes on his inspection form
23 when he writes "acc," or acceptable.

24 Beyond that point his function is to make sure
25 that any additional passes placed on the materials are

22-8
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1 placed in a uniform manner.

2 Q Is there any utility -- why is the minimum
3 of eight required to be noted? What's the utility of
4 that?

5 BY WITNESS MCKAY:

6 A That was a requirement in the construction
7 procedure. Therefore, it became a new process acceptance
8 criteria.

9 Q But what I'm trying to understand is what
10 utility the eight has when the final acceptance must be
11 based on a performance standard rather than --

12 BY WITNESS HEDGES:

13 A The eight passed assures a minimum uniformity
14 of the material, and that's the reason that was placed
15 in the construction procedure.

16 We wanted to see a minimum uniformity of the
17 material.

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1 BY JUDGE BECHHOEFER:

2 Q Now, I notice in Applicant's Exhibit 8,
3 there is a question directed to Page 30, which noted
4 that a considerably higher number --

5 MR. GUTTERMAN: Mr. Chairman, excuse me
6 for interrupting, but you said Applicant's Exhibit 8,
7 I think you might have meant 6.

8 JUDGE BECHHOEFER: I should have said 6.
9 I'm sorry.

10 BY JUDGE BECHHOEFER:

11 Q Page 30. I think there was a question asked
12 concerning the 16 to 20, or more passes, are presently
13 needed to consistently meet the specification requirements.
14 Does the 8 indicate a sufficient degree of uniformity
15 to be meaningful -- the 8 which is the subject of a
16 requirement?

17 BY WITNESS PETTERSSON:

18 A Yes, sir. And after 8 passes, we have
19 reached a point which is in conformance with the 80
20 percent relative density, or very close to it. But,
21 more importantly, we have reached uniformity of
22 density with this.

23 Q Well, does the 16 to 20, it says "presently
24 needed to consistently meet specification requirements."
25 Is that needed to make 80 percent or 84 percent or --

23-2

1 BY WITNESS PETTERSSON:

2 A Yes, sir. Well, we know that this 16 to
3 20 or more passes actually has provided an average
4 density of ... oh, 95 percent.

5 As a point of explanation here, we have
6 already before talked about the diminishing compaction
7 with increased number of passes.

8 The first few passes accomplishes the highest
9 degree of compaction. And then each test -- each pass
10 thereafter adds a decreasingly smaller and smaller
11 amount of densification.

12 And, therefore, if you have not achieved
13 the 80 percent acceptance criteria after eight passes,
14 you will not gain much more by adding one, two, three
15 more passes.

16 And, therefore, construction's mode of
17 operation is that they add another eight passes; and
18 that's why you rapidly get into a number of passes
19 that appears to be high.

20 Q I see. Could you estimate how often --
21 what percentage of -- well, what percentage of the time
22 that this procedure comes into play would you meet 80
23 percent after eight passes?

24 BY WITNESS PETTERSSON:

25 A I may not be able to answer your precise

1 question, but I --

2 Q Just a ballpark figure.

3 BY WITNESS PETTERSSON:

4 A The number of re-tests we have, I believe,
5 is about 20 percent. It's one time every fifth time,
6 they would have to go out and perform additional com-
7 paction.

8 Q I take it this report, when they talked
9 about 16 to 20, and when they talked about consistency,
10 they meant something greater than 80 percent of the
11 passes to be consistent.

12 BY WITNESS PETTERSSON:

13 A Yes. The construction approach now is that --
14 of course, they don't want to have a large number of
15 failing tests, because it is an interruption in the
16 construction procedures.

17 So, therefore, they have elected to continue
18 to 16 passes or so, and they know that if they do that,
19 they will have an acceptably small amount of re-
20 compaction to do.

21 Q I see. Do you have any -- Would there
22 be any -- No, wait a minute. Strike that.

23 If the requirement of observing eight were
24 changed to 16, would that serve any useful purpose,
25 in terms of the observing i?t

1 BY WITNESS PETTERSSON:

2 A Well, I haven't thought much about it in
3 these particular terms. But I would say that from an
4 engineering point of view, that would not add anything
5 significantly to our opinion about the acceptability
6 of the backfill ... not at all because already with
7 eight passes, we have achieved the uniformity that we
8 are looking for.

9 Q I see. I think there was testimony earlier --
10 and I don't remember by whom -- that when a table was
11 broken down, a nonconformance report should have been
12 filed.

13 My question was: Am I correct that someone
14 stated that?

15 BY WITNESS McKAY:

16 A Yes, that's correct. I made that state-
17 ment.

18 Q Was one every filed?

19 BY WITNESS McKAY:

20 A Yes, it was.

21 Q When? I mean, how long after the event?

22 BY WITNESS McKAY:

23 A About the time we got the new equipment
24 in, and it was determined at that point -- I can't
25 remember who made the determination -- that a

23-5

1 nonconformance was required.

2 Q Now, one follow-up question to one Dr.
3 Lamb asked.

4 Can liquefaction ever occur at a level of
5 acceleration of 0.1 G?

6 BY WITNESS HEDGES:

7 A Yes, liquefaction can occur at 0.1 G if the
8 density is exceptionally loose. I would guess if your
9 relative density is down on the order of 35 percent --
10 somewhere between 35 and 50 percent for a large volume --
11 that you could have liquefaction.

12 Q At that acceleration?

13 BY WITNESS HEDGES:

14 A At that 10 percent G acceleration.

15 JUDGE BECHHOEFER: Okay, thank you. That's
16 all I have.

17 That's all the questions the Board has.
18 Mr. Gutterman.

19 MR. GUTTERMAN: I just have a couple of
20 questions, Mr. Chairman.

21 REDIRECT EXAMINATION

22 BY MR. GUTTERMAN:

23 Q The first one is for Mr. McKay. In answer
24 to a question from Mr. Jordan this morning about PTL
25 inspection and test activities at STP, did I understand

1 you to state that PTL's only earthworth activities
2 are related to structural backfill placement?

3 BY WITNESS McKAY:

4 A No. All of our inspection and testing
5 activities cover all backfill, whether it be structural
6 backfill or other non-category one type backfill.

7 Q Thank you.

8 Mr. Pettersson, in answer to a question
9 from Mr. Gutierrez, you mentioned an FSAR change that
10 was filed on May 1, 1981. That was after your testimony
11 had already been filed in this proceeding.

12 Please explain the effect of that change.

13 BY WITNESS PETTERSSON:

14 A In our review of the provisions for per-
15 forming the maximum/minimum laboratory density tests --
16 performing at least one maximum/minimum laboratory
17 test during a shift, we determined that it would not,
18 under all circumstances, be possible to perform that
19 test during the same shift as the sample had been
20 obtained.

21 We, therefore, concluded that the practical
22 solution which would satisfy the engineering requirement
23 would be that the sample would be obtained, at the same
24 time as the in-place density tests.

25 However, the actual performance of the

23-7

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1 laboratory test could take place at the later shift,
2 because the properties of the backfill material would not
3 change with time.

4 MR. GUTTERMAN: Thank you. I have no further
5 questions.

6 JUDGE BECHHOEFER: Mr. Jordan.

7 RECROSS-EXAMINATION

8 BY MR. JORDAN:

9 Q In discussing, gentlemen -- whoever knows
10 the answer -- the various discussion during the day of
11 settlement, differential settlement and so on, you
12 stated the settlement occurred beneath the backfill.

13 Do you know whether -- what extent settlement
14 is expected of these various buildings?

15 BY WITNESS HEDGES:

16 A Yes, we do. We made quite an extensive
17 analysis in the design phase. We anticipated that the
18 heave from the excavation unloading to get down to the
19 containment elevation would be somewhere on the order
20 of four to five inches; that is, the ground at the
21 excavated level would rise four to five inches.

22 Our instrumentation shows that the ground
23 rose 4 1/2 inches.

24 Now, with the weight of the buildings and
25 the backfill going on top of the excavated surface, we

1 anticipated that this heave would be reconfined, and
2 settlement would occur, I believe an inch and a half of
3 new settlement.

4 So anticipating an inch and a half of new
5 settlement after the reconfinement of heave from the
6 excavation process.

7 BY WITNESS PETTERSSON:

8 A That would then be a total settlement of
9 six inches. And the building that we're specifically
10 talking about now is the Unit 1 Reactor Containment
11 Building.

12 That is the example that Mr. Hedges has
13 described.

14 MR. JORDAN: That's all I have.

15 JUDGE BECHHOEFER: Mr. Sinkin.

16 MR. SINKIN: Let me just clarify something
17 that was just said.

18 RECROSS-EXAMINATION

19 BY MR. SINKIN:

20 Q There has been testimony previously that
21 there's no backfill under the Reactor Containment
22 Buildings except in one small area, which I think was
23 the pedestal.

24 BY WITNESS PETTERSSON:

25 A That is correct. There is an amount of

23-9

1 backfill that was placed in the so-called pedestal
2 area that was described in the expert testimony.

3 Q So what you've just described in terms of
4 settlement is actual settlement of the natural soil?

5 BY WITNESS PETTERSSON:

6 A Correct, sir.

7 Q Okay. We've been talking about Page 30 in
8 your Applicant's Exhibit 6. In response to a question
9 from Judge Bechhoefer, Mr. Pettersson (I believe it
10 was), you said that the first passes achieve the highest
11 degree of compaction, and then the next passes achieve
12 a much lesser degree of compaction; is that correct?

13 BY WITNESS PETTERSSON:

14 A That is generally true. The first passes
15 on the newly placed backfill accomplishes the highest
16 degree of densification.

17 Q Okay. I will admit to having difficulty
18 with Figure 16 in this same report, which is referred
19 to in that paragraph we've been discussing, where it
20 seems that the relative density goes down in the
21 period from zero to six passes. Do you see the
22 chart that I'm talking about?

23 BY WITNESS PETTERSSON:

24 A Yes, sir, I'm looking at the chart.

25 Q Would you explain that chart to me?

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1 BY WITNESS PETTERSSON:

2 A Yes, I can.

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4-1 1 So anticipating high initial gain in
2 densification that have been mentioning several times,
3 of course, it is not always evident from this chart when
4 the backfill first is placed after several passes you have
5 a density that probably is on the order of 40 percent, or
6 maybe even less.

7 So, the first four passes brings the backfill
8 up to somewhere in the 70 percent relative density.

9 Q Okay. So, really, to be complete that chart
10 should have some kind of mark down there 40 percent, and
11 then a line running up to the 70 to 80 percent mark?

12 BY WITNESS PETTERSSON:

13 A Yes. For purpose of illustration that will
14 make the figure more complete.

15 Q Well, let's take it from four to eight, where
16 at least in one case, which is the bottom of Test Life 2,
17 if I read that figure correctly, it drops from four to
18 eight passes from the 75 percent range to the 65 percent
19 range. Could you explain that to me?

20 BY WITNESS PETTERSSON:

21 A I cannot explain it precisely. I'm not sure
22 that anybody really can.

23 However, the density in the real world out
24 there does not drop.

25 Q Does not drop?

4-2 1 BY WITNESS PETTERSSON:

2 A No. Like some things expertly said, that the
3 backfiller would not know that a certain point of
4 compaction he should change his mind and become looser.

5 Q Okay.

6 I also want to be very clear in my own mind
7 about the tilting building, and you have explained it I
8 think fairly thoroughly.

9 But let me understand, we have more backfill
10 on the south side than we have on the north side. Correct?

11 BY WITNESS PETTERSSON:

12 A That was the situation approximately a year
13 ago, yes.

14 Q Okay.

15 Explain to me why the existence of more
16 backfill on the south side than is on the north side
17 causes the slab to tilt to the south?

18 BY WITNESS PETTERSSON:

19 A The settlement that we are dealing with here
20 is occurring fairly deep in the stratification. We are
21 talking about depths of several hundred feet.

22 At these large depths there is a great over-
23 lap for stress inference. In other words, the load that
24 has been placed outside the building areas -- in this
25 case it was actually immediately outside -- all the way

up to the walls, inferences the consolidation that is taking place under the building.

Q So we are talking about consolidation of the natural material --

BY WITNESS PETTERSSON:

A Oh, yes, natural. I would like to make that clear. That's what we are dealing with.

MR. SINKIN: That's all I have, Your Honor.

JUDGE BECHHOEFER: Mr. Gutierrez.

MR. GUTIERREZ: I have two questions.

RECROSS-EXAMINATION

BY MR. GUTIERREZ:

Q Mr. Pettersson, you testified that you have no doubt that the backfill meets the specifications. I am unclear, do you have any doubt that the QA/QC procedures during the backfill compaction activity were met, as well?

Do you understand the question?

BY WITNESS PETTERSSON:

A Yes. Could you explain what activity, sir, is --

Q Well, my confusion is, in response to a question by Judge Bechhoefer you said that there were no procedures relative to minimum number of passes.

And Mr. McKay, I believe, said that the QC

24-4 1 inspectors did have to observe and document that at least
2 a minimum of eight were in fact made.

3 And there is some confusion in my mind.

4 BY WITNESS PETTERSSON:

5 A Well, let me try to explain that. The
6 requirements for number of passes, be at least eight pass
7 requirements is set forth in the construction procedure.

8 Now, the inspectors, PTL earth-work inspectors
9 are required to assure adherence to these procedures, and,
10 therefore, when they are checking acceptable that is their
11 evidence that the provisions of the procedure have been
12 met, that is with the minimum of eight passes have been
13 performed.

14 Q And the minimum number is a construction
15 procedure?

16 BY WITNESS PETTERSSON:

17 A That is correct. It is a construction procedure
18 criteria.

19 Q Mr. Pettersson, again turning to Applicant's
20 Exhibit 6, this time to Figure 16 in the back. Have you
21 found that, sir?

22 BY WITNESS PETTERSSON:

23 A Yes, sir.

24 Q In interpreting that graph can you form an
25 opinion as to what percentage of time the 80 percent

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1 relative density would have been achieved after eight
2 passes?

3 BY WITNESS PETTERSSON:

4 A Yes. This would be an opinion, yes, from
5 looking at it now. I hadn't previously looked at it from
6 that point of view.

7 If we look at the middle of Test Lift 1, which
8 is the second lift from the top you will find that in
9 fact you had 80 percent minimum relative density after
10 eight passes.

11 If you look at the next -- there are some
12 boxes there which are the ones that are filled at the
13 top -- you will find that you are quite close to an 80
14 percent, or somewhere around 77 percent after eight passes.

15 Now, we must remember -- and this is probably
16 part of the answer that I should have given Mr. Sinkin
17 before -- there are variances in the test method. We have
18 previously addressed variations of one pound.

19 Variations of one pound, of course, translates
20 into the four percent relative density, and, therefore,
21 you may conclude that to be the back of the soil areas,
22 but we are within the accuracy of the testing from the
23 specifications.

24 Q Let me just ask: As a layman I look at this,
25 and I may layman in this sense, and it seems to me what

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1 this graph is saying, and you correct me if I am wrong,
2 is that each lift was tested in one of four places, four
3 depths of the lift, and only in one of those places after
4 eight passes did it achieve the 80 percent relative
5 density. Is that correct?

6 BY WITNESS PETTERSSON:

7 A If you make the strict interpretation of this
8 charts, that is, of course, what the chart shows.

9 Now, the area that did in fact pass is the
10 middle of the underlying lift, and then the area that was
11 next in line as far as relative density goes is the top
12 of the underlying lift, the underlying lift being Lift 1,
13 now that is the place where PTL historically had been
14 taking their in-place density tests.

15 So, therefore, the test results we have are
16 all truly conservatively representative for the density
17 of the backfill.

18 (Counsel conferring.)

19 Q Just one last question on this point: Do you
20 disagree with the conclusions of the expert committee in
21 this regard, that 16 to 20 passes is required to meet the
22 minimum 80 percent relative density?

23 BY WITNESS PETTERSSON:

24 A No, I don't disagree with them. That is the
25 mode of operation right now. And, again, we are dealing

1 with this as being an end product and specification and
2 product requirement. Our construction people are putting
3 on 16 to 20 passes, and that achieves to the end results.

4 Q Finally, Mr. Logan, you stated that as long
5 you achieve relative density the number of passes is
6 technically irrelevant, I think.

7 BY WITNESS LOGAN:

8 A I did say that. I probably should qualify it.
9 There should be a minimum number to assure uniformity.

10 Q Okay. That was one point I wanted to make.

11 BY WITNESS LOGAN:

12 A Yes.

13 Q The second point I wanted to make, is how about
14 a Quality Assurance point of view. Is that equally
15 irrelevant, or are other factors --

16 BY WITNESS LOGAN:

17 A No, sir. I don't believe that the number of
18 passes per se, other than the fact that we achieved a
19 uniformity is really relevant.

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1 Q Well, just let me close this line with this
2 question.

3 If the specifications require a minimum of
4 eight, from a quality assurance point of view, you do
5 have to see to it that those eight passes are in fact
6 rolled?

7 BY WITNESS LOGAN:

8 A Yes, sir, and we did that because it was
9 required in the construction procedure.

10 Q And quality assurance, assumedly, would have
11 to inspect that you followed the construction procedures?

12 BY WITNESS LOGAN:

13 A Well, I didn't inspect quality assurance; from
14 my point of view, PTL did the inspection. I just made
15 sure that they performed that inspection.

16 It's a quality control function rather than --
17 I'm not saying -- I don't want to leave this hearing with
18 the impression that I personally inspected to see that
19 eight passes were there, all the passes, because I did not.

20 MR. GUTIERREZ: I have no further questions.

21 JUDGE BECHHOEFER: The Board has no questions.

22 Mr. Gutterman, do you have anything further?

23 MR. GUTTERMAN: I have no further questions.

24 JUDGE BECHHOEFER: Mr. Jordan or Mr. Sinkin,
25 based on the Staff's --

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1 MR. JORDAN: No.

2 MR. SINKIN: No.

3 JUDGE BECHHOEFER: I believe this panel may
4 be excused.

5 (Whereupon, the witnesses were excused.)

6 MR. GUTTERMAN: Perhaps we can keep
7 Mr. Pettersson up there and add Mr. White to the panel
8 and go on with the next piece of testimony.

9 JUDGE BECHHOEFER: I think the Board would
10 prefer to adjourn now for dinner.

11 Let's return at about 7:30 for the other
12 panel.

13 MR. GAY: Mr. Chairman, with the indulgence
14 of one moment, just discussing something with Mr. Sinkin,
15 I've determined that both CCANP and CEU will have an
16 objection to the entirety of the testimony of the next
17 panel, and I just wanted to inform you of that and you
18 may want to go ahead and offer the testimony now and hear
19 our objection and think about it during the break, or
20 make a determination before we adjourn, but it doesn't
21 bother us. I wanted to make sure that you had that for
22 purposes of your information before we adjourn.

23 (Whereupon, at 5:14 p.m., a recess was
24 taken until 7:35 p.m., the same day.)
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EVENING SESSION

7:35 p.m.

JUDGE BECHHOEFER: Back on the record.
Good evening. I hope you all had a nice
dinner.

Are the Applicants prepared to present their
next panel?

Are there preliminary matters first?

(No response.)

JUDGE BECHHOEFER: If not, the Applicants may
call their next panel.

MR. GUTTERMAN: At this time Applicants call
C. Bernt Pettersson and Jon G. White.

Mr. Pettersson has already been sworn, but
Mr. White has not.

JUDGE BECHHOEFER: Mr. White, do you swear
that the testimony you are about to give is the truth,
the whole truth, and nothing but the truth, so help you
God?

MR. WHITE: I do.

Whereupon,

C. BERNT PETTERSSON
JON G. WHITE

having been previously duly cautioned and sworn to tell
the truth, the whole truth and nothing but the truth,

1 testified as follows:

2 DIRECT EXAMINATION

3 BY MR. GUTTERMAN:

4 Q Please state your names and current employment
5 for the record.

6 BY WITNESS PETTERSSON:

7 A Bernt Pettersson. I'm employed by Brown & Root.

8 BY WITNESS WHITE:

9 A I'm Jon White. I'm employed by Houston
10 Lighting & Power.

11 Q Do each of you have in front of you a 16-page
12 document, plus cover, entitled "Testimony on Behalf of
13 Houston Lighting & Power Company, et al., of Mr. C. Bernt
14 Pettersson, Mr. Jon G. White, Regarding Alleged False
15 Statements in the FSAR"?

16 BY WITNESS WHITE:

17 A Yes, sir.

18 BY WITNESS PETTERSSON:

19 A Yes.

20 Q Are each of you familiar with the contents
21 of that document?

22 BY WITNESS PETTERSSON:

23 A Yes.

24 BY WITNESS WHITE:

25 A Yes.

25-5 1 Q Are there any corrections that need to be
2 made to it?

3 BY WITNESS PETTERSSON:

4 A Yes. There are two corrections to this
5 document.

6 Page 9, Line 28, insert before the word
7 "Paragraph" "The second," and after the word "Paragraph,"
8 "of section," so that the beginning of this line will
9 read: "The second paragraph of Section 2.5.4.," et cetera.

10 The next correction is on Page 10, Line 36,
11 before the word "Paragraph," insert "The first." After
12 the word "Paragraph" insert the words "of section," so
13 the beginning of the line will read: "The first paragraph
14 of Section 2.5.4.," et cetera.

15 Q Are those the only corrections?

16 BY WITNESS PETTERSSON:

17 A Yes, sir.

18 Q With those corrections, is the document
19 entitled "Testimony on Behalf of Houston Lighting & Power
20 Company, et al., of Mr. C. Bernt Pettersson, Mr. Jon G.
21 White, Regarding Alleged False Statements in the FSAR"
22 true and correct, to the best of your knowledge and
23 belief?

24 BY WITNESS PETTERSSON:

25 A Yes, it is.

1 BY WITNESS WHITE:

2 A Yes, sir.

3 MR. GUTTERMAN: Mr. Chairman, at this time
4 I move that the document entitled "Testimony on Behalf of
5 Houston Lighting & Power Company, et al., of Mr. C. Bernt
6 Pettersson, Mr. Jon G. White, Regarding Alleged False
7 Statements in the FSAR" be admitted into evidence and be
8 bound into the transcript as if read.

9 JUDGE BECHHOEFER: Mr. Jordan or Mr. Sinkin?

10 MR. JORDAN: Mr. Gay.

11 JUDGE BECHHOEFER: Mr. Gay. Okay.

12 MR. GAY: Mr. Chairman, CUE has an objection
13 and we would move to strike the entirety of the testimony.

14 We have previously informed the parties of
15 the grounds for this and the argument that would be made,
16 and we would like to keep this argument as succinct and
17 as short as possible.

18 Basically, Your Honors, the argument goes to
19 the fact that the Applicants should be estopped from
20 denying that which they have previously admitted.

21 If you look at Page 4 of Mr. White and
22 Mr. Pettersson's testimony, the purpose of this testimony
23 is to respond to items which were in the Show Cause Order,
24 apparent false statements of particular sections.

25 If we look to the Show Cause Order, Page 17,

1 Item 10, it states that the licensee shall verify or
2 correct if necessary the FSAR statements contained in
3 the sections at issue.

4 Now, if we look to the document which I
5 believe is Staff Exhibit 48, which is the Applicants'
6 response to the Show Cause Order --

7 JUDGE BECHHOEFER: Yes. Wait a minute.

8 MR. GAY: -- they basically reiterate the
9 same --

10 JUDGE BECHHOEFER: Wait one second.

11 MR. GAY: All right. I'm sorry.

12 JUDGE BECHHOEFER: Go ahead. I won't try to
13 dig it up.

14 MR. GAY: It states, if you'll follow me,
15 basically the Applicants c. Page 2-1 of their response
16 to the Show Cause reiterate this same statement, .10 of
17 the Show Cause.

18 If we flip to their actual response on that
19 item, which appears on 2-36 of their response to the
20 Show Cause, it is under Subsection C, FSAR amendments,
21 and what the Applicants have done in the response to the
22 Show Cause is to state without comment the amendments
23 that they have made to the FSAR in response to what the
24 Commission has called for, to either correct if necessary
25 or verify.

25-8

1 The Applicants have chosen to correct, because
2 it was necessary, and they have not responded in any
3 detail in the Show Cause beyond those amendments, and
4 we find it unnecessary now at this point in time to go
5 into this matter, which essentially the testimony of
6 these two individuals is a denial that there were false
7 statements in the FSAR.

8 MR. SINKIN: Mr. Chairman --

9 JUDGE BECHHOEFER: I just want to ask a
10 question about all this.

11 Have the Applicants admitted to false state-
12 ments, or have they admitted merely that a section of
13 the FSAR needs correction, because I think this testimony,
14 as I read it, deals with false statements, but this is --
15 and I also ask you, was not the admission and the payment
16 of a fine more of a nolo contendere plea?

17 MR. GAY: I think Mr. Sinkin wants to --

18 JUDGE BECHHOEFER: I'm going to ask the
19 Applicants the same question.

20 MR. SINKIN: Mr. Chairman, referring to
21 10 CFR 2.202, Section B, a licensee may respond to an
22 Order to Show Cause by filing a written answer under oath
23 or affirmation. The answer shall specifically admit or
24 deny each allegation or charge made in the Order to Show
25 Cause and may set forth the matters of fact and law

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✓
1 on which the licensee relies.

2 Then additionally, in 2.202, Section E, the
3 assent of the licensee to the entry of an Order shall
4 constitute a waiver by the licensee of a hearing, finding
5 of fact and conclusions of law and of all right to seek
6 Commission and judicial review or to contest the validity
7 of the Order in any forum.

8 Based on those two sections, the option to
9 the Applicants was to deny that there were false state-
10 ments, ask for a public hearing and contest that
11 allegation, or to admit that there were false statements,
12 and by correcting the statements in the FSAR we view that as
13 an admission. By failing to request a public hearing and
14 issuing a denial, we view that as an admission.

15 Under Part E, they are not allowed to litigate
16 the question of the accuracy of that charge in any forum,
17 particularly before this Commission.

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1 JUDGE BECHHOEFER: All right.

2 Back on the record.

3
4 Mr. Axelrad, are you going to --

5 MR. AXELRAD: Yes, I'm prepared to respond,
6 Mr. Chairman.

7 I do believe that it would be necessary for
8 the Board to view the documents I'm going to refer to
9 in context.

10 I'll be glad to describe them, if the
11 Board does not feel a need to view them. That's okay.

12 But let me just respond. From the beginning,
13 the Intervenor has not pointed out any specific
14 location in any document where the Applicants have ad-
15 mitted to any false statements.

16 The truth --

17 JUDGE BECHHOEFER: That was one question I
18 asked, and I wanted that.

19 MR. AXELRAD: Right.

20 JUDGE BECHHOEFER: I would also like you to
21 comment at some point whether you consider whatever you
22 did so in the sense of a nolo plea.

23 MR. AXELRAD: No, it was not a nolo plea,
24 Mr. Chairman. I will be pleased to explain exactly what
25 we did.

26-2

JUDGE BECHHOEFER: Okay.

MR. AXELRAD: With respect to this particular matter of the alleged false statement, which is the matter we're discussing right now -- we're not discussing anything else. Okay?

The first item that we filed in response to the Order to Show Cause of April 30, 1980 with our May 23, 1980 response.

It was an answer filed pursuant to Section VI of the Order to Show Cause. That appears as the Staff's Exhibit No. 91. And it may be useful for the Board to view that document, because the Intervenor's have not correctly reflected what the documents contain.

In that particular document where we filed pursuant to Section VI, we stated in the paragraph that begins at the bottom of Page 1 our responses to the allegations that were contained in Section III of the Show Cause Order.

And if the Board will recall, Section III of the Show Cause Order was a narrative description of a number of events. It was not pinpointed one, two, three, et cetera.

We responded to that. And the paragraph which appears at the bottom of Page 1 of our letter

26-3

1 ta ks about all of the allegations in Section III, with
2 one exception; the one exception being the one that
3 pertains to the two apparent false statements in the
4 FSAR.

5 In that paragraph which appears at the
6 bottom of Page 1 we incorporate the text of our reply
7 to the Notice of Violation, which dealt with the 22
8 items of non-compliance.

9 And we noted that each item of non-
10 compliance was answered in that reply, which we in-
11 corporated by reference; and that we, therefore, were
12 answering those through that mechanism.

13 We then went on in the first full paragraph
14 on Page 2 of that letter to state specifically, with
15 respect to the one allegation that, "two apparent
16 false statements in the FSAR were identified regarding
17 tests and observations actually performed. The supporting
18 information is not found in the Notice of Violation.

19 This item will be addressed in the response
20 to Section V, Item 10 of the Order to Show Cause.

21 Let me just refresh the Board's recol-
22 lection. The narrative description that was contained
23 in Section III of the Show Cause Order did not contain
24 any discussion on what the apparent false statements
25 were.

26-4

1 Now, the response to Section V, Item 10,
2 of the Order to Show Cause is a document that we then
3 filed on July 28, 1980, Licensee's Response to Order
4 to Show Cause, which is a document that was referred
5 to by the Intervenor before, which is Staff Exhibit
6 No. 48.

7 That document at Page 2-33, in responding
8 to Item 10, FSAR description, we pointed out that we
9 were performing a comprehensive evaluation of the FSAR
10 sections that had been referred to in the Order to Show
11 Cause.

12 And in the second sentence of that first
13 paragraph we stated, "Based on the evaluation completed
14 to date, an FSAR amendment will be submitted to clarify
15 the description of the construction process."

16 And then on Page 2-36, we describe the
17 changes in the FSAR that were going to be submitted to
18 clarify that subject.

19 And that is the full sum and extent of what
20 we have done with respect to those FSAR descriptions.
21 We have amended those two FSAR paragraphs in order to
22 clarify the matters contained therein.

23 The testimony that we are submitting at this
24 time is intended to assist the Board to understand what
25 the FSAR provisions dealt with, to describe the fact

26-5 1 that they contain programmatic descriptions; namely,
2 descriptions of the criteria that we're to apply to the
3 work.

4 The testimony will describe the deviation
5 from those criteria that did take place during the
6 course of the years.

7 It will also describe the reasons for the
8 amendments that were ultimately filed. We think that
9 this is information which is essential for the Board
10 to have, in order for it to understand what the purpose
11 of those specific FSAR sections were, why the devia-
12 tions from the requirements described therein took
13 place, and why those FSAR sections were being
14 amended.

15 The particular sections of the regulation
16 cited by Mr. Sinkin just do not apply to this particular
17 situation; and we do not intend to get into any detailed
18 legal discussion of those at this time because it is
19 so clear that the Applicants have not -- have not
20 admitted any false statements.

21 And the purpose of this testimony is to
22 make sure that the Board understands what these cir-
23 cumstances are.

24 We will point out that in any event, it is
25 incumbent upon this Board, regardless of whose view it

26-6

1 ultimately accepts, as to the legal considerations
2 discussed by the Intervenor or as to what the legal
3 effect might have been of the deviation of false --
4 the deviations from the FSAR statement.

5 It's incumbent upon this Board to be fully
6 apprised of all the circumstances associated with those
7 particular deviations, so that it knows how to take
8 them into account in weighing the Applicants' competence
9 and character.

10 We just cannot imagine how the Board could
11 feel that it's doing its job properly and fully without
12 having before it the evidence that these two witnesses
13 will bring to it.

14 MR. REIS: If the Staff could be heard.

15 JUDGE BECHHOEFER: Yes, we were about
16 to -- I would like to know how the Staff regards the
17 Applicants' various responses.

18 MR. GUTIERREZ: Well, Mr. Chairman, the
19 Staff essentially agrees with the Applicant on this
20 point.

21 I only wanted to make two points. First,
22 the Intervenor's motion based on 2.202 assumes that
23 Item -- Show Cause Item 10 is either an allegation or
24 a charge made by the Commission which requires an
25 admission or a denial.

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1 It's a request to either verify something,
2 and if necessary, correct it. It's a direction on the
3 part of the Staff for the Licensee to take certain
4 action.

5 It's not a direct allegation that certain
6 statements are false.

7 So I think that the Intervenor's are mis-
8 placed on their motion because I think they assume
9 that Show Cause Item 10 is somehow an allegation. It's
10 not.

11 It's a direction to take certain action.
12 That's one distinction I draw.

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1 MR. GUTIERREZ: The next point I want to make
2 is to cite the Board's attention to the North Anna
3 case, which I think essentially says -- although I
4 don't -- haven't read it since the Intervenor made
5 their motion.

6 But from recall, essentially I think this
7 Board has to hear all the circumstances surrounding an
8 alleged false statement, in order to determine
9 whether, after hearing everything, it was in fact
10 false.

11 You can't make a determination in isolation.
12 So that's my second point.

13 JUDGE BECHKOEFER: Let me ask you a question
14 about.

15 Is there any difference between a case,
16 such as North Anna, where there was an attempted en-
17 forcement of a civil penalty and a show cause order,
18 and this which is more or less collateral use of the
19 results of such a proceeding?

20 MR. GUTIERREZ: I didn't understand the
21 distinction you're drawing.

22 JUDGE BECHHOEFER: Well, it was my im-
23 pression -- and I probably read it farther back than
24 you did -- so I don't remember it in all detail. My
25 understanding of North Anna was that it was the direct

26-9

1 enforcement -- the case involved was the enforcement
2 action itself.

3 And what I'm asking you is there any dif-
4 ference between that and a case like this where we're
5 not involved in the Show Cause Order as such, but we're
6 involved in the collateral use of that.

7 MR. GUTIERREZ: I understand the distinction
8 you're drawing.

9 I'm not sure that that's a relevant dis-
10 tinction or a key distinction. I think North Anna is
11 a clearer instance of a false statement or where a
12 false statement was clear.

13 Here, a question was raised with respect to
14 the accuracy of statements made in the FSAR. Now, you've
15 yet to hear on the record whether the -- whatever the
16 underlying facts were that the statement was based upon
17 occurred before the statement was made or after the
18 statement was made.

19 There's just need for clarification. And
20 I think that's what the Show Cause Order asked the
21 Applicant to do. That is, I think, what the Applicant
22 did.

23 And now there's testimony clarifying
24 whether it was a false statement ... was an apparent
25 false statement ... just what the situation was.

26-10

1 I think that's why this Board has to
2 hear this panel.

3 JUDGE BECHHOEFER: What effect, if any,
4 does payment of a civil penalty have?

5 MR. GUTIERREZ: I don't know exactly what
6 they paid the civil penalty for, or whether it directly
7 arose out of the FSAR statements or for other items of
8 noncompliance.

9 I don't think the Commission tied the civil
10 penalty to the FSAR statements.

11 MR. SINKIN: Mr. Chairman, I don't think --

12 JUDGE BECHHOEFER: As soon as the Staff is
13 through, we'll hear your response to both of the
14 other parties.

15 MR. GUTIERREZ: Just to be clear on this,
16 Mr. Chairman, I think the distinction I'm trying to draw
17 is if one of the 22 items of noncompliance -- or
18 violations was a direct allegation by the Staff that
19 the Applicant had made a false statement and they came
20 back and admitted it, clearly, I think, they would be
21 estopped in this proceeding to refute it.

22 But my point is: This proceeding is
23 distinguishable from that. We simply asked them or
24 directed them to verify or correct certain statements
25 which appeared not to be the truth ... or somehow

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1 inaccurate, and to explain it.

2 Mr. Chairman, the final point ... Mr. Reis
3 reminded me of one aspect of the North Anna case --
4 and that is, granting that it's a false statement, the
5 North Anna Board seemed to indicate that a licensing
6 board -- and then judging the character of the utility
7 has to see the context in which the false statement was
8 made, in order to judge its overall relevancy to the
9 licensing process.

10 So even if we assume the Applicant admitted
11 to making a false statement, in this proceeding we still
12 have to hear -- and to have you hear it -- for purposes
13 of the overall decision.

14 JUDGE BECHHOEFER: Mr. Gay, I guess you get
15 to respond.

16 MP Gay: Mr. Chairman, there are several
17 occasions in the Notice of Violation and the Show
18 Cause Order where reference is made to alleged false
19 statements within the FSAR ... what would appear to be
20 false statements.

21 The Order clearly asks the Applicant within
22 the Show Cause to either verify or correct. Now, it is
23 my argument to you that they should be deemed to have
24 admitted and corrected those particular -- those two
25 statements, the two occasions in the FSAR -- in their

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1 Page 2-36 of their response to the Show Cause.

2 I think that the Notice of Violation, the
3 Show Cause and the events that occurred around that
4 time clearly constitute evidence in this proceeding.

5 But we should not have to litigate the
6 Show Cause Order within this proceeding. And I find
7 this occasion -- with regard to the testimony of these
8 two gentlemen -- an occasion where we are being called
9 upon to litigate the Show Cause Order.

10 JUDGE BECHHOEFER: Would you think that if
11 we regard the statements as evidence of character, we
12 shouldn't inquire into the nature of those statements?
13 Even if they were admitted -- even if the Applicant
14 admitted that the FSAR statements were incorrect,
15 what effect would that have --

16 Don't we have to take into account more
17 factors to decide what effect it would have on the
18 Applicant's character to build or operate the
19 plant?

20 MR. GAY: Well, Mr. Chairman, I think we
21 have to broadly construe the notion of character for
22 this proceeding. But on the other hand, I don't think
23 that the Applicant should be permitted to come back
24 and deny something which they are deemed to have
25 admitted.

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MR. SINKIN: Mr. Chairman, if I might.

Mr. Gutierrez said that it would have to be viewed as either a charge or an allegation for 2.202 to come into effect.

I don't think there's any question as to how the Applicants view it, because this panel is titled "Alleged False Statements in the FSAR."

So that's an allegation. I think it appears as an allegation in the Order to Show Cause.

And if you're going to follow 2.202, they only had two options: To deny or affirm. If they corrected or amended the statement that was made, I view that as affirming the allegation.

And the problem arises because in Page 4 of this testimony, they have a conclusion: The statements in question were truthful and accurate programmatic descriptions.

That's now denying that they were false statements.

If they're going to be allowed to come in here and litigate this one, they can come in here and litigate the rest of the Order to Show Cause.

And I don't think we're here to defend the Order to Show Cause.

MR. GUTIERREZ: Just one final point, Your

Honor.

The Staff is very sensitive to the Applicant coming in before this Board and attempting to re-litigate matters which they admitted to in response to 79-19.

And in that case we'd agree with Mr. Sinkin. But I only call again your attention to the fact that this is clearly distinguishable.

Show Cause Item 10 is not an item of non-compliance, not a violation. In the context of the Show Cause Order, it's the Commission directing the Applicant to show cause -- to show the Commission reasons why certain things should not be done.

And in the context, Item 10 says, "Verify or correct, if necessary, the PSAR statements."

It's not an accusation or charge that is susceptible to an admission or a denial. If the only thing the Applicant did in response to Show Cause Item 10 was say, "I admit it or deny it," it would make no sense.

MR. SINKIN: Mr. Chairman, we don't --

MR. AXELRAD: If I might --

MR. SINKIN: I'm sorry. Go right on.

MR. AXELRAD: Thank you very much.

I have just a couple of very brief remarks.

26-15

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1 One is there have been a lot of very broad statements
2 made by both the Staff and the Intervenors with respect
3 to the actual items of noncompliance; and that is a
4 matter which we might have to discuss some other
5 day.

6 But, importantly, as the Staff has pointed
7 out, this particular item was not one of the items of
8 noncompliance. This was a separate matter within the
9 Order to Show Cause.

10 With respect to the Board's specific
11 question as to the civil penalty that was paid, the
12 letter that we sent in with respect to the civil
13 penalty -- and that was Staff's Exhibit No. 90, of
14 May 23, 1980 -- specifically referred to the items of
15 noncompliance.

16 And that was what the fine was being paid
17 in accordance with -- those items of noncompliance. That
18 does not pertain to the particular matter that's being
19 addressed here.

20 And we did not at any point admit those
21 particular -- alleged false statements. And as a matter
22 of fact, we specifically said that we were not address-
23 ing them in the response to the Order to Show Cause of
24 May 23.

25 MR. SINKIN: Mr. Chairman, one final point

26-16 1 before you decide --

2 JUDGE BECHHOEFER: We want to go back and
3 discuss it before we rule.

4 MR. SINKIN: Yes. I'd like to leave you
5 with one final thing before you go to discuss it.

6 JUDGE BECHHOEFER: This will be the
7 last one ... here.

8 MR. SINKIN: Okay.

9 The item of an alleged false statement
10 appears in Section III of the Order to Show Cause,
11 along with all of the other allegations, like harassment,
12 intimidation, procedural and programmatic inadequacies.

13 It is in no way distinguished from those
14 allegations.

15 MR. GUTIERREZ: It's distinguished because
16 intimidation and harassment were items of noncompliance;
17 and this was put in a show cause context in an attempt
18 to get it clarified.

19 There's your distinction.

20 JUDGE BECHHOEFER: Well, we wanted to --

21 MR. NEWMAN: -- event to the extent that
22 the order said something about the question of false
23 statements, the response to that order dated May 23rd
24 explicitly stated that we were not admitting or
25 denying the charge that we would handle the response to

26-17

1 that when we filed the formal answer to the Order to
2 Show Cause in July.

3 And that was done.

4 JUDGE BECHHOEFER: Well, we want to go look
5 at this for a minute.

6 We'll be off the record.

7 (A short recess was taken.)

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1 JUDGE BECHHOEFER: After considering the motion
2 we have decided to deny it, and to -- for two reasons --
3 admit the evidence, subject to any other objections which
4 we have not heard yet, but at least because of this motion --
5 we think, first, there has not been an admission of a
6 false statement, but, second, even if there had been we
7 think the Commission expects us to look into all aspects
8 of the Applicant's character and these statements of the
9 circumstances surrounding them certainly would bear on
10 that character.

11 Even if there had been an admission, we believe
12 we would be required to look into the facts and
13 circumstances of that admission.

14 We believe that the North Anna decisions, the
15 Commission, as well as the Appeal Board and Licensing
16 Board decisions, would support that view. That to
17 determine the seriousness of the alleged false statement,
18 we would have to look at all of the facts and circumstances
19 surrounding it, even if it had been admitted to be false.

20 So, that's the dual basis upon which we will
21 deny that motion.

22 Are there any other objections to the admission
23 of this testimony?

24 MR. GUTIERREZ: The Staff has no objection.

25 JUDGE BECHHOEFER: The testimony will be admitted.

(See attached pages.)

ALDERSON REPORTING COMPANY, INC.

8-1

1 JUDGE BECHHOEFER: After considering the motion
2 we have decided to deny it, and to -- for two reasons --
3 admit the evidence, subject to any other objections which
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8 of the Applicant's character and these statements of the
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10 that character.

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16 Board decisions, would support that view. That to
17 determine the seriousness of the alleged false statement,
18 we would have to look at all of the facts and circumstances
19 surrounding it, even if it had been admitted to be false.

20 So, that's the dual basis upon which we will
21 deny that motion.

22 Are there any other objections to the admission
23 of this testimony?

24 MR. GUTIERREZ: The Staff has no objection.

25 JUDGE BECHHOEFER: The testimony will be admitted.

(See attached pages.)

ALDERSON REPORTING COMPANY, INC.

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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ALLEGED FALSE STATEMENTS IN THE FSAR

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5 UNITED STATES OF AMERICA
6 NUCLEAR REGULATORY COMMISSION
7

8 BEFORE THE ATOMIC SAFETY AND LICENSING BOARD
9

10 In the Matter of:

11
12 HOUSTON LIGHTING & POWER
13 COMPANY, ET AL.
14

15 §
16 §
17 § Docket Nos. 50-4980L
18 § 50-4990L
19 §
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24 §

25 (South Texas Project,
26 Units 1 & 2)
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20 TESTIMONY OF BERNT PETTERSSON AND JON G. WHITE
21 ON ALLEGED FALSE STATEMENTS IN THE FSAR
22

23 Q. 1 State your names.

24 A. 1 C. Bernt Pettersson and Jon G. White.

25 Q. 2 Mr. Pettersson, by whom are you employed and what
26 are your job responsibilities:
27

28 A. 2 (CBP): I am employed by Brown & Root, Inc. (B&R)
29 as Assistant Discipline Project Engineer (Civil Structural
30 Discipline) for the South Texas Project (STP) and am responsi-
31 ble for geotechnical engineering including development of
32 the FSAR Section relating to geotechnical engineering. I
33 have been in charge of soils work on the STP during the
34 construction phase of the job.
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Q. 3 Please describe your education and job experience.

A. 3 (CBF): This information is set forth in A.4 of my testimony on backfill verification.

Q. 4 Mr. White, by whom are you employed and what are your job responsibilities?

A. 4 (JGW): I am employed by Houston Lighting & Power Company (HL&P) as Licensing and Technical Coordinator for the STP. My responsibilities include supervision of the Licensing staff which coordinates HL&P's response to questions arising out of NRC's technical review of the FSAR and FR and resolving special problems as assigned by the Project Manager.

Q. 5 Please describe your educational background and work experience.

A. 5 (JGW): I received both a Bachelor of Science and a Master of Science degree in Mechanical Engineering from the University of Texas in Austin in December 1972, and May 1974, respectively. I worked for ten (10) months in the Energy Production Department of Flower Power Corporation at their Crystal River Nuclear Plant. I joined HL&P in November, 1974, as an Associate Engineer in the Nuclear Licensing Division and was assigned to the STP. In June 1977, I was named Lead Engineer and made responsible for nuclear licensing activities on STP. In June 1978, I was promoted to Supervising Engineer, Nuclear Licensing Division and assumed responsibility for supervising activities for both HL&P

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5 nuclear projects - STP and Allens Creek Nuclear Generating
6 Station. In August, 1980, I was named to my current position.

7 Q. 6 Mr. Pettersson and Mr. White, what is the purpose
8 of your testimony?

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10 A. 6 (CBP, JGW): We are responding to concerns expressed
11 by the NRC, which led to item V.A. (10) in the Order to Show
12 Cause (April 30, 1980), that there were "apparent false
13 statements" in section 2.5.4.5.6.2.4 of the Final Safety
14 Analysis Report (FSAR) regarding the frequency of laboratory
15 tests for the relative density and gradation, and in section
16 2.5.4.5.6.2.5 regarding the extent of inspection of backfill
17 placement and compaction activities. (Sections 2.5.4.5.6.2.4
18 and 2.5.4.5.6.2.5 are also referred to in this testimony as
19 "the FSAR sections in question").
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29 Our testimony will explain that the purpose and intent
30 of the FSAR sections in question was to describe the applic-
31 able QC methods for the STP Category I backfill placements,
32 and that the statements in question were truthful and accurate
33 programmatic descriptions.
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38 In addition, our testimony will describe certain devia-
39 tions from the program requirements set forth in those FSAR
40 sections, which occurred during implementation of the program,
41 but will explain that these were isolated deviations and incon-
42 sequential from a technical viewpoint.
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Q. 7 Mr. White, how did your responsibilities in the Licensing Division relate to the preparation of the STP FSAR?

A. 7 (JGW): From 1976 to 1978, I was responsible for ensuring that the FSAR was prepared in an accurate manner in preparation for its submittal to the NRC.

Q. 8 How did you carry out this responsibility?

A. 8 (JGW): In late 1976, HL&P and B&R met to discuss the planning for preparation of the FSAR. We prepared an FSAR Preparation Manual to assure that adequate review cycles and schedules were provided.

The various sections of the STP FSAR were prepared initially by HL&P, B&R, the NSSS supplier, or other consultants. Each FSAR section received several inter-discipline and inter-company reviews, and HL&P reviewed and approved each section before it submitted the FSAR to NRC on May 10, 1978. The intent of the review and comment cycles was to ensure accuracy and consistency of information.

Q. 9 Mr. Pettersson, how were the FSAR sections in question drafted, reviewed and approved?

A. 9 (CBP): I was the B&R employee directly responsible for the preparation and drafting of these FSAR Sections. I commenced work on the FSAR in March 1977. Between March 1977 and May 1978, three drafts of the FSAR sections in

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question were reviewed by B&R; the second and third drafts were also reviewed by HL&P and Woodward Clyde Consultants (WCC). The primary purpose of the FSAR reviews was to assure consistency between the applicable engineering design documents and the proposed FSAR program descriptions, and to assure compliance with applicable industry and regulatory requirements.

The first draft of the FSAR sections in question were prepared by directly extracting the pertinent provision of the engineering design documents and arranging them in accordance with FSAR content requirements. In May 1977, the first draft was issued for B&R in-house review, which included reviews by on-site engineers having first hand experience of the construction operations. Editorial comments regarding the style and form of the section were received and resolved, however there were no substantive comments or questions.

The second draft was issued in August 1977. This was subjected to review by B&R, HL&P and WCC. No comments were received on the second draft of the FSAR sections in question. The final FSAR draft was prepared, which for these sections was identical in content and language to the second draft. The final FSAR draft was reviewed in meetings held in November 1977. These meetings were attended by B&R, WCC and HL&P personnel. No comments were received on the FSAR sections

in question and the FSAR sections were subsequently finalized and submitted to the NRC in May 1978.

Q. 10 Mr. Pettersson, what engineering design documents and regulatory requirements were utilized in preparing the FSAR sections in question?

A. 10 (CBP): The applicable engineering design documents are the B&R Structural Backfill Specification and the B&R Earthwork Inspection and Testing Specification, both of which were prepared in 1975 for the purpose of defining applicable construction and quality control requirements for STP backfill activities. These specifications were written based on recommendations from WCC, and reflected industry practice in both technical provisions and language. These specifications were reviewed and approved by HL&P. The FSAR sections in question were drafted in accordance with the requirements of Regulatory Guide 1.70, Revision 2, which defines the standard format and content requirements for Safety Analysis Reports. In addition, the review procedures and acceptance criteria contained in NRC Standard Review Plan 2.5.4 were considered in preparation of these FSAR sections. The Standard Review Plan indicated that the FSAR sections are to contain descriptions of general quality control methods, rather than discussions of how the program requirements are individually implemented.

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5 Q. 11 Mr. White, after the FSAR is docketed by the
6 NRC, is there any method to ensure that the FSAR remains
7 accurate?
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9 A. 11 (JGW): Yes, any change to a basic design document
10 is compared with the relevant provisions of the FSAR to
11 determine whether there is a need for an FSAR revision.
12

13 Q. 12 Does a deviation in field construction necessarily
14 entail FSAR revision?
15

16 A. 12 (JGW): No. The FSAR is a description of the
17 design basis of the plant, including analyses and evaluations
18 showing that the design basis or criteria result in an
19 acceptable plant. Individual deviations in construction are
20 not reflected in the FSAR unless the correction of the
21 deviation involves changing the design basis. The FSAR
22 would then reflect the new design basis. The majority of
23 deviations are either corrected to bring the as-built design
24 back into conformance with the design basis or an engineering
25 evaluation is performed to show that even with the deviation
26 the design basis of the plant is maintained.
27

28 Q. 13 Mr. Pettersson and Mr. White, the NRC Inspection
29 Report 79-19 (pages 64-65) contained findings regarding
30 noncompliances in the areas of backfill laboratory testing
31 and inspection. On the same subject, the NRC's Order to
32 Show Cause (page 11), contained the statement by the NRC
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What is your reaction to the NRC's statement that because certain backfill field activities were not strictly in accordance with backfill program descriptions in the FSAR, there were "apparent false statements in the FSAR"?

The second
Paragraph *of section* 2.5.4.5.6.2.4 of the STP FSAR as filed in May 1978, read as follows:

In Inspection Report 79-19, the NRC identified a period between November 17, 1979 and January 7, 1980, in which Pittsburgh Testing Laboratories (PTL), the QC inspection agency for backfill at STP, was not performing laboratory

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4 testing for determining maximum density of the backfill
5 (pursuant to ASTM D2049), because a vibratory table was not
6 functioning. Hence, the required laboratory testing could
7 not be performed for construction work in progress. Although
8 the table was not operational, samples designated for labora-
9 tory testing were taken and were subsequently tested when
10 the equipment was repaired. Nonetheless it was acknowledged
11 by HL&P and B&R that the failure to perform the required
12 laboratory tests as the work progressed constituted a noncom-
13 pliance.
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17 To my knowledge, these facts discussed in the NRC
18 Inspection Report were the only basis given for the "false
19 statements in the FSAR" referenced in the NRC Order to Show
20 Cause. It should be emphasized that the two month period
21 between November 1979 and January 1980, in which the vibratory
22 table was not operational, occurred nearly two years after
23 the filing of the FSAR section in question.
24

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26 *My first*
27 Paragraph *of section* 2.5.4.5.6.2.5 of the STP FSAR as filed in May
28 1978, read as follows:
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30 "The testing agency provided continuous
31 inspection of the placement of all backfill
32 material and tested the material in the field
33 for degree of compaction. The inspectors
34 observed the type of material, lift thickness,
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operation of compaction equipment, and all other pertinent material or construction conditions affecting the quality of work and compliance with the specifications....".

To my knowledge, the NRC Inspection Report 79-19 did not directly cite any deviations from this section of the FSAR. However, the NRC identified a noncompliance in which neither the applicable procedure nor the inspection form required that the actual backfill lift thickness and the number of passes of the compaction equipment be documented. This apparently caused the NRC to question the level of inspection effort, and to question whether "continuous inspection," within the intent of the above FSAR section, was being conducted.

In fact, as stated in the Licensee's July 28, 1980 Response to the NRC's Show Cause Order, the QC inspectors from PTL were on duty during the backfill placements. Inspection was performed with the objective of assuring that the criteria of the specification and construction procedures were satisfied. For example, the PTL QC Inspectors checked to make sure that the lifts were within the 18-inch maximum thickness and that the minimum required number of roller passes were performed. The QC Inspectors recorded the observations on their Inspection Reports. Observance of the minimum required 8 roller passes was recorded as "acceptable",

1 without notation of the actual total number of passes.
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3 Likewise, the lift thickness was recorded as "18-inch"
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5 indicating that the specification limit was satisfied even
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7 though the actual thickness generally was much less than 18
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9 inches. Furthermore, this interpretation by PTL, B&R and
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11 HL&P of the FSAR "continous inspection" requirement is
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13 consistent with the accepted industry usage of this term,
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15 which is not a requirement for 100% direct observation of
16
17 all field activities. Thus, as previously stated, we have
18
19 understood questions raised by the NRC regarding FSAR Section
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21 2.5.4.5.6.2.5 solely as concerning the interpretation of the
22
23 backfill inspection program implementation requirements, and
24
25 not as involving "false statements in the FSAR".
26

27 Q. 14 Mr. Pettersson, were previous QC field activities
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29 in the area of backfill inspection and testing, related to
30
31 the sections in question, reviewed in the course of responding
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33 to the NRC's Order to Show Cause. If so, please describe
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35 the results of the review.
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37 A. 14 (CBP): Yes. As stated in the Licensee's Response
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39 to the NRC Order to Show Cause the actual number of maximum/
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41 minimum relative density laboratory tests were compared to
42
43 the actual number of in-place density tests for the plant
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45 area. "Plant area" includes the backfill for the main
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47 structures, but excludes the Essential Cooling Water System
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(ECWS) piping and structures. On the average one maximum/minimum laboratory density test was obtained for every four in-place density tests, in the plant area. However, the laboratory tests were not always made for at least every fourth field test, but they were performed in varying intervals depending on the work schedule and placement sequence. These variations are not significant since the acceptance criteria are based on the average of 20 laboratory tests. The variations took place in a minuscule number of the lab tests (less than 2%), and there were never more than seven field tests between laboratory tests.

In addition, an investigation of the placements of Category I structural backfill for the ECWS piping has revealed that the required maximum/minimum laboratory density testing was not implemented for the placement of such backfill due to a misinterpretation by PTL personnel of the applicable specifications. However, the backfill used for the ECWS was the same backfill material which was being used at the same time for the plant area and which was being subjected to laboratory tests in connection with that use.

Q. 15 In light of your answer to Questions 13 and 14 why was the decision made to modify the language of the two FSAR sections in question, as explained in the Licensee's July 28, 1980 Response to the NRC's Order to Show Cause?

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4 A. 15 (CBP): In the case of Section 2.5.4.5.6.2.4, as
5 I have indicated above, the review of backfill test results
6 identified isolated cases of deviation from the absolute
7 "one laboratory test for every four field tests" requirement.
8 Since the laboratory tests had been performed on the average
9 of every four field tests, and our engineers and consultants
10 determined that such frequency was more than adequate, it
11 was decided to revise the FSAR to set forth this broadened
12 criterion. Thus, as amended, the pertinent portion of
13 Section 2.5.4.5.6.2.4 now reads, "One relative density test
14 (ASTM D 2049) and one gradation test (ASTM D 422) were
15 performed on the average for every four field tests in the
16 plant area to ensure compatibility between field and labora-
17 tory tests". Nonetheless, although the FSAR criteria have
18 been changed the backfill program being implemented today
19 still satisfies the previous criteria of performing one
20 laboratory test for every four field tests.
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27 In the case of Section 2.5.4.5.6.2.5., minor language
28 modifications were made to clarify the intent of the "contin-
29 uous inspection" requirement. The pertinent portion now reads,
30 "The testing agency provided QC inspection of the backfill, the
31 placement and testing of the material in the field for degree
32 of compaction. The QC inspectors observed the type of material,
33 lift thicknesses, operation of compaction equipment, and all
34 other pertinent material or construction conditions affecting
35 the quality work and compliance with the specifications".
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6 Q. 16 At the time you prepared the FSAR sections in
7 question, what knowledge did you have of the deviations
8 discussed in Answer 14?
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10 A. 16 (CBP): Placement of backfill in the ECWS trench
11 area did not start until late 1978, after the filing of the
12 FSAR; hence, the nonconformance in this area did not take
13 place until after the FSAR was prepared. At the time I
14 wrote the FSAR sections in question, I was not aware of the
15 instances in which the actual frequency of laboratory testing
16 deviated from the precise specification requirement of one
17 laboratory test for every four field tests.
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20 Q. 17 In your opinion what is the technical significance
21 of the backfill testing and inspection matters raised in
22 Inspection Report 79-19 and the NRC Order to Show Cause, and
23 of the deviations identified during B&R and HLSP's investiga-
24 tion following the NRC Order to Show Cause?
25
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27 A. 17 (CBP): With respect to FSAR Section 2.5.4.5.6.2.4,
28 as indicated in Answer 15, we have concluded and our consul-
29 tants have confirmed that the deviations in laboratory
30 testing frequency were inconsequential from a technical
31 viewpoint. Because the backfill used at STP is extremely
32 uniform, and laboratory test results are likewise uniform,
33 the frequency of laboratory testing--which is performed
34 solely for the purpose of determining the soil density
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criteria by which field tests will be measured--is less significant than it might be elsewhere. In particular, there were inconsequential differences between testing at a frequency of one laboratory test for every four field test, as stated in the FSAR, and the widest frequency actually noted, which was one laboratory test for seven field tests. Furthermore, field acceptance criteria were based on an average of 20 laboratory tests, which further diminished the sensitivity of laboratory testing frequencies.

Although the failure to conduct laboratory testing on the backfill for the ECWS piping trench area was not significant for the reasons just stated, i.e., STP backfill uniformity and averaging of laboratory tests, the backfill in this area will, in any case, be removed down to the bedding as part of a re-examination program of ECWS pipe welding and will subsequently be replaced, inspected and tested.

TH:12:B

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1 MR. GUTTERMAN: Applicants have no further
2 questions of these witnesses.

3 JUDGE BECHHOEFER: Mr. Gay?

4 CROSS-EXAMINATION

5 BY MR. GAY:

6 Q Mr. White, I would like to begin with you on
7 Page 3 of your testimony.

8 JUDGE BECHHOEFER: Could you get a little
9 closer to your microphone. I couldn't hear you.

10 BY MR. GAY:

11 Q A few questions about your duties and
12 responsibilities and prior experience, Mr. White.

13 How many people do you have on your licensing
14 staff presently?

15 BY WITNESS WHITE:

16 A There's three safety engineers, and two
17 environmental engineers, and one site licensing engineer,
18 which I guess adds up to six people.

19 Q In Answer 5 of Page 3, can you tell me which
20 ten-month period you worked at Crystal River?

21 BY WITNESS WHITE:

22 A It was from January 1974 to November, or
23 through October 1974.

24 It may be confusing to you that I got my
25 degree in May.

8-3

1 Q That was a little confusing.

2 BY WITNESS WHITE:

3 A Okay. What it was, I finished my course
4 work in December 1973. Took the position with Florida
5 Power. And finished my last draft of the thesis at night,
6 and then received the degree in May.

7 Q In June 1977 you were made a lead engineer.

8 Can you tell me what that is, what your duties were?

9 BY WITNESS HITE:

10 A As lead engineer I was to provide technical
11 direction to two other engineers on the staff, in preparing
12 the FSPR, primarily.

13 Q How many other lead engineers are there, or
14 were there at that time?

15 BY WITNESS WHITE:

16 A Well, lead engineer is the title used in the
17 company for a lot of different areas, so I guess I would
18 have to ask you to be more specific as to what you are --

19 Q Okay. Well, I don't have any engineering
20 background, so I take it that a lead engineer is just a
21 term of art.

22 BY WITNESS WHITE:

23 A It's a title from the company that is used
24 for first-line supervision, technical supervision of people
25 in the engineering area.

28-4

1 Q How many people were you supervising as a lead
2 engineer?

3 BY WITNESS WHITE:

4 A At that time, two. Did you say supervising
5 engineer, or --

6 Q At the time you were a lead engineer how many
7 people?

8 BY WITNESS HITE:

9 A Two.

10 Q And wha about when you were supervising
11 engineer?

12 BY WITNESS WHITE:

13 A There was approximately eight engineers, and
14 several administrative people. I don't recollect the
15 exact number. If you need it, I guess I can

16 Q As a supervising engineer were you still
17 working on the FSAR?

18 BY WITNESS WHITE:

19 A No. By that time I was not working on the
20 FSAR in South Texas.

21 Q What were you doing?

22 BY WITNESS WHITE:

23 A I was supervising licensing activities for
24 both South Texas and Allens Creek, so we had another person
25 in the plant, lead engineer, to work specifically on South

28-5 1 Texas. I supervised that individual.

2 Q When was the last time that you worked on the
3 FSAR?

4 BY WITNESS WHITE:

5 A What do you mean by work?

6 Q Well, I take it from your testimony that you
7 helped draft the FSAR statements pertaining to backfill
8 and to testing that were filed in 1978; is that correct?

9 BY WITNESS WHITE:

10 A For that level of work it was through June
11 of 1978, through the submittal date.

12 Since that time I have just been involved
13 mainly in the supervision of other people's activities
14 doing that.

15 Q Did you have any direct personal involvement
16 in the amendments that were made to those particular
17 sections?

18 BY WITNESS WHITE:

19 A I was aware of the amendments and reviewed
20 the amendment that was filed in May of this year.

21 Q Regarding your present position, Mr. White,
22 did someone have that position before you, or were you
23 the first occupant?

24 BY WITNESS WHITE:

25 A I am the first licensing and technical

8-6 1 coordinator. Previously the project had just a supervisor
2 of licensing, or lead engineer of licensing, I should say,
3 on the project.

4 Q On Page 5 of your joint testimony you describe,
5 you begin the description of the FSAR and the process that
6 you went through.

7 Can both of you respond and tell me whether or
8 not you used any models in preparation for particular
9 FSAR statements that are at issue here, or just generally
10 tell me the process by which you went through creating that
11 first draft of the FSAR.

12 BY WITNESS WHITE:

13 A Well, I guess in general terms we started out
14 with a plan, and schedules of the drafting of the various
15 sections of the FSAR, Chapters 1 through 17.

16 Assigned responsibilities for who would do
17 the drafting of the first drafts, and who would receive
18 copies for review and comment.

19 Then according to the schedule we proceeded
20 into the appropriate person writing the first draft, having
21 it typed, sent out for review and comment. This usually
22 happened within the company responsible for that section.

23 So in the case of these sections with Brown &
24 Root, they would have been reviewed internally by their
25 own staff only. Comments sent back to the originator.

8-7

1 Comments resolved. The second draft issued.

2 The second draft stage was typically one that
3 went out -- well, not typically in each case -- to the
4 other affected organizations for preparing an FSAR, because
5 as I say in the testimony it involved not only Brown & Root
6 but also HL&P and Westinghouse.

7 These people would provide comments back to
8 the originator again, and the originator would resolve
9 those comments.

10 The third draft would go before a review board
11 which would be a round-table discussion of the contents of
12 the section, and once all the words were agreed upon then
13 it would be sent off to where it would be printed, and
14 put on the shelf, ready to be put into the whole book,
15 once it was all finished.

16 And that was process went by for any such --

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1 BY WITNESS PETTERSSON:

2 A Yes, the process that Mr. White described was
3 the process followed in preparation of the questions that
4 or in preparation of the sections we are concerned about
5 here.

6 Of course, the consultant that was involved
7 in review of this section was Woodward Clyde Consultants.

8 Q Mr. White, as I understand it, you were the
9 person in charge of that process at that time for HL&P?

10 BY WITNESS WHITE:

11 A Yes, sir..

12 Q And if I understand your testimony that was
13 after you had two year's of experience, or you had been
14 out of school for two years at the time you were put in
15 charge of that process?

16 BY WITNESS WHITE:

17 A Yes. That would have been -- Yes, two and a
18 half to three years, I guess.

19 Q During those two and a half to three years,
20 did you have any geotechnical experience?

21 BY WITNESS WHITE:

22 A No, sir.

23 One thing I might point out is the fact that
24 my role, and the other people working for me on the FSAR
25 preparation, was that of what we call a licensing engineer.

8-9

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1 A licensing engineer's function is not to
2 review the contents from a technical viewpoint, but to
3 review the contents of a section to make sure that it
4 complies with the requirements of the standard review
5 plan issued by the NRC, any regulatory guides that are
6 also out on the subject, and to coordinate the review,
7 and to make sure that appropriate people have a chance
8 and opportunity to review and comment on that section.

9 So, I do not have any geotechnical --

10 Q So aside from reviewing the standard review
11 plan you depended upon Brown & Root, and Mr. Pettersson
12 in particular, for preparation of the technical aspects
13 of this portion of the FSAR?

14 BY WITNESS WHITE:

15 A For the preparation of those sections, yes.

16 For review and comment by the other companies,
17 that phase of the review, we would send them out to our
18 own engineers, so in this case to the civil geotechnical
19 engineer within the light company.

20 Q Now, Page 6 you describe the various drafts,
21 and you just testified to that again. Just so I can be
22 clear on this, between the first draft and the final FSAR
23 statement, is it your testimony that there were not real
24 substantive changes that were made in any of this review
25 process?

8-10

1 BY WITNESS PETTERSSON:

2 A That is correct. In the sections that we are
3 concerned about, there were no changes to the substance
4 of the text.

5 The only changes that occurred was between
6 the first and second draft. And as stated in our testimony,
7 these were editorial.

8 Q Mr. Pettersson, on Page 7 of the testimony in
9 answer to Question 10, you talk about the engineering
10 design documents being the structural backfill specification
11 of Brown & Root and the Brown & Root earthwork inspection
12 and testing specification.

13 Can you tell me, or describe the process how
14 those documents originate?

15 BY WITNESS PETTERSSON:

16 A Yes. I can.

17 These documents were prepared by Brown & Root
18 in 1975, prior to the construction activity starting. They
19 were prepared based on recommendations that were furnished
20 us from our geotechnical consultants, from Woodward Clyde
21 Consultants.

22 They were reviewed by HL&P, and approved by
23 HL&P.

24 Q So it is actually the consultants that spelled
25 out the criteria that you incorporated into the FSAR?

8-11

1 BY WITNESS PETTERSSON:

2 A That is correct when it comes to the specific
3 criteria that we are dealing with, such as testing
4 frequencies.

5 The -- In the earthwork inspection, and
6 testing specification there were general words, general
7 language descriptions, of all duties, activities, which
8 may not have been spelled out in that detail by the
9 consultants recommendations.

10 Q What about the amendments, Mr. Pettersson?
11 Were they also the basis of consultant recommendations?

12 MR. GUTTERMAN: Excuse me. I'm not sure
13 amendments to what? The question is kind of vague.

14 MR. GAY: I'm sorry, Mr. Gutterman.
15 BY WITNESS GAY:

16 Q I'm not clear. The eventual modifications
17 that were made in those two sections of the FSAR that
18 are at issue in your testimony.

19 BY WITNESS PETTERSSON:

20 A No. They were prepared by Brown & Root.

21 Q Without any advice or consultation from the
22 consultants?

23 BY WITNESS PETTERSSON:

24 A Woodward Clyde consultants were generally
25 aware of the changes we were making. However, there were

8-12

1 no formal review-and-comment cycle with that involvement.

2 Q Now, you state that these documents were
3 originated in 1975. Can you tell me the month that those
4 were originated?

5 BY WITNESS PETTERSSON:

6 A Yes. The first drafts of the structural
7 backfill specification was written quite early in 1975.
8 I will recall I started to draft that document maybe
9 already late in 1974.

10 The earthwork inspection and testing
11 specification, the drafting of that specification began
12 a few months later, probably in the spring of 1975. And
13 the documents were issued for use, of course, when the
14 construction activity started.

15 Q When did the construction activities begin?

16 BY WITNESS PETTERSSON:

17 A The activities that we are concerned about
18 here started in the spring of 1976.

19 Q Part of Mr. Pettersson's answer in Question 10,
20 Mr. White, states that the specifications were review and
21 approved by HL&P. Does that mean you and your group?

22 BY WITNESS WHITE:

23 A No, sir. That would have been the cognizant
24 engineer over that area within HL&P.

25 Q And who would that have been?

8-13

1 BY WITNESS WHITE:

2 A I am not certain. I believe it was probably
3 Calvin Stripling.

4 BY WITNESS PETTERSSON:

5 A That is correct.

6 Q I didn't catch the last name.

7 BY WITNESS WHITE:

8 A Stripling.

9 Q Thank you.

10 Now at the bottom of Page 7 there is a
11 reference to the Standard Review Plan, and a statement
12 that that calls for general quality control methods rather
13 than a discussion of how the program requirements are
14 individually implemented.

15 Did you follow that in enacting the initial
16 FSAR statements that are at issue in your testimony?

17 BY WITNESS PETTERSSON:

18 A Yes.

19 Q If we could refer, Mr. Pettersson, for a
20 moment to Page 9 and the quotation of the FSAR statement
21 that was initially prepared, is it your belief that the
22 words "were performed" in the middle of Page 9 in the
23 statement, Paragraph 2.5.4.5.6.2.4 is a statement of
24 general policy description, as opposed to an individual
25 description?

8-14

1 BY WITNESS PETTERSSON:

2 A Yes. That is a correct characterization.

3 Q Mr. Pettersson, could you tell me what
4 regulations or statutes generally provided guidance for
5 your drafting of the FSAR?

6 BY WITNESS PETTERSSON:

7 A Yes. I can. The FSAR is put there in
8 accordance with the standard format which is set forth
9 in Regulatory Guide 1.70.

10 Furthermore, we use the Standard Review Plan
11 for Section 254 for guidance.

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1 BY MR. GAY:

2 Q On Page 8 of your testimony, Answer No. 11,
3 Mr. White, you're talking about the basic design docu-
4 ments. Are those the same documents that Mr. Pettersson
5 referred to in the previous page?

6 BY WITNESS WHITE:

7 A Yes.

8 Q Is there anything else that you want to
9 mention, in addition to those two items that he men-
10 tioned?

11 BY WITNESS WHITE:

12 A I think what we're trying to point up by
13 the answer here is that the changes to any of these
14 design documents, whether related to this area or other
15 areas, are to be reviewed against the descriptions
16 provided in the FSAR to determine whether any further
17 changes to the FSAR are required.

18 So those were the two design documents that
19 are on the previous page ... that are for this section --
20 the appropriate design document.

21 Q Does anyone within HL&P make a decision as
22 to what constitutes a basic design document?

23 BY WITNESS WHITE:

24 A I believe over the years those items have
25 been defined as the engineering specifications, the

28-2

1 system design description, some technical reference
2 documents that provide design criteria and certain draw-
3 ings on the project.

4 Q In the middle of that Page 8 there is a
5 reference to design basis. Is the term "design basis" --
6 Well, let me ask it this way.

7 Is the FSAR itself equivalent to design
8 basis?

9 BY WITNESS WHITE:

10 A The FSAR is a description of a design basis
11 and the design documents, and it provides not only the
12 design basis of the plant -- a description of the design
13 basis of the plant, but also any evaluations or analyses
14 that are also required for the NRC Staff to review.

15 Q Would it be true that a deviation within the
16 FSAR or from the FSAR would be a deviation in design
17 basis?

18 MR. GUTIERPREZ: Excuse me. Could you repeat
19 the question? I just didn't hear it.

20 MR. GAY: Okay, I'm sorry.

21 BY MR. GAY:

22 Q My question was whether or not a deviation
23 in the FSAR is a deviation from design basis.

24 MR. GUTTERMAN: Mr. Chairman, I'm afraid
25 I still don't understand the question. I don't understand

1 what a deviation in the FSAR is.

2 BY MR. GAY:

3 Q A failure to follow the FSAR, would that be
4 a failure to follow a design basis for the plant?

5 BY WITNESS WHITE:

6 A I think, as I've tried to describe -- the
7 FSAR is a description of the design of the plant. The
8 exact implementation in the field of each procedure is
9 not necessarily reflected in the FSAR.

10 Unless those nonconformances or incon-
11 sistencies in the implementation of the types of programs
12 described in the FSAR are, in fact, significant enough
13 to cause the design of a plant to change, then, yes,
14 the FSAR would be changed.

15 Q Okay. You make the reference yourself, Mr.
16 White, to individual deviations on Line 24 of that
17 page.

18 Can you tell me who makes the decision as
19 to what constitutes an individual deviation that does
20 not call for a correction in the FSAR --

21 MR. GUTIERREZ: I hate to interrupt. I
22 really didn't hear it.

23 MR. GAY: It's a problem with speaking this
24 way into the microphone.

25 ///

28-4

BY MR. GAY:

Q The question, Mr. White, was referring you to Line 24 of your testimony on Page 8 where you speak of individual deviations in construction, which are not reflected in the FSAR unless the correction of the deviation involves changing the design basis.

My question is: Who makes that decision as to when the design basis or the FSAR needs to be changed?

BY WITNESS WHITE:

A For deviations or nonconformances in the field, they have to be dispositioned, which typically involves the role of engineering, who is responsible for these design documents also.

So during the disposition that engineer should evaluate his design documents such that whether or not they need to be changed. And of course, if the design documents are changed, then the FSAR needs to be changed.

What I'm talking about here is, for an example, where a weld is not in accordance with an ASME code ... a weld does not change the design basis of the plant.

So, therefore, that deviation would not be reflected in the FSAR.

28-5

Q We're still talking about the procedure now, Mr. White. Who would have been the individual responsible, either at HL&P or Brown & Root or the Pittsburgh Testing Lab in this situation?

Who specifically was the engineer that would have made this kind of decision on the FSAR matters?

BY WITNESS PETTERSSON:

A It is the responsibility of the Brown & Root engineer that is responsible for the particular design document, to be sure that it complies with the FSAR.

And he is responsible for initiating any FSAR changes. And these would be -- these changes would be subject to management's review as the changes are approved.

However, if you are dealing with deviations -- nonconformances that are dispositioned as such without a change in the design document, there would not be any need for a change in the FSAR.

Q Does a matter have to go to an engineer for that decision to be made? Who makes the first line decision as to whether or not --

BY WITNESS PETTERSSON:

A The first line decision is by the particular engineer responsible for the design document or for

28-6

1 dispositioning a nonconformance or a deviation.

2 But as I previously said, it is subject
3 to management's review.

4 Q Who is that first line engineer for Brown &
5 Root who would have had authority over this decision
6 making process with regard to the two FSAR statements
7 that are at issue?

8 BY WITNESS PETTERSSON:

9 A That would be me.

10 Q Question 13, Mr. Pettersson, at the bottom of
11 Page 8 references Pages 64 and 65 of the NRC inspection
12 report 79-19. Could you turn to that for me. Do you
13 have that with you?

14 BY WITNESS PETTERSSON:

15 A No, I don't have it here.

16 Q It is 79-19, which is Staff Exhibit No.
17 46, Page 64 of that exhibit.

18 (Document handed to witness.)

19 BY WITNESS PETTERSSON:

20 A Okay. I've found Page 64.

21 Q Sub point c is labeled "Soil Sampling Pro-
22 gram," Mr. Pettersson.

23 BY WITNESS PETTERSSON:

24 A Yes.

25 Q In the middle of that second paragraph, there

1 is the statement, "Furthermore, the testing laboratory
2 personnel failed to document and correct this non-
3 conforming condition."

4 Do you agree with that statement, sir?

5 BY WITNESS PETTERSSON:

6 A Yes, I understand that was correct at
7 the time of the inspection.

8 Q Now, the third paragraph there alleges
9 that there was a failure to take prompt corrective
10 action. Do you agree with that statement, sir?

11 BY WITNESS PETTERSSON:

12 A The actions taken by PTL, I believe, were
13 addressed in previous testimony by Mr. Steve McKay
14 from PTL. He explained that PTL had taken actions
15 to obtain the replacement for this vibratory table
16 that had broken down, and that they, in addition to
17 that, were collecting the samples for subsequent
18 testing, so that action was taken by PTL.

19 I understand that the course of this ob-
20 servation was that at that time -- at the time of the
21 inspection, they had not written up nonconformance
22 reports.

23 Q I understood Mr. McKay's comments, Mr.
24 Pettersson. But I'm asking you whether you personally
25 agree, based upon the knowledge that you had available

28-8

1 to you, with the third paragraph that appears on that
2 page?

3 BY WITNESS PETTERSSON:

4 A They had taken the taking of steps to correct
5 the situation. But I understand that they had not taken
6 the formal step of issuing a nonconformance report at
7 the time when the NRC inspector made his observation.

8 However, I understand that they subsequently
9 issued a nonconformance report.

10 Q At Page 9, gentlemen, the answer to Question
11 13, your answer states that what happened in this
12 particular situation reflected isolated instances where
13 personnel did not adhere to project procedures, and not
14 as involving false statements in the FSAR.

15 My question is: Are you aware of any other
16 isolated instances where personnel did not adhere to the
17 project procedures, as in this case, prior to the Notice
18 of Violation issued by the NRC?

19 BY WITNESS WHITE:

20 A I'm sorry. Are you saying are there other
21 items of nonconformance on the project? Or are you
22 saying items of nonconformance that we're not aware
23 of?

24 Q No, I'm asking you, from your personal
25 knowledge -- matters that you would be aware of -- were

28-9

1 there other isolated instances? Or is this the only
2 isolated instance where they didn't adhere to the pro-
3 cedure?

4 BY WITNESS PETTERSSON:

5 A What specific area of activity are you
6 talking about?

7 Q With regard to the exact instance that
8 occurred, that is cited by the NRC.

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1 MR. GUTTERMAN: Mr. Chairman, it still seems
2 kind of vague to me. Perhaps we can get a restatement
3 of the question and understand what the question is.

4 BY MR. GAY:

5 Q Gentlemen, we were referring to the soil
6 testing, are we not, with regard to the testimony that
7 you've filed?

8 BY WITNESS WHITE:

9 A Yes.

10 Q Okay. Now, I'm asking with regard to that
11 soil testing, were there other occasions -- other isolated
12 instances where they did not adhere to procedures?

13 BY WITNESS PETTERSSON:

14 A We haven't found -- and this was reported
15 in the initial Show Cause Order response that when we
16 looked back over PTL's records of laboratory testing,
17 specifically looking at the relationship between in-
18 place density testing and relative density determinations
19 in the laboratory, we found that there was a handful
20 of incidents over the several years of activities where
21 they had not conformed to this very precise require-
22 ment.

23 Q Are you saying that that's a review that
24 you performed after this citation by the NRC?

25 ///

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28-11 1 BY WITNESS PETTERSSON:

2 A It was a review that we performed as a part
3 of our studies conducted as a result of the Show Cause
4 Order.

5 Q Could you tell me what those instances
6 were?

7 BY WITNESS PETTERSSON:

8 A I can describe them to you in general.
9 We found that there had been deviations from this
10 precise criteria of one test for every four. In a --
11 as I say -- a handful of cases, I believe that we
12 initially identified approximately ... I believe 30
13 cases.

14 At any rate, it amounted to less than two
15 percent of the number of tests performed. We had
16 made -- There have been additional reviews of the
17 documents made, and I know now that the actual number of
18 cases is probably around half a percent.

19 So there are very, very few of these in-
20 stances.

21 The maximum magnitude of the deviations
22 that we have found is one laboratory test for seven
23 field tests, which we find to be absolutely insignificant
24 from a technical point of view.

25 Q This two percent figure that you just

28-12

1 referred to, Mr. Pettersson, is that the same two
2 percent figure that you referred to on Page --

3 BY WITNESS PETTERSSON:

4 A That is the same figure. But as I indicated,
5 PTL has made a very thorough research of the documents,
6 which is -- It is already very thorough, but it is
7 not complete yet.

8 The indications from that search is that
9 the two percent number is a very conservative number.
10 Most likely, we will wind up with a number, like half
11 a percent.

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29-1 1 Q You said the review is not complete to this
2 date?

3 BY WITNESS PETTERSSON:

4 A The PTL are still looking at the records, yes.

5 Q When is that review expected to be completed,
6 sir?

7 BY WITNESS PETTERSSON:

8 A I believe within the next few days.

9 Q Mr. Pettersson, on Page 13 you use the term
10 miniscule number, and a minute ago you made a reference
11 to a handful of cases.

12 Can you give me a more precise number?

13 BY WITNESS PETTERSSON:

14 A Yes. We have 700 maximum-minimum laboratory
15 density tests, two percent that are -- would be like 14
16 tests -- I don't believe that that is the precise number,
17 but that's the order of magnitude.

18 BY WITNESS WHITE:

19 A If I might clarify, I'm not certain that we
20 were trying to state that they were isolated instances,
21 but it was in relation to the alleged false statements
22 on the FSAR.

23 What we're trying to say is that a deviation
24 from a procedure or a nonconformance does not in itself
25 cause a false statement, if you take the term "false

29-2 1 statement" as being some sort of intent to deceive.

2 What it means is that you have not implemented
3 the types of descriptions that may be provided in the FSAR,
4 and that does not constitute, in our minds, a false
5 statement.

6 Q Well, Mr. White, what if you take the term
7 false statement to mean simply a statement that turned
8 out to be wrong rather than a statement that was intended
9 to deceive?

10 If you use that definition, would you agree
11 that the FSAR statements were false?

12 BY WITNESS WHITE:

13 A I'd have to say that the FSAR statement was
14 an accurate reflection of the specifications. It was
15 not an accurate description of what was implemented in
16 the field, since there were some of these isolated
17 instances. So the FSAR is a description of the specifi-
18 cation requirements, so in that context it was accurate.

19 Q On Page 9 of the testimony, toward the
20 center of the page where you made the correction, the
21 second paragraph of section -- I won't read the section --
22 you state that that section was filed in May of 1978.

23 Could you tell me how much backfill had
24 occurred at that particular point in time when you filed
25 that statement?

29-3

1 BY WITNESS PETTERSSON:

2 A I'm thinking.

3 Yes. As a rough idea, we probably had placed
4 about 50 percent of the backfill at that time.

5 JUDGE BECHHOEFER: Is that five-oh?

6 WITNESS PETTERSSON: Yes.

7 BY MR. GAY:

8 Q On Page 10 of the testimony, if you will,
9 please; I believe, Mr. Pettersson, you referred to the
10 PTL review that's gone on, and we've got a time frame on
11 when the NRC came in and noticed that this vibrating table
12 was not operational.

13 Were you aware of any of the instances -- the
14 14 or thereabouts instances prior to the NRC coming in
15 and discovering that nonoperational table?

16 BY WITNESS PETTERSSON:

17 A No, I was not.

18 Q I believe, Mr. White, or I understand the
19 testimony to be that essentially you don't believe that
20 these statements were false because they were written
21 prior to the occasion of the discovery of this non-
22 conformance, is that correct?

23 BY WITNESS WHITE:

24 A I would have to say that I do not consider
25 these statements false, in the context of false meaning

29-4

1 some sort of intent to deceive. They are accurate in
2 that they are the description of what was called out
3 in the engineering specifications to occur at the site.

4 Q Would you agree with me, Mr. White, that
5 absent a modification or an amendment to the FSAR that
6 the NRC, and even the general public, would have to
7 assume that the FSAR statements at issue applied to the
8 time frame 1980-1981 and on beyond that period?

9 BY WITNESS WHITE:

10 A I would agree that the FSAR -- as long as the
11 spec remained with the same wording in it, the FSAR would
12 remain that way, and unless you found reasons to change
13 the specification, such as design requirements change,
14 then the FSAR would not be changed, and it would still be
15 an accurate reflection on the requirements of the
16 specifications.

17 Q Mr. White, do you have an opinion as to a
18 reasonable period of time that should be necessary to
19 make a modification in the FSAR after the discovery of
20 a nonconformance?

21 BY WITNESS WHITE:

22 A Well, again it depends on the nonconformance.
23 As in this case, the cause for the FSAR change was more
24 to clarify the wording that was -- well, was to clarify
25 the wording. In other words, the design bases of the

29-5

1 plant did not change.

2 Q Was it your belief --

3 BY WITNESS WHITE:

4 A So therefore, under normal circumstances,
5 an amendment may not have been generated to the FSAR to
6 correct that section, even though there had been
7 isolated instances of nonconformance at the site, because
8 those nonconformances must be dispositioned properly.

9 Q So is it your opinion that the amendments in
10 this particular case were not directly responsive to the
11 nonconformance?

12 BY WITNESS WHITE:

13 A No, I didn't say that. What I said was the
14 amendments served to clarify the testing frequency such as
15 to remove all doubt as to what was required.

16 Q Mr. White, what would normally be the course
17 of events in making a change in the FSAR? For instance,
18 if the NRC had not come in and discovered the non-
19 functioning vibrating table and had there not been this
20 item mentioned within the Show Cause and Notice of
21 Violation, and assuming that you discovered this event
22 on your own, how would there have been a modification in
23 the FSAR, or maybe I should ask, would there have been a
24 modification in the FSAR?

25 / / /

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1 BY WITNESS WHITE:

2 A The natural sequence of events would have
3 been a nonconformance would have been written on the
4 situation and it would have been reviewed by engineering
5 disposition and nonconformance.

6 If the disposition was such that the design
7 specification did not require changes, then the FSAR
8 would not be changed.

9 And in this case -- I'm not certain, I guess
10 I'd have to ask Bernt as to whether they would really
11 change the specification to be more general, instead of
12 saying every fourth test it would say on the average of
13 ever four.

14 BY WITNESS PETTERSSON:

15 A I don't believe that we would have changed
16 the FSAR in this instance.

17 Q Mr. White, can I get your impression -- I know
18 that the previous panel addressed this somewhat, but I'd
19 like your impression of the meaning of continuous
20 inspection.

21 BY WITNESS WHITE:

22 A I personally am not familiar with that term as
23 it relates to the industry's practice.

24 Q Page 13 of your testimony, Lines 8 through 12,
25 references something we've already discussed this evening

29-7

1 with regard to laboratory tests not always being made at
2 least every fourth field test.

3 My question is, is it your opinion, based
4 upon what you know from the PTL investigation, or your
5 own investigation, Mr. Pettersson, that this is attributable
6 to an inadequate lab?

7 BY WITNESS PETTERSSON:

8 A No, not at all.

9 Q Is it attributable to inadequate personnel?

10 BY WITNESS PETTERSSON:

11 A No, not at all.

12 Q Do you have any opinion as to what it is
13 attributable to?

14 BY WITNESS PETTERSSON:

15 A Yes, I do. It is because of the very large
16 amount of information that is being handled by PTL.
17 There are in the Category I, or there have been in the
18 Category I area over 2,800 in-place density tests
19 obtained, plus other tests in non-Category I areas.

20 Only looking at the Category I test table
21 would have been, as I said before, 700 laboratory
22 maximum-minimum density tests.

23 This is a large amount of test information.
24 In that large amount of information, if you find what I
25 like to call only a handful of deviations from these

29-8
✓

1 very precise criteria, I think that is an indication
2 that the laboratory have in fact performed excellent work.

3 The deviations that have occurred are, as I
4 said before, are of no technical significance. The
5 maximum deviation that we have found is one in seven.

6 Such a deviation can easily happen during
7 periods with a large amount of work in construction going
8 on at one time, in particular if there are numerous
9 in-place density tests obtained during one shift.

10 In the assignment of test numbers and in the
11 correlation of the test numbers with the field testing,
12 and then again correlation with the laboratory testing,
13 there can very easily be an assignment of a maximum-
14 minimum laboratory density test to a particular in-place
15 density test that does not fall into this very precise
16 sequence. The criteria is very stringent, and I think
17 that PTL has done an excellent job.

18 Q Could you give me a time frame for the
19 testing that you referred to in total number of tests?
20 Did that refer to the start of the program to date?

21 BY WITNESS PETTERSSON:

22 A That was the start of the program up through
23 June of 1980.

24 Q Of June 1980?

25 A Yes, sir.

1 Q I recall from the previous panel, from your
2 testimony here, and it's mentioned again on line 17 on
3 page 17, the average of twenty laboratory tests. Can you tell
4 me how you selected that number twenty?

5 BY WITNESS PETTERSSON:

6 A Yes, I can. It was selected based on the
7 uniformity of the backfill that we have on South Texas, also,
8 the recognition of the normal variations that you have in
9 laboratory test results.

10 Q Just one final line of question, with regard to
11 your understanding of the FSAR statement and the procedure
12 that is permissible. You might reference page 14, and 15.

13 Would it have been possible to comply with the
14 original FSAR statement if you had collected samples every
15 fourth field test and set those samples aside and performed
16 all the tests at the end of the month?

17 BY WITNESS PETTERSSON:

18 A No. There was another provision in the
19 specification which addresses the time limits of the
20 testing. That particular provision required a test minimum.
21 They should obtain one field and one laboratory maximum/
22 minimum test during each shift when work was completed in
23 some area.

24 Now, this is recognized -- I'm the first one
25 to recognize that this was again an overly stringent criteria

1 criteria we're dealing with. As a matter of fact, from a
2 practical point of view, our specification contained an
3 impossible criteria in the situation when you would have
4 the, maybe, the one and only field in place density test
5 obtained at the end of a shift. There would not be the time
6 to get back to the laboratory and perform the test.

7 Q How much time is permissible? What are the
8 boundaries under the new FSAR statement?

9 BY WITNESS PETTERSSON:

10 A The new FSAR statement that deals with that matter
11 says that during each shift, when work is being completed, they
12 have to obtain at least one in place density test and collect
13 the sample for the laboratory tests.

14 Q But it doesn't say anything about having to perform
15 the lab tests?

16 BY WITNESS PETTERSSON:

17 A That is correct. The importance, when it comes
18 to performing the laboratory test is that the laboratory tests
19 are performed in sequence with the field testing so that the
20 averaging of test results that PTL are performing can keep
21 step with the field testing.

22 Q So, under the amended or present FSAR statement,
23 it would be permissible for PTL to obtain the tests and run
24 the lab test at the end of the month, so long as it follows
25 the same sequence?

1 BY WITNESS PETTERSSON:

2 A That would be permissible, however, that would not
3 be a good procedure because if there is a high level of work
4 going on, we must recognize that the properties of these
5 samples do not change with time. There is no technical
6 concern. However, of course, if the acceptance criteria,
7 which are based on these laboratory tests becomes known much
8 later than the field tests have been obtained, obviously you
9 have another problem in hand, namely to correlate you
10 acceptance criteria with the field tests.

11 MR. GAY: I pass the witness, Mr. Chairman.

12 JUDGE BECHHOEFER: Mr. Sinkin?

13 MR. SINKIN: Yes.

14 CROSS-EXAMINATION

15 BY MR. SINKIN:

16 Q Mr. Pettersson, just following up on what you
17 were just answering, if they were stored for --

18 MR. GUTIERREZ: Before that question is asked,
19 I would object, only because I'm led to believe that
20 Mr. Sinkin and Mr. Gay divided cross-examination for some
21 purpose, and he doesn't have the luxury to follow up on
22 questions.

23 JUDGE BECHHOEFER: You really should divide the
24 areas, as I mentioned earlier.

25 MR. SINKIN: Well, Mr. Chairman, if an area is

1 explored, and new information not in the direct testimony
2 develops through that exploration, that raises a question
3 in my mind that doesn't happen to raise the question in
4 Mr. Gay's mind, it seems to me I should --

5 MR. GUTIERREZ: That's why they should have
6 coordinated it.

7 MR. SINKIN: I don't know what the witness is
8 going to answer to every question he's asked. If he answers
9 something that raises a whole new area that's nowhere even
10 suggested --

11 MR. GUTTERMAN: Mr. Chairman, the argument
12 Mr. Sinkin is making could apply to any time there is a
13 division of the cross. He could always have some new
14 question raised by the questions and responses in the
15 other parties' cross. There would be no way to divide it
16 if you allow such a distinction that Mr. Sinkin advocates.

17 MR. SINKIN: In taking a testimony that's
18 sixteen pages long and asking us to divide it in any meaningful
19 way doesn't make much sense to me, and the fact that Mr. Gay
20 has gone through a good bit of the testimony, I have maybe
21 five or six questions -- I think the rule is dysfunctional
22 on testimony like this.

23 (Board conferring.)

24 JUDGE BECHHOEFER: We'll see where you're going.
25 It will have to be different questions. We don't want

1 repetition.

2 MR. SINKIN: All right. Yes.

3 BY MR. SINKIN:

4 Q The question I was going to ask was --

5 JUDGE BECHHOEFER: I know, you haven't asked it
6 yet.

7 MR. SINKIN: Yes, I realize that. Interesting
8 objection.

9 BY MR. SINKIN:

10 Q The question I was going to ask was, you said that
11 you might, under this new FSAR statement, you might take
12 samples, set them aside, and test them at the end of the
13 month. My question was going to be whether you risk in
14 doing that having additional work done in the area where the
15 sample was taken such that that additional work might have
16 to be removed if the sample showed a problem. Do you follow
17 my question?

18 BY WITNESS PETTERSSON:

19 A Yes, I do. If the testing would be as untimely as
20 your indication, that could be -- well, that would not be
21 the situation because you are indicating that they actually
22 would continue the backfill. Well, they wouldn't do that,
23 because they have to have the acceptance of the other lifts
24 that are already there before they can go on. So, that
25 situation would not develop.

1 Q Okay. The acceptance checkoff would prevent that
2 happening?

3 BY WITNESS PETTERSSON:

4 A That is correct.

5 Q You stated that at the time the FSAR statement
6 was filed, fifty percent of the backfill was placed. Can you
7 tell me when the testing program on the backfill actually
8 began?

9 BY WITNESS PETTERSSON:

10 A Yes, I can. It started in non-Category I areas,
11 in March of 1976 and I believe we moved into the Category I
12 areas in May of '76.

13 Q In your estimate of the number of cases of
14 deviation that have been found in the PTL review of your
15 estimate, is your estimate based on communications you've
16 received on the number or on the percentage only?

17 BY WITNESS PETTERSSON:

18 A It is based on a review, my own review, of the
19 records and also reviews of summaries of the records prepared
20 by others. And I have reviewed the deviations, if it's one
21 in four or it's one in three or one in one or one in five.
22 I looked over that. I have summarized it and at one time
23 I counted them. And at one time I calculated the percentage.
24 However, what escapes me at the moment is the precise number
25 that I counted.

30-7

1 Q Were any of those deviations prior to May of 1978?

2 BY WITNESS PETTERSSON:

3 A I believe so, yes.

4 MR. SINKIN: Mr. Gay has done such an excellent
5 and thorough job that I am finished.

6 JUDGE BECHHOEFER: Mr. Gutierrez, are you
7 handling this?

8 MR. GUTIERREZ: Yes.

9 I agree with Mr. Sinkin. In light of Mr. Gay's
10 cross-examination, I only have a couple of questions.

11 CROSS-EXAMINATION

12 BY MR. GUTIERREZ:

13 Q Mr. Pettersson, you mentioned that --

14 JUDGE BECHHOEFER: Could you speak a little
15 louder.

16 BY MR. GUTIERREZ:

17 Q Mr. Pettersson, you mentioned that at some point
18 in time you realized that the FSAR statement that one laboratory
19 test would be performed each shift backfill was placed, at
20 some point in time you realized that was an impossible
21 specification to meet; is that correct?

22 BY WITNESS PETTERSSON:

23 A Yes.

24 Q Could you tell me approximately when you made
25 that realization?

1 BY WITNESS PETTERSSON:

2 A Yes, it was in the spring of this year.

3 Q That was the first time?

4 BY WITNESS PETTERSSON:

5 A Yes.

6 Q Up until the spring of 1981, you thought it was
7 a thoroughly workable specification?

8 BY WITNESS PETTERSSON:

9 A Yes, I was under that impression. Yes.

10 MR. GUTIERREZ: I have no further questions.

11 BOARD EXAMINATION

12 BY JUDGE LAMB:

13 Q Gentlemen, with respect to the paragraph on
14 page nine, your answer to question 13, first of all, I'm
15 interested in the use in the quote which you have from the
16 FSAR. I'm interested in use of the verb "were." Is that
17 customary language for that document?

18 BY WITNESS PETTERSSON:

19 A Yes, it is.

20 Q The entire document is written in past tense?

21 BY WITNESS WHITE:

22 A Yes.

23 BY WITNESS PETTERSSON:

24 A The entire document is written in the past tense.

25 Q Why is that?

1 BY WITNESS WHITE:

2 A The reason is that the FSAR needs to be filed
3 with NRC staff to allow them adequate time to review the
4 plans, and it has to be filed several years ahead of when
5 you need your operating license. So, therefore, you're
6 faced with the quandry of still doing work and describing
7 how the plant is to be built. So, the typical practice is
8 to phrase it in terms of this is what happens and only in
9 those cases where it doesn't happen and the design basis does
10 get changed do you file an amendment to say this is what
11 happened, as amended.

12 Q I assumed that was the case, but I just wanted
13 to confirm that.

14 Now, then this indicates, as you stated, that
15 any changes from this would occur as they happen?

16 BY WITNESS WHITE:

17 A Yes.

18 Q Now, should this be viewed -- is this viewed as a
19 draft or a finished document, when you submit it?

20 BY WITNESS WHITE:

21 A We would view it as a final document, with the
22 qualification that if there is no question from NRC to changes
23 nor are there any further changes in the design basis of the
24 plant or the analysis or evaluation presented in the document.

25 So, ideally, it could be a final document.

1 Q Now, most of the things which occur of the
2 type which we've been discussing, nonconformances, would not
3 result in changes to the FSAR, is that correct?

4 BY WITNESS WHITE:

5 A I would say that the examples that we're talking
6 about in this testimony are examples such that they would not
7 cause changes in the FSAR.

8 There are other examples of nonconformances where
9 design basis would change and they would be reflected in the
10 FSAR.

11 Q Now, in being corrected, or having these called
12 to your attention by the NRC, is the NCR the most usual way
13 for doing this?

14 BY WITNESS WHITE:

15 A Yes. I would say for field-related nonconformances,
16 the NCR is the typical way; there are other documents which
17 can, such as engineering design deficiency documents, these
18 sorts of things. There are a couple of other procedures on
19 the project on which a deviation or nonconformance can be
20 reported.

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1 WITNESS WHITE: Most of them are from the
2 NCR's.

3 BY JUDGE LAMB:

4 Q I beg your pardon.

5 BY WITNESS WHITE:

6 A Most of them are from nonconformance
7 reports.

8 Q Right. What has made me confused is I'm
9 wondering why that wasn't done in this instance, as
10 opposed to the route that was taken. Do you know why
11 the difference in this instance?

12 BY WITNESS WHITE:

13 A I'm sorry. Are you saying why wasn't an
14 NCR written?

15 Q That's right. Why did it take the
16 approach of referring to this as a false statement
17 in the FSAR, as opposed to just putting it through as
18 a nonconformance?

19 MR. GUTTERMAN: Judge Lamb, I'm kind of
20 confused by the question myself. I don't know if the
21 witness is. But are you asking why the NRC took that
22 approach?

23 JUDGE LAMB: I'm asking if he knows why
24 the NRC -- if in the process of discussing it, whether
25 he picked up anything from the NRC which would indicate.

1 Do you know --

2 WITNESS WHITE: I'm not personally familiar.
3 Maybe Bernt --

4 WITNESS PETTERSSON: No, I'm not.

5 BY JUDGE LAMB:

6 Q Normally, once something happens that brings
7 to your attention that there's a change that should be
8 made in the FSAR, what kind of time involvement is
9 required?

10 How long does this process normally take?

11 BY WITNESS WHITE:

12 A Well, as you can well imagine, it varies
13 on the particular problem. If it's a problem that is
14 going to require an extensive amount of evaluation,
15 engineering re-design, the FSAR won't be changed until
16 the new design is available, so this could take several
17 months.

18 On the other hand, other changes that are
19 very straight forward and do not require extensive
20 evaluations may be done in a matter of a couple of
21 weeks.

22 Q Now, in this instance the FSAR was prepared
23 in May -- I believe you said May of 1978.

24 BY WITNESS WHITE:

25 A Yes, the FSAR was submitted.

31-3

1 Q And the nonconformance which led to this
2 question occurred at the end of 1979?

3 BY WITNESS PETTERSSON:

4 A That's correct.

5 Q It occurred, according to your answer
6 between November 17, 1979 and January 7, 1980. That is
7 very close to or virtually coincides, doesn't it,
8 with the time in which the NRC was conducting its
9 investigation?

10 BY WITNESS PETTERSSON:

11 A That is correct. This incident with the
12 vibratory table breakdown did occur when the NRC
13 made their inspection on site -- the '79 inspection.

14 Q Was the FSAR accurate when you wrote
15 it?

16 BY WITNESS PETTERSSON:

17 A Absolutely.

18 BY WITNESS WHITE:

19 A Yes, sir.

20 JUDGE LAMB: That's all I have. Thank
21 you.

22 JUDGE HILL: I have just a couple of more
23 questions along the same lines that Dr. Lamb was
24 asking about.

25 ///

31-4

BOARD EXAMINATION

1
2 BY JUDGE HILL:

3 Q Specifically, in the period prior to May '78,
4 were you in general compliance with those two ASTM
5 standards?

6 BY WITNESS PETTERSSON:

7 A To the best of our knowledge -- to the best
8 of my knowledge, we were.

9 Q You said that you had conducted up to that
10 time approximately 50 percent of the backfill?

11 BY WITNESS PETTERSSON:

12 A Yes, I said 50 percent. It might have been
13 slightly more, yes.

14 Q What about the period of the 18 months
15 that occurred between May of '78 to November '79? Were
16 you in general compliance with those two ASTM standards
17 during that 18-month period?

18 BY WITNESS PETTERSSON:

19 A To the best of my knowledge, yes.

20 JUDGE HILL: That's all I have.

21 BOARD EXAMINATION

22 BY JUDGE BECHHOEFER:

23 Q Continuing on much the same subject, I
24 think you testified that some of the deviations had
25 taken place prior to May '78. I think one of you

31-5

1 testified --

2 BY WITNESS PETTERSSON:

3 A Yes, I did. And the point that I should
4 make clear here, I believe, is that deviations that
5 had occurred in this earlier time period were not
6 recognized until we performed the in-depth review of
7 the records that we made as a result of the Show Cause
8 Order, which was in May/June of 1980.

9 Q So that in May 1978 you were not aware at
10 all that one relative density test and one gradation
11 test may not have been performed for every fourth
12 field test; is that correct? You were not aware of
13 any instance --

14 BY WITNESS PETTERSSON:

15 A That's an absolutely correct statement. We
16 were not aware of any of these instances until May/
17 June of 1980.

18 Q As a matter of pure correction, I'd like to
19 ask if on Page 3, Line 33, the word in that line
20 shouldn't be "Florida" rather than "Flower"?

21 BY WITNESS PETTERSSON:

22 A That is correct.

23 Q The change in the FSAR ... the way I read
24 it is that now there is no maximum number of field
25 tests which could go on before laboratory tests are

1 undertaken -- at least the way that is written -- am
2 I not correct?

3 BY WITNESS PETTERSSON:

4 A Where precisely are you reading?

5 Q Interpreting the new specification which
6 appears to say that of the one density test and one
7 gradation test, on the average for every four tests --

8 BY WITNESS PETTERSSON:

9 A Yes.

10 Q Theoretically, you could go 10, 20, 50 field
11 tests, couldn't you, as long as the average for all of
12 them was four?

13 You might have to do one lab test for every
14 field test for six months or a year, but, theoretically,
15 couldn't you go 40 or 50 or 100, or whatever?

16 BY WITNESS PETTERSSON:

17 A Theoretically, in accordance with the FSAR,
18 you probably could. I assume so.

19 However, as I have explained before, the
20 specification is more stringent in this area than the
21 FSAR. The specification still requires that they
22 comply with this precise requirement of one in four --
23 for every fourth.

24 Q I'm now referring to the ASTM spec which
25 you just mentioned.

31-7

1 BY WITNESS PETTERSSON:

2 A No. The specific I'm talking about
3 is the earthwork inspection and testing specification.

4 BOARD EXAMINATION

5 BY JUDGE LAMP:

6 Q Excuse me. But aren't you limited, Mr.
7 Pettersson, by your 20 sample? Isn't this based
8 on 20 samples?

9 BY WITNESS PETTERSSON:

10 A Yes, that is correct. They still get to
11 perform the laboratory test in such a manner that they
12 can establish the acceptance criteria.

13 Q What I had in mind is wouldn't the 20-sample
14 collection limit you in how many you could --

15 BY WITNESS PETTERSSON:

16 A The average of 20 samples -- that is an
17 average of 20 laboratory tests.

18 Q Right. Thank you.

19 BOARD EXAMINATION

20 BY JUDGE BECHHOEFER:

21 Q My other really follow-on question is: Should
22 there be in the FSAR some sort of a maximum? Is it enough
23 to have an average? Or to put it another way: Why doesn't the
24 FSAR reflect the other construction -- the specification?

25 BY WITNESS PETTERSSON:

A The reason for the change that we made in the

1 FSAR is that performing one field density test for
2 every four on the average provides a very conservative
3 and adequate acceptance criteria.

4 And, therefore, the FSAR now describes an
5 adequate basis for the testing.

6 On the other hand, as I pointed out, we
7 are still maintaining the operational criteria in the
8 field.

9 Q What I was trying to figure out was: At
10 some point, whether it's 10 or 15 ... at some point
11 shouldn't there be, not an average, but a requirement
12 that some tests be done -- lab tests vis-a-vis field
13 tests?

14 BY WITNESS PETTERSSON:

15 A Well, I explained in the response to an
16 earlier question that the time limits of the work will
17 govern this because they cannot proceed without
18 establishing their acceptance criteria with a very
19 large number of tests, because they cannot continue
20 to place subsequent lifts until they have been able to
21 accept previous lifts.

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1 BY JUDGE BECHHOEFER:

2 Q I see. So through that the natural operation
3 of the system you will not --

4 BY WITNESS PETTERSSON:

5 A If they did what has been suggested by your
6 question, if they stockpiled it, well, pretty quick the
7 PTL Construction would come to grinding halt.

8 Q I see. So that you have to get both the field
9 test and the lab test before you could proceed with --
10 BY WITNESS PETTERSSON:

11 A That's right. They must re-establish their
12 acceptance criteria in step with the field work.

13 Q So that would happen after how many times?
14 You would do the field test. Say you would do ten field
15 tests. Now, you would have to verify -- Well, let's put
16 it at 12. You would have to verify -- you would have to have
17 three lab tests before you could do any further work on
18 the area covered by those, say, 12 tests?

19 BY WITNESS PETTERSSON:

20 A Okay. The way that PTL's procedure for
21 averaging is that they are changing the criteria when
22 around the average of 20 tests after five new laboratory
23 tests. So, typically, it would be five times four is
24 twenty in-placed into the test, and they would be looking
25 for a new acceptance criteria, or confirmation of their

2-2 1 acceptance criteria.

2 JUDGE BECHHOEFER: That's all the questions
3 the Board has.

4 Mr. Gutterman?

5 MR. GUTTERMAN: Applicants have no further
6 questions.

7 JUDGE BECHHOEFER: Mr. Gay?

8 MR. GAY: No questions.

9 JUDGE BECHHOEFER: Mr. Sinkin?

10 MR. SINKIN: No questions.

11 JUDGE BECHHOEFER: Staff?

12 MR. GUTIERREZ: Just two questions.

13 RECROSS-EXAMINATION

14 BY MR. GUTIERREZ:

15 Q In response to a question asked by Judge Lamb,
16 I think it was Mr. Logan said that the FSAR is based upon
17 design documents.

18 Just an information question: To your
19 knowledge, is there any section in Reg Guide 1.70,
20 Revision 2, which states the FSAR is to be based upon
21 design documents rather than based upon actual construction
22 that has occurred in the field?

23 BY WITNESS WHITE:

24 A I believe I was the person that was making
25 those statements about design documents. I am not aware

2- 1 that those exact words are in the standard format and
2 content guide.

3 I'm aware that it provides a -- it says that
4 the FSAR is to provide a description of the design basis,
5 evaluation analysis of the plant, such that the staff
6 can draw their conclusions about the acceptability of
7 the plant.

8 Q Is it not to be of the plant as constructed
9 as opposed to as designed?

10 BY WITNESS WHITE:

11 A Yes. It would be as constructed, but there
12 is no way to imply that each and every nonconformance
13 that occurs in the field is to be documented in the FSAR
14 and an explanation of the disposition of that non-
15 conformance and how it relates to the basic design
16 criteria, and that's all I was saying.

17 Q Thank you. One other question for
18 Mr. Pettersson.

19 At the time that you submitted the FSAR back
20 in May of '78, I believe, at that time were you aware of
21 any instances where at least one laboratory density test
22 had not been performed on any given shift when backfill
23 had been placed?

24 BY WITNESS PETTERSSON:

25 A No, no such instance had been brought to my

2-4 1 attention.

2 MR. GUTIERREZ: Thank you very much.

3 The Staff has no further questions.

4 JUDGE HILL: I ju have one further question.

5 BOARD EXAMINATION

6 BY JUDGE HILL:

7 Q Does Reg Guide 1.70 specifically state that
8 you are to write FSAR's in the past tense?

9 BY WITNESS WHITE:

10 A I do not believe that guidance is in there.

11 Q It just has become an established custom?

12 BY WITNESS WHITE:

13 A Yes, sir.

14 JUDGE HILL: All right.

15 JUDGE BECHHOEFER: Any further questions?

16 MR. GUTTERMAN: None from the Applicants?

17 MR. REIS: No more from the Staff.

18 MR. GAY: No.

19 MR. SINKIN: No.

20 JUDGE BECHHOEFER: The panel is excused.

21 (Whereupon, the witnesses were excused.)

22 JUDGE BECHHOEFER: We do not propose to
23 start any other panels tonight.

24 (Laughter.)

25 MR. AXELRAD: I just wanted to confirm that

32-5 1 we would start tomorrow morning with Mr. McKay and
2 Mr. Logan and this panel is excused.

3 JUDGE BECHHOEFER: What I would like some
4 clarification on first, though, is just so everyone knows
5 what are the panels that will follow that, the Buckalew/
6 Duke Panel?

7 MR. AXELRAD: Buckalew/Duke Panel, and then
8 the three concrete panels, starting with the concrete
9 verification panel and the panel on the Intervenor's
10 contention relating to concrete, and then followed by
11 the concrete restart panel.

12 JUDGE BECHHOEFER: Okay. I didn't know the
13 order of those three.

14 Anything further before we adjourn?

15 (No response.)

16 JUDGE BECHHOEFER: We're adjourned until
17 9:00 o'clock tomorrow.

18 (Whereupon, at 9:36 p.m., the hearing was
19 adjourned, to reconvene at 9:00 a.m., Wednesday,
20 June 24, 1981.)

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This is to certify that the attached proceedings before the
NUCLEAR REGULATORY COMMISSION

in the matter of: HOUSTON LIGHTING & POWER COMPANY
SOUTH TEXAS NUCLEAR PROJECT UNITS 1&2

DATE of proceedings: 23 June 1981

DOCKET Number: 50-498 OL; 50-499 OL

PLACE of proceedings: San Antonio, Texas

were held as herein appears, and that this is the original
transcript thereof for the file of the Commission.

LaGailda Barnes

Official Reporter (Typed)

LaGailda Barnes
Official Reporter (Signature)