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Transcript of Proceedings

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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In the Matter of: :
:
CONSUMERS POWER COMPANY :
: Docket Nos.: 50-329 OM
(Midland Units 1 and 2) : 50-330 OM
: 50-329 OL
-----+ 50-330 OL

DEPOSITION OF JOHN P. MATRA, JR.

Bethesda, Maryland

Wednesday, 7 January 1981

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DEPOSITION OF JOHN P. MATRA, JR.

Bethesda, Maryland

Wednesday, 7 January 1981

Deposition of JOHN P. MATRA, JR., called for examination by agreement of counsel, at Room P114, Phillips Building, 7920 Norfolk Avenue, Bethesda, Maryland, at 9:00 a.m., before William R. Bloom, a notary public in and for the District of Columbia, when were present on behalf of the respective parties:

On behalf of the Applicant, Consumers Power Company:

MICHAEL I. MILLER, Esq.,
Isham, Lincoln and Beale,
One First National Plaza,
Chicago, Illinois

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

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On behalf of the Regulatory Staff:

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

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P R O C E E D I N G S

Whereupon,

JOHN P. MATRA, JR.

was called as a witness and, having been first duly sworn,
was examined and testified as follows:

DIRECT EXAMINATION

BY MR. MILLER:

Q Mr. Matra, would you state your name for the record,
please?

A My name is John P. Matra, Jr.

Q And by whom are you employed, Mr. Matra?

A I'm employed by the Naval Surface Weapons
Center in White Oak, Silver Spring, Maryland.

Q You have supplied us with a two-page resume of
your experience and background. Is that in your handwriting,
sir?

A Yes, it is.

MR. MILLER: Okay. I would like to have that
marked as Matra Deposition Exhibit 1 for identification.

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(Whereupon, the document referred to was marked as Matra Deposition Exhibit 1 for identification.)

BY MR. MILLER:

Q Mr. Matra, looking at the second page of your resume and experience it says from 1953 to 1967 you were employed by the Glen L. Martin Company as a structural engineer. Is that correct?

A That is correct.

Q And what were your duties generally as an employee of the Martin Company?

A I did a number of things. I worked in the design and analysis of the P5M, Canberra; basically aircraft and missile work.

Also I worked in their Research Department, mainly dealing with structural problems.

Q What sort of structural problems?

A Being an aircraft company, it was an aircraft-type or aircraft-related problems, both thermal, non-elastic, non-linear type.

Q Sir, would you describe for the record what the

e-3

1 Naval Surface Weapons Center is?

2 A Well, it's a Navy installation working on surface
3 weapons, from the ship, in other words, to the air.

4 Q I take it it's a branch of the Department of the
5 Navy. Is that correct?

6 A That's correct.

7 Q And about how many employees does the Naval Surface
8 Weapons Center have?

9 A I would say about four thousand.

10 Q Are they all located in Silver Spring?

11 A No. Some of them are at Dahlgren, Virginia.

12 Q Is Silver Spring the headquarters of the Center?

13 A Dahlgren is, Virginia.

14 Q And you've been employed as a structural engineer
15 at the Naval Surface Weapons Center from 1967 to the present?

16 A That's correct.

17 Q And what have your duties been at the Naval Surface
18 Weapons Center?

19 A Again as a structural analysis staff and more or
20 less working on the more difficult problems throughout the
21 lab on any problem that would come up pertaining to structure.
22 It could be a grenade launcher to an underseas submarine, to

eb4

1 a building or anything else that comes up.

2 Q Now since 1967, how many structures, buildings,
3 have you been involved with in your duties as a structural
4 engineer with the Naval Surface Weapons Center?

5 A Buildings would only be for example the housing
6 for some of the electronic movable type of transportable
7 type that we worked on that would be housing electronic
8 equipment for moving from one location to another in an emer-
9 gency.

10 Q What is the approximate size of these buildings?

11 A I would say about the size of a large trainler.

12 Q And would you say that the bulk of your work for
13 the Naval Surface Weapons Center has involved structural
14 engineering problems related to weapons systems?

15 A Weapon system, yes, that's right. Basically that's
16 what our function is, but we handle all types, or we're
17 capable of handling all types of structural problems.

18 Q Now I see that you majored in structures at
19 Rensselaer Polytechnic Institute when you received your
20 Bachelor's degree of aeronautic engineering.

21 Would you describe for us the courses, if any,
22 that you had involving strength of materials?

eb5

1 A Yes. I took the theory of plates and shells,
2 strength of material courses, thermodynamic courses, a whole
3 gamut of courses.

4 Q Sir, were there more than four courses that you
5 took dealing with the strength of materials?

6 A I believe so, yes. I don't have that material with
7 me.

8 Q Then when you took your Master of Science degree
9 in mechanical engineering from Drexel Institute of Technology
10 you again majored in structures?

11 A That is correct.

12 Q What courses, if any, did you have in the strength
13 of materials in that course?

14 A Well, I went in with the-- Let me think a minute
15 here.

16 (Pause.)

17 Again, some of Timoshenko's repeated-- What do
18 you call it? Let me get my bearings straight.

19 I'm looking for courses that I've taken.

20 I've taken courses using--well, in non-linear
21 mechanics, for example, some courses in-- Oh, I forget. I'm
22 trying to think of the proper word, using Kronecker deltas.

eb6

1 It's a shorthand form of structures.

2 Q Would you spell that word for the Reporter, please?

3 A I believe is is-- I don't know the exact spelling.

4 I'm just guessing here. It's K-r-o-n-i-c-k, I think it is,

5 but I'm not sure.

6 What the devil do you call that? Variational
7 calculus techniques using Christoffel's symbols.

8 Q Mr. Matra, do you consider yourself to be an expert
9 on the strnegth of materials?

10 A I consider myself to be an expert in structures,
11 structural analysis and design.

12 Q And does part of that involve analysis of strength
13 of materials?

14 A They go hand-in-hand. You must know strength of
15 materials to do structures.

16 Q So you do consider yourself to be an expert then
17 in strength of materials?

18 A Yes.

19 Q Now in an idealized situation will you agree that
20 additional strain on a material causes additional stress
21 until the yield point of the material is reached?

22 A Yes.

eb7

1 Q And again in an idealized situation, would you
2 agree that additional strain does not cause additional stress
3 past the yield point of the material?

4 A You'd be going into the plastic range is what
5 you're saying.

6 Q Right.

7 A Yes.

8 Q And the situation we have been describing, the
9 plastic range of material as there being no additional stress
10 resulting from additional strain, remains true up to the
11 point at which the strain becomes so great that the material
12 fails.

13 A That's correct.

14 Q Okay.

15 Now until you reach the point of failure, even
16 past the yield point of the material, the material retains
17 its ability to resist load. Is that correct?

18 A You get greater elongation when it does resist
19 load.

20 Q And it's approximately equal-- Its ability to
21 resist load remain approximately equal to its ability to
22 resist load at its yield point. Is that correct?

eb8

1 A What's your question again?

2 Q All right, that the material retains its ability

3 to resist load once it has passed its yield point at

4 approximately the same level, if you will, as it was at its

5 yield point; that is, it's a straight line?

6 A Yes, a straight line. Okay.

7 Q All right.

8 Now for reinforcing bars used in reinforced con-

9 crete structures, would you agree that the point of failure

10 of those reinforcing bars is about one hundred times the

11 yield point of the material -- the yield strain of the

12 material. I'm sorry.

13 A You're asking-- I still don't understand your

14 question. I'm sorry.

15 Q Okay.

16 Well, as a certain strain is applied to a rein-

17 forcing bar it will reach its yield point. Is that correct?

18 A That's correct.

19 Q All right.

20 And then will you agree that it would take approxi-

21 mately a hundred times that force beyond its yield point or

22 yield strain -- I'm sorry -- before failure occurs?

eb9

1 A You're talking about the strain is a hundred times?

2 Q Yes.

3 A What type of steel are you using? I mean you .
4 haven't defined the-- You're just saying they are bars and
5 there is steel in there. I would want to know more about the
6 conditions that you're talking about, and then analyze it in
7 that respect.

8 Q Let me see if I can be a little bit more specific.
9 I hope this will be helpful.

10 It would be the normal rebar that is used in high-
11 strength reinforced concrete structures.

12 A You're saying approximately a hundred times. I
13 don't know the exact number but I know it's greater. Okay?
14 Let's put it that way.

15 Q Would you say it is substantially greater?

16 A You get quite a large elongation. This is what
17 you get when you get a large strain, basically is what you're
18 saying, I think.

19 Q Now once this material, this reinforcing steel
20 is past its yield point, nonetheless as stress is reduced
21 the strain is reduced. Isn't that correct?

22 A Once--

eb10

1 Q Once it's past its yield point but it hasn't
2 failed, as stress is reduced strain is reduced correspondingly.
3 Isn't that correct?

4 A As you reduce the stress? In other words you're
5 taking the load off of this?

6 Q Yes, you're unloading it.

7 A And then you're saying it is going to go down, but
8 it doesn't have to go down the same path. It's going to go
9 down to a certain way and then go parallel to it, so you're
10 going to have some permanent set. So it depends on where
11 you're going, what you're talking about.

12 How much is another question here, is when you
13 reduce it it depends on-- You're talking about your stress/
14 strain curves here, I'm assuming.

15 Q That's correct.

16 And would you agree that the stress/strain curve
17 will be approximately parallel to the stress/strain curve
18 before the yield point is reached?

19 A Yes, it's going to come down and then parallel.
20 They're not going to be to the same line.

21 Q But they will be essentially parallel. Is that
22 correct?

eb11

1 A Yes.

2 Q Now I'd like you to assume that there is a rein-
3 forced concrete structure with a crack 35 mils in width.

4 A In the concrete?

5 Q In the concrete.

6 Do you believe that the existence of such a crack
7 in, say, the diesel generator building -- let's make it the
8 diesel generator building at the Midland site -- would re-
9 sult in failure of the reinforcing steel?

10 A No, not if it's designed correctly. Let me put it
11 that way. I don't know how it's designed.

12 Q How what is designed, sir?

13 A The building.

14 What I'm saying is assuming that all your work
15 that you have done is correct, that you consider the steel
16 to take all the tension load, and that's as much tension
17 load as gets on there, and the concrete will take the com-
18 pression load, and that's all that gets on there, and that's
19 the way it is, but if you assume-- If you make a wrong
20 assumption that there's more tension load and that your bars
21 are not designed correctly, then it wouldn't. I mean that's
22 what I'm assuming.

ebl2

1 It will not fail just due to that crack at that
2 site.

3 Q All right.

4 And just taking us back a little bit, if you assume
5 that there is a 35 mil crack in the concrete and there has
6 been proper design of the reinforcing steel and so on, that
7 steel would nonetheless be able to resist an external load
8 equal to its yield stress even though it was in a condition
9 where there had been some strain put on it-- Isn't that right?
10 -- as a result of the cracking, or as indicated by the
11 cracking?

12 A It could still resist load. It's going to go
13 back up that curve again.

14 Q To its yield stress? Is that right?

15 A Yes.

16 Q You can see I'm talking generally now about the
17 facility.

18 A Okay.

19 Q If we know the total amount of differential
20 settlement in the structure, that is the limit of the strain
21 which the rebar will experience over the life of the plant
22 from that load. Isn't that right?

eb13

1 A If you know the total amount. But what is the
 2 cause of the settlement? I mean that's going to be the
 3 question I would ask.

4 If I see a building settling I will ask why is it
 5 settling.

6 Q Is that important to know in calculating the amount
 7 of strain?

8 A I think it's important to know with respect to the
 9 structural soundness of the building why something is happen-
 10 ing.

11 Q But you would agree that if you can know the total
 12 amount of differential settlement you can calculate the
 13 strain--

14 A Assuming that it's known.

15 Q Okay.

16 And as long as you assume with me that you know
 17 the total amount of differential settlement, as long as you
 18 haven't gotten the failure of the rebar, the ultimate strength
 19 of that rebar as a structural member has not been affected
 20 by the differential settlement... Isn't that right?

21 A What you stated there is an idealistic case. You
 22 know everything. And I'll say Yes.

ebl4

1 Go ahead.

2 Q Now, so to the extent that you know the amount of
3 the strain that results from the differential settlement,
4 that is the limit of the strain that the reinforcing bar will
5 see from that load. Isn't that right?

6 A So far, yes.

7 Q Now let's assume a different set of circumstances.
8 Let's assume that there is a structure, again at the Midland
9 site, under which the soil is sound for a portion of the
10 structure but unsound for another portion of the structure,
11 and in making calculations of strains that will be put on
12 the structure as a result of bad soil, assume that there is
13 a cantilever effect, if you will, but if the amount of
14 settlement is not known and cannot be predicted, would you
15 then agree that the amount of strain that is put on the re-
16 inforcing steel in the structure, the portion of the structure
17 that is supported on good soil might exceed its failure
18 point?

19 A There's a possibility. I mean you're talking
20 idealistically again, which-- I don't have the loads or
21 looking at your particular problem.

22 You're saying that part of the building is on

eb15

1 solid ground, part of it has been on fill material or some-
2 thing to that effect, and so you now have different boundary
3 conditions of the particular problem, looking at it as a
4 structural problem.

5 So now your building is a foundation, I would put,
6 with rigid support on one side or fixed support, on the
7 other side it's like an elastic foundation, and design it
8 that way, is the way I would do it. Then I would check it,
9 and as a possibility if it hasn't been done that way, it
10 could have a problem.

11 Q You mean failure perhaps?

12 A Yes-- I won't say failure until you run some
13 numbers, I mean.

14 Q Certainly.

15 But in that instance you would expect that some
16 sort of firm support under the portion of the structure that
17 was cantilevered out on good soil would be the solution. Is
18 that correct?

19 A Yes, that's correct.

20 Q Now, Mr. Matra, prior to the time that the Naval
21 Surface Weapons Center was retained by the Regulatory
22 Commission in connection with the Midland, Waterford and

eb16

1 Comanche Peak Nuclear Plant Projects, had you personally ever
2 been involved in the design or analysis of a nuclear power
3 plant?

4 A Not a nuclear power plant.

5 Q All right, sir.

6 Would you just describe for me -- I'm a lawyer and
7 I don't understand this -- what projects in your background
8 you believe are most analogous to the design effort involved
9 with a nuclear power plant?

10 A In my background?

11 Q Yes, as far as the structural.

12 A The structural aspect, whether it's a building,
13 an aircraft, or a submarine, I don't think it makes that much
14 difference. A structure is a structure, and stress is stress
15 and strain is strain.

16 Probably the only differences that I could see
17 in my particular analysis, you must consider your soil, your
18 seismic type of analysis if you're to run the spring con-
19 stants that you use. But other than that, I think the
20 analysis is practically the same.

21 I don't see-- If you can do structures work,
22 you're just putting in different material properties,

eb17

1 different boundary conditions in solving your particular
2 problem. I don't see where it must be shall I say a nuclear--
3 You've got to get your experience somehow, so you get it and
4 apply it toward your particular structure that you're dealing
5 with.

6 Q Have you observed any difference in the manner in
7 which loads are combined in the structural analysis for a
8 nuclear power plant as opposed, say, to an aircraft or a
9 submarine?

10 A Well, I think an aircraft is going to be somewhat
11 more restrictive in their design. By that I mean you have
12 not only the strength but the weight requirement. You have
13 to design it for strength and weight. You have gust loads.
14 You have flutter problems, vibration problems. And I think
15 an aircraft design is probably a lot more complicated maybe
16 than some of these buildings where you don't have the weight
17 problem.

18 I'm not saying that one is not more -- that one is
19 not complicated. They both are. But I'm just saying I could
20 see more problems and more difficulties arising where you
21 must meet a space criteria, a weight criteria, and a strength.
22 It's a more rigorous type of analysis.

eb18

1 Q Now Mr. Matra, we touched generally on your quali-
2 fications. Are you a member of any professional societies,
3 sir?

4 A Yes. I'm a member of Gamma Alpha Rho which is an
5 aeronautical engineering honorary society, and I belong like
6 to the Arnold Air Society and the American Rocket Society
7 or something like that, and the Institute of Aeronautical
8 Science. I didn't put it down there, nor all my publications,
9 other than my thesis.

10 Q Okay.

11 Are you a member of any committees of the ASME?

12 A No, I'm not.

13 Q Are you continuing your course work at the Uni-
14 versity of Maryland for your doctorate?

15 A Not at the present moment. I probably will, but
16 I stopped for a while. I'm trying to get a doctor's in math,
17 in applied math, is what I'm trying to do.

18 Q There are two papers that are identified as pub-
19 lished theses.

20 A Yes.

21 Q Where were these published? Were they just pub-
22 lished by the institution that you attended?

eb19

1 A Yes. One of them was a requirement for a Bachelor's degree. That's the first one on the propagation of a
2 disturbance in a visco-elastic medium.
3

4 And the other was on the development of theoretical
5 methods of prediction of thermal properties of a heterogeneous
6 material, and that was for my Master's work.

7 Q All right.

8 And I think you stated earlier that you had published some other articles.
9

10 A Yes, I did.

11 Q Okay.

12 Within the last, say, five years, have you published any articles?
13

14 A Yes.

15 Let's see, how can I put this?

16 (Pause.)

17 Some of these are confidential. I could give you
18 the title.

19 Q Okay.

20 When you say they're confidential, is that because
21 they are security-related?

22 A Yes, because they're security-related.

eb20

1 Q Well, if you can give us the titles maybe we ought
2 to do that if you can.

3 A Okay. One dealt with a reentry type vehicle.
4 This was done at the Martin Company when I was there, dealing
5 with heat shields and the structural analysis of a heat
6 shield and its attachment during reentry. I think it is a
7 Martin RM report. It's an HTC report, high technology -- and
8 heat.

9 There's another one just recently -- well, not
10 recently but within the five years which would be on laser
11 damage type on a structure, let's say. I'll put it that way.
12 And that's about four different volumes, and that one is
13 classified.

14 Q But none that are available to the general public?

15 A No.

16 Q Can you describe for us how the Naval Surface
17 Weapons Center was selected to perform this work for the
18 Nuclear Regulatory Commission?

19 A Yes. I think that we've done other work for them
20 with respect to--

21 Q You say "we," but not you personally?

22 A Well, the staff. I'm referring to the Structural

eb21

1 Analysis staff when I say "we," or the Naval Surface Weapons
2 Center in this case.

3 We have done this particular work with respect to
4 the shipping of material, radioactive material for one, and
5 doing the containment -- when I say "containment," for the
6 nuclear material to ship it from one place to another, and do
7 things like that to check them for drop, corner drop, edge
8 drop, containment, fire, tie-downs.

9 Q These are shipping casks?

10 A Shipping casks; this is correct.

11 Q To your knowledge, prior to this assignment has
12 the Naval Surface Weapons Center been involved in analysis
13 of structures at a nuclear power plant?

14 A At a nuclear power plant? Not to my knowledge.

15 Q How were you informed that the assignment had taken
16 place?

17 A How was I informed?

18 Q Yes.

19 A You mean that they needed help?

20 Q Yes.

21 A I think in this case Frank Rinaldi, who knew that
22 we've done work for him, got in touch with us and asked us

eb22

1 whether we could help on this particular task.

2 Q Did he contact you or Dr. Huang?

3 A He contacted myself in this case and then I in turn
4 contacted Dr. Huang and our particular chain of command in
5 the Naval Ordnance Laboratory. In this case it was Jack Wack.

6 Q Will you describe for me generally what the chain
7 of command is in the Naval Surface Weapons Center?

8 A Okay. Well, we have a department and then under
9 the department comes the division, and our Structural Analysis
10 staff reports to the division head. In this case it's Jack
11 Wack. And we ourselves do all the structural work basically
12 across the Lab.

13 That would be any other department, any other
14 division, any other branch which is under us, and proceed
15 from there. We are on the division staff, I guess is the way
16 it would be.

17 Q And where does Dr. Huang fit in? Is he Mr. Wack's
18 superior?

19 A No. Dr. Huang is more or less the head of the
20 staff, the head of the Structural staff.

21 Q I see.

22 And Mr. Wack is his superior then?

eb23

1 A Is his superior.

2 Q In addition to Dr. Huang and yourself, are there
3 any other individuals in the Naval Surface Weapons Center
4 that were involved in the analysis of the structures at
5 Midland?

6 A No.

7 Q And as between Dr. Huang and yourself, what would
8 the division of responsibility with respect to the Midland
9 Project be?

10 A With respect to the Midland Project, I have done
11 I'd say 90 percent of it.

12 Q All right, sir.

13 And could you differentiate between the 90 percent
14 that you've done and the 10 percent that Dr. Huang has done?

15 A Well, basically the difference would be after I
16 have done it I more or less talk things over with Dr. Huang,
17 and also with, say, the Nuclear Regulatory Commission to meet
18 their particular guidelines. In other words they set up the
19 guidelines that we should be following in this.

20 For example, in the FSAR or anything else that we
21 have written, the Final Safety Analysis Report, they set up
22 the guidelines; we more or less follow them and proceed from.

eb24

1 there.

2 Q And that's Mr. Rinaldi from the NRC; is that
3 correct?

4 A That's correct.

5 Q Have you had any contact with any other individual
6 employed by the Nuclear Regulatory Commission other than
7 Mr. Jones, of course?

8 A Well, I briefly talked to other-- I mean just
9 meet and contact maybe Frank Schauer, which is his boss,
10 Frank's boss, I believe.

11 Q Schauer; that's right.

12 A Schauer, yes.

13 Basically I've dealt with Frank on the Midland
14 Plant, you're talking about.

15 Q Yes, I am.

16 I think you said that the NRC, through Mr. Rinaldi,
17 set up guidelines for such things as preparation of the
18 Safety Evaluation Report. Were those guidelines written or
19 oral?

20 A Both. Some are written. In fact when we set up
21 this, they have certain blank forms, more or less, and they
22 ask for information and we look through the thing and see

eb25

1 that the Regulatory Guides have been met, and read both the
2 Regulatory Guide and this, as well as with direction from
3 the Nuclear Regulatory, in this case Frank, to say "Look at
4 these things, look at these," and decide our own particular
5 judgment in the particular investigation.

6 Q And will you describe for me in general terms what
7 your work, if you will, has consisted of on the Midland Plant,
8 what you've done?

9 A Well, the first thing I did was try and get the
10 Final Safety Analysis Report, read anything pertaining to
11 the structures part of it, compare those with the guidelines
12 set out by NRC, did they meet them or didn't they meet them,
13 or anything that we didn't quite understand, we more or less
14 sat down and wrote ourselves questions.

15 Once we completed this we then wrote an FSAR and
16 then put some questions on this.

17 Q FSAR or Safety Evaluation Report?

18 A Safety Evaluation Report, this one.

19 Q Okay.

20 A "Final" is what we were reading.

21 Q Anything else?

22 A And we looked at-- Well, we attended meetings when

eb26

1 asked, like when they were talking about particular problems
2 they were having.

3 I'd like to say that we basically, when I say
4 the Naval Surface Weapons Center or the Structural Analysis
5 staff, got involved in this more or less last February.

6 Q Yes, that's understood.

7 A -- so a lot of this work has been done. And then
8 we were just catching up and trying to pick up the pieces,
9 in other words trying to understand what's going on and what
10 are the problems, if any, so that we can help.

11 Q It has been 11 months. Do you think you understand
12 what the problems are?

13 A I believe we understand what most of the problems
14 are, yes.

15 Q Now have you ever had a talk or any conversation at
16 all with a man named Mr. Lipinski, an employee of the Nuclear
17 Regulatory Commission?

18 A I know of a Mr. Lipinski. I have talked with him,
19 but basically not in regard to the Midland. Most of my
20 conversation was with Frank Rinaldi.

21 Q Now I see that you have three blue binders sitting
22 there.

eb27

1 A Yes.

2 Q What is in those binders?

3 A That was the information that I believe it was you
4 people requested for me to bring.

5 Q Okay.

6 A They're basically my working papers.

7 Q May we have them please?

8 MR. MILLER: Off the record.

9 (Discussion off the record.)

10 MR. MILLER: Back on the record.

11 THE WITNESS: You can have them but I want them
12 back.

13 MR. MILLER: Absolutely.

14 (Documents handed to Mr. Miller.)

15 Let's just take a few minutes so I can take a
16 quick look at this.

17 (Brief recess, whereupon the deposition again
18 was resumed.)

19 MR. MILLER: We've spent a little bit of time
20 going through the three binders which Mr. Matra had in his
21 possession.

22 BY MR. MILLER:

eb28

1 Q Will you describe for us briefly what those three
2 binders consist of?

3 A They consist of both the rough draft of the safety
4 analysis or safety evaluation, whatever you call it here,--

5 Q Safety Evaluation.

6 A Safety Evaluation Report.

7 (Continuing) -- and some questions and open items,
8 upon reading the FSAR, that we thought should be asked--

9 Q All right.

10 A -- pertaining to the Midland Plant.

11 Q Do the three binders represent all the documents
12 in your possession that refer or relate to the Midland Plant?

13 A Yes, other than the FSARs,--

14 Q Yes, right.

15 A -- which are about 20-some volumes.

16 Q Yes, and growing.

17 A And also the Regulatory Guides.

18 Q Those are NRC publications. Correct?

19 A Yes.

20 Q Now Mr. Matra, how many times have you visited the
21 Midland site?

22 A Once.

eb29

1 Q Do you remember the approximate date?

2 A I think it was when I first got in last February
3 when they had a large meeting there. I forget the date off-
4 hand. They presented a lot of their problems and their
5 solutions to the particular problems that they had at that
6 time.

7 Q Now the Naval Surface Weapons Center had just been
8 retained at the time that meeting took place. Is that right?

9 A That's correct.

10 Q Prior to the time that you went on that meeting,
11 did you do anything to familiarize yourself with the project
12 or the problems?

13 A No.

14 Q Did you have any documents in your possession for
15 review prior to the time you went up there?

16 A Well, you say "prior." Maybe a day or something
17 to that effect. When we first started in other words, yes,
18 we got the documents and then later on, maybe a couple of
19 weeks later or something like that, then we went up, but not--
20 Prior to us being assigned the responsibility of handling
21 this, we did not have any documents.

22 Q I want to pick up on something you said. I think

eb30

1 you said that you said that the only documents you haven't
2 brought with you are the FSAR documents, some 20 volumes.
3 Do you include in that number or in those documents the
4 applicant's response to the 50/54(f) questions?

5 A Yes, I have those, and I didn't bring those either.

6 Q Okay.

7 A And I have some others on the soil fill, the plant
8 fill problems, the questions and answers, too, which I have
9 there. We didn't get them all at one time, but we've been
10 getting them.

11 Q Now when you were at the Midland site, will you
12 describe for us generally your recollection of what took
13 place there?

14 A Well, we went there I believe in the morning and
15 we had more or less a large meeting or hearing in which
16 Midland or Bechtel -- I don't know if I'm pronouncing it
17 correctly -- presented their particular -- some of the work,
18 not all of it, and some of the particular problems that they
19 were having.

20 B2. For example, I believe on the surface water tank
21 when they drove a pile down and put in an abutment and jacked
22 it up -- or what do they call it? -- concrete that they

eb31

1 bolted on--

2 Q A core bell?

3 A Is that called a core bell? I'd call it an abut-
4 ment.

5 And then we went also on a tour, looking at all
6 the buildings and showing us also some of the problem areas
7 where there were cracks in the diesel generator building,
8 et cetera.

9 Q Did you ask any questions during the course of that
10 tour?

11 A I believe I did, yes.

12 Q Do you remember what questions you asked?

13 A Well, basically some of the functions of the build-
14 ings possibly. In regards to the actual proposed fixes on
15 the service water tank -- the service water building, I asked
16 questions on that.

17 I asked questions where they'd had settlement in
18 I believe some duct work where they severed it after they
19 preloaded it, and I asked questions about preload on sand.
20 And I asked all sorts of questions that came to mind at the
21 time.

22 I don't know exactly who I talked to because we

eb32

1 were changing and walking around. It was just the person who
2 was closest to me.

3 Q Do you remember the names of any of the individuals
4 from Bechtel or Consumers Power Company?

5 A No, I don't.

6 Q Was Mr. Rinaldi with you at all times during the
7 tour?

8 A Well, he was there, but not personally with me. He
9 was also going around.

10 Q Was Dr. Huang there?

11 A Dr. Huang was there as well.

12 Q All right.

13 Now do you recall Mr. Rinaldi, during the course
14 of the tour, remarking that the cracks in the diesel generator
15 building were not as large as he had expected them to be?

16 A No, I don't recall that.

17 Q Was this the first time that you had ever been at
18 a nuclear power plant?

19 A Yes, it was.

20 Q Did you observe cracks in certain of the structures?

21 A Yes, I did observe cracks in structures. Some of
22 these cracks-- I mean if you're going to build any building

eb33 1 you're going to get some cracks. Let's face it, no building
2 is completely crack free.

3 Q And did the cracks that you observed appear to you
4 to be abnormal in either width or location?

5 A Some to me were larger than I expected. But
6 whether they're detrimental to the building or not I can't
7 tell without knowing more about the loads and the construction
8 of the building. I mean that's the first time I'd seen the
9 building. I don't know whether they have reinforced steel in
10 the building or what they have.

11 I see a crack and I say Gee--

12 Q It needs some further investigation; is that right?

13 A Yes.

14 Q Would you accept the differentiation between a
15 through crack and a surface crack, and it that a recognized
16 difference?

17 A I think a through crack you don't want.

18 Q But surface cracks--

19 A Surface cracks may be acceptable.

20 Q -- could be caused by shrinkage of the concrete?

21 A Could be caused by shrinkage; that's correct.

22 Q Now I'd like to show you a document that was marked

eb34

1 yesterday as Rinaldi Deposition Exhibit 2 for identification.

2 (Handing document to the witness.)

3 I'd like to ask you first if that's in your hand-
4 writing?

5 A Yes, this is in my handwriting.

6 Q All right.

7 Do you know a man named Joe Kana?

8 A I've talked to him on the phone.

9 Q On how many different occasions?

10 A Once.

11 Q And did he call you or did you call him?

12 A I called him. In this particular instance I be-
13 lieve he had a document here that I was reading, and I was
14 just giving my comments on the particular document.

15 Q Do you recall which document it was, sir?

16 A Not off-hand.

17 Q I show you a document that was marked yesterday
18 as Rinaldi Deposition Exhibit 16.

19 (Handing document to the witness.)

20 "Would you look at the attachment to that document
21 which is a Corps of Engineers' report?"

22 A I think this may be the document.

eb35

1 Q That's the document that you were commenting on?

2 A I more or less read and made this particular comment
3 on.

4 Q Could I have that document back, please?

5 A Surely.

6 (Handing document to Mr. Miller.)

7 Q Is it fair to characterize Rinaldi Deposition
8 Exhibit 2 as being a statement of your interest as a struc-
9 tural engineer in the matters that are discussed by the
10 Corps of Engineers in the attachment to Rinaldi Deposition
11 Exhibit 16?

12 A Right. I'm not a soil expert basically so what
13 I'm saying here is I'm only after the loads and the effect
14 this would have on the structure.

15 Q All right.

16 And the two items that you identified were whether
17 the dewatering system was going to be reliable and work as
18 predicted, and that there be a seismic reanalysis of all
19 Category I structures?

20 A Right. If you get soil liquefaction, I would
21 then say you're changing the boundary conditions of my parti-
22 cular problem and I would want to run another reanalysis.

eb36

1 But I'm leaving this, you know, to the soil people here. If
2 the dewatering system is okay I'm not going to argue with them

3 Q I show you a document marked yesterday as Rinaldi
4 Deposition Exhibit 7.

5 (Handing document to the witness.)

6 I call your attention particularly to the matters
7 that follow the first page.

8 A Yes.

9 Q Did you prepare that?

10 A I prepared most of this document.

11 Q And could you describe for us what those requests
12 represent?

13 A At the time when I first wrote these particular
14 questions, these were questions that arose when -- upon read-
15 ing the FSAR and attending that particular meeting at Midland.
16 And the questions I was more or less asking myself to get
17 answers to so we could evaluate more or less the buildings
18 and the work a lot more effectively.

19 Q All right.

20 Mr. Matra, that document is dated I believe in
21 October of 1980.

22 A That's correct.

eb37

1 Q Between February 1980 and October 1980, what were
2 you doing with respect to the Midland Project?

3 A As I said, I was reading the FSAR and preparing --
4 getting this thing (indicating) up to date.

5 Q This thing is --?

6 A The Safety Evaluation Report.

7 Q I see.

8 Approximately how many hours did you spend between
9 February and October 1980 on the Midland Project?

10 A I'll say about three-quarters of my time was spent
11 on the Midland work. In other words, I had other functions
12 to do.

13 Q Okay.

14 But your primary task during that period was the
15 Midland Project. Is that right?

16 A That's correct.

17 Q And did you meet with Mr. Rinaldi during that time
18 period?

19 A Yes, we did.

20 Q About how frequently did you meet with him?

21 A I think maybe once every other week, more or less
22 to see where I am and what I'm doing.

eb38

1 Q Now Question Number 5 of numbered Paragraph 5 on
2 page 2 of the attachment actually to Rinaldi Deposition Exhibit
3 7 refers to tension field data.

4 Could you define those words for me, please?

5 A I believe so. In a structure let's say you get
6 a bending, let's say something is bent or bending, you get
7 a tension side and a compression side. We're talking here
8 the tension field in the tension side. What are these values?

9 In other words in the case of-- Let's say you
10 have concrete and you have steel bars in there, and the steel
11 in this case is going to be taking the particular load, so
12 what tension load is being picked up locally by the steel bars,
13 in tension, that is?

14 Q What you're asking for is the amount of the load
15 that the steel would see as a result of differential settle-
16 ment?

17 A Right. This pertains to a crack analysis. A
18 crack is okay as long as it does not continue to propagate.
19 And what I'm saying here is: Show us that it will not propa-
20 gate, will not continue to crack.

21 Q I take it that crack propagation indicates that
22 additional strain is continuing to be exerted--

eb39

1 A That's correct.

2 Q -- on the member. Is that correct?

3 A That's correct. I mean if you can show this then...

4 And one way of doing it is the technique that we
5 have mentioned here, by saying -- looking at your analysis--
6 I don't know the type of analysis that has been performed
7 because I don't have them, or the type of model that they
8 used, or anything to that effect, so I'm asking questions here:

9 Can you tell what the tension is, or tension field
10 is in that area of the critical part so you can check it?
11 If so, I'm just asking what are they?

12 Q Okay.

13 And if the amount of strain that has resulted from
14 the differential settlement is calculated and there is then
15 a prediction of additional settlement and additional strain
16 resulting from that settlement, that would then enable you
17 to evaluate whether the failure point of the material is
18 going to be reached during the life of the plant. Isn't that
19 right?

20 A Whether you get enough strain to fail or get a
21 local failure. It may not be a complete failure or anything
22 to that effect. You could have some local problems.

eb40

1 Q As a structural engineer, Mr. Matra, are there
2 recognized techniques by which this tension field can be
3 measured, to your knowledge?

4 A I believe there are recognized techniques in
5 which they could be obtained. A lot of this is going to
6 depend on the sophistication possibly in the model that you
7 have to get this out. I don't know the type of model.

8 If you have, for example, a good maybe finite-
9 element type model or three-dimensional model, the more
10 dimensions the greater the cost to run the particular analy-
11 sis. But I believe that we -- when I say "we," the Struc-
12 tural Analysis staff in this case -- could recommend a solu-
13 tion to you, but I can't tell....In other words, I cannot
14 tell ^{you} how to run their analysis or anything to that effect.

15 Q Yes, sir.

16 A But I want to know whether--

17 A If they come and ask us, "Gee, how will you do it?"
18 I could recommend a technique in which, yes, it can be done.

19 Q Well, that's my question.

20 Is there a technique that you are aware of for
21 making this type of analysis?

22 A What? Available? Yes, it is available.

eb41

1 Q Will you describe it for us, please?

2 A Well, I would develop a finite element model, put
3 the boundary conditions in. In this case I would run a
4 NASTRAN analysis on it--

5 Q What's the word?

6 A NASTRAN, N-A-S-T-R-A-N.

7 (Continuing) -- put the boundary conditions, your
8 loads, and it depends on the complexity. I would have maybe
9 a finer mesh in more critical areas or what I think are the
10 critical areas and a coarser mesh away to cut down on the
11 degrees-of-freedom problem and establish my boundary condi-
12 tions and run the analysis, and then analyze the results and
13 get the data I want out of it.

14 Now I would have to, in this case, model the re-
15 inforced concrete with rebars and everything else in there,
16 but I see no difficulty in performing-- I can't do it, you
17 know, right now.

18 Q It's not a hand calculation?

19 A No, it isn't. It requires a lot of work.

20 Q Now I think you referred to the NASTRAN.

21 A NASTRAN, which is a NASA Structural Analysis
22 Program.

eb42

1 Q Is that a standard computer program?

2 A It is a standard computer program. They use it
3 quite a lot. They could use other programs as well but that's
4 just one that I would....

5 MR. MILLER: Let's go off the record.

6 (Whereupon a brief recess was had, after which
7 the deposition again resumed.)

8 BY MR. MILLER:

9 Q Mr. Matra, this tension field analysis that we've
10 been talking about, is the information that is sought analysis
11 for all the reinforcing steel that's in the structure or only
12 the reinforcing steel in the vicinity of cracks that have been
13 mapped?

14 A Only in the vicinity of the cracks that have been
15 mapped.

16 It's part of the determination. I think you can
17 determine whether this crack is going to continue to propa-
18 gate and that's the thing you want to know.

19 Q Okay.

20 A I believe I said that, "don't I? Yes, it says
21 "....at all crack locations."

22 Q Mr. Matra, as you know, the question-and-answer

eb43

1 response between the applicant and the NRC staff is continu-
2 ing.

3 A Yes.

4 Q And I'd like to show you the applicant's response
5 to Question Number 40 under 50.54(f).

6 (Handing document to the witness.)

7 I would like to ask you first whether you have
8 seen that before.

9 A I may have seen this before, yes.

10 Q All right, sir.

11 A I probably didn't, in other words, read the whole
12 thing or remember it right now.

13 Q Sure.

14 Would you turn to the response to Subpart 4 of
15 Question 40.

16 A Okay, Question 40, Subpart 4.

17 Q Right.

18 And if you'll just take your time and read over
19 that answer, then I have some questions for you.

20 (Witness reviewing document.)

21 A All right.

22 Q Is that a form of tension field analysis that's

eb44

1 described in the response to Subpart 4 of Question 40?

2 A You're saying is that a form of tension field.
3 What I was after here-- Let's say there's a crack located in
4 a certain part of the building and what I would want to know
5 then, what is the tension field loading in that area of the
6 crack? You don't tell me that here exactly. You're talking
7 generalities here more than specifics.

8 (Whereupon, the taking of the deposition was
9 recessed to reconvene in the Library of the Maryland
10 National Bank Building.)

11 BY MR. MILLER:

12 Q Mr. Matra, you do understand, do you not, that as
13 far as providing tensile strength in the structures at the
14 Midland Plant, credit is only taken for the reinforcing
15 steel in the structure?

16 A That's correct.

17 Q And therefore, in determining the loads that have
18 been applied to the structure it is loads that are applied --
19 tensile loads that are applied to structural steel that are
20 the focus of the analysis. Is that correct?

21 A In the analysis you have performed I believe that
22 is correct.

eb45

1 Q And that is the basis on which an evaluation would
2 be made by you as to whether or not the structure is ade-
3 quate from a structural engineering standpoint -- isn't that
4 right? -- as far as tensile loads are concerned?

5 A You mean on the particular building you're analyz-
6 ing, in this case one of the Midland buildings?

7 Q Yes, sir.

8 A There's more to it than that. Let me say that
9 you have a particular building in which you have part on
10 solid ground, part on fill. Your original analysis possibly
11 was done on an all-solid foundation and then you found out
12 that there was a fill.

13 So you perform another analysis, and in effect I
14 think you've done this with the service water building, and
15 you show that it was cracks and you can get, well, like it
16 exceeded-- Your building has a problem, could have a problem.
17 In fact this is what I read in one of your particular-- I
18 forget which one it was off-hand.

19 And in this case you're changing your basic
20 boundary conditions and therefore you're changing your problem.
21 Therefore, you could have tension loads where you don't ex-
22 pect them. I mean-- And it's for these reasons I think you

eb46

1 should rerun an analysis of that particular building. I'm
2 just giving an example.

3 So there are other things that could come into the
4 reason for asking for the tension fields in certain areas.
5 You've got to look at each building and each particular
6 problem independently.

7 Q Well, let's assume that the tension field analysis
8 in the form that you generally described it was run for each
9 of the structures at the Midland site. Would that give you
10 information concerning the concrete or the reinforcing steel?

11 A For the tension field I'm after the -- and the
12 reinforcement, if it is reinforced concrete, then that would
13 be what the tension -- what the steel bars would take
14 basically because that's how it's basically designed, if I'm
15 not mistaken, in this case.

16 Q That's correct.

17 For a tension field analysis, though, you would
18 have to analyze any cracks that might exist in the structural
19 steel itself. Isn't that right?

20 A I'm after--In this particular case in your crack
21 area you don't have to have-- In fact you can't tell me
22 whether the steel is cracked or not. I mean it's embedded

eb47

1 in the concrete, the rebars are. So what I'm after here is
2 in the area where there's tension, a high tension field, and
3 you have reinforced steel, assuming that you do in this
4 particular case, then what is the values that we're talking
5 about is what I'm asking, not--

6 Q Expressed in KSI?

7 A KSI or any other units that you want.

8 Q Now as part of the question that we've been talking
9 about I think you mentioned something about crack propagation.

10 A That's correct.

11 Q And again, just so we make sure we're talking about
12 the same thing, this would be crack propagation in the con-
13 crete itself. Is that right?

14 A That is correct. Concrete is not designed normally
15 in tension.

16 Q All right.

17 A If it continues to increase or propagate then you
18 can have a problem.

19 And it would be a problem primarily because that
20 would indicate that additional strain -- additional settlement
21 or whatever it is is occurring.

22 Q And at some point it is conceivable that the strains

eb48

1 would get so great that the reinforcing steel might fail. Is
2 that right?

3 A This is correct.

4 Q Are there criteria which are generally accepted
5 by structural engineers to establish when a crack is propa-
6 gating or not propagating?

7 A Are there criteria?

8 (Pause.)

9 Other than you mean visual, or analytical, or--

10 Q Either one of those.

11 A Well, there's the visual. You could measure it
12 and see whether it is enlarging. That's one particular
13 technique.

14 Analytically, knowing the particular properties of
15 your particular material and when they exceed -- well, you go
16 into the plastic range and everything else, then you can
17 determine there's a possibility that it can continue to crack
18 or not. It depends on-- That's why I want these tension
19 field values.

20 You get so much elongation because of the extra
21 strain so what happens to it? It's got to either open up the
22 crack, or what?

eb49

1 Q Well, would you expect, though, in the case of a
2 reinforced concrete structure, that any additional strain
3 will lead to additional cracking of the concrete itself?

4 A I would expect, if it is already cracked and there
5 is additional strain on your building, yes.

6 Q But that won't necessarily tell you whether you
7 are approaching the failure point of the steel, will it?

8 A If I know the strain value and I know the proper-
9 ties of the particular steel, yes, I can tell whether I am
10 approaching the values of the steel.

11 Q So then if we can establish, say over the lifetime
12 of the plant, that existing cracks would not increase by more
13 than X amount in terms of width, would that be a criterion
14 that could be established?

15 A Would not increase-- Would you repeat that again?

16 Q All right.

17 I'm talking about a hypothetical criterion for
18 crack propagation, that over the lifetime of the plant a
19 crack would not exceed a certain width--

20 A You mean length or open the gap in this case?

21 Q Well, let's talk about-- I was talking about the
22 opening, the gap. Would that be a satisfactory criterion for

eb50 1 crack propagation?

2 A This could be different for every structure now.

3 Let me--

4 Q In terms of the value.

5 A Yes. In terms of-- You're talking in terms of
6 magnitude here. You're saying a certain width crack, but then
7 I would want these more or less substantiated by some sort
8 of test or, you know, to back up your particular....

9 Q Wouldn't you agree that the response to Question
10 40, Part 4, provides an analytical approach to determining
11 when a specific crack size approaches the yield point, not
12 failure but yield point of reinforcing steel?

13 A Here you say the majority of the cracks were
14 caused by shrinkage. That's your statement, so I have to
15 take it for its value. It's typical of concrete structures.
16 Okay?

17 And then you talk about the duct banks where you
18 removed the local -- the particular problem by separating
19 the duct banks from your wall there. In this case it re-
20 lieved that local particular problem.

21 Q And in fact the cracks closed up. Isn't that what
22 the--

eb51

1 A Yes. Because the crack closed doesn't solve your
2 crack problem. The crack is still there.

3 Q Well, there was some strain experienced by the
4 reinforcing steel.

5 A That's correct.

6 Q And then it was relieved once the duct bank was
7 cut loose. Isn't that what would be indicated?

8 A Locally, the problem, yes, and then the stress if
9 locally relieved.

10 Q Okay.

11 A And then you talk about here a maximum width of
12 these cracks, wherever they are, is 20 mils. And using that
13 width you are correlating what is the stress on the steel.

14 Q Yes, sir.

15 Isn't that the strength value of interest, that
16 is, the stress on the steel? Isn't that what we're really
17 interested in determining in order to evaluate the struc-
18 tural integrity of those buildings?

19 A I would say yes, it's part of the particular prob-
20 lem.

21 Q Okay.

22 A Well, why I say that is--

eb52

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Q I know what you mean.

A What are the design loads and what are the stresses under the design loads by which you're also saying these have to be added to your other -- if it is a seismic load, if it is a snow load, or whatever the case may be, or a wind load or....

Q And in fact the answer to Question 40, Part 4, states as follows:

"Combining these cracking stresses with the stresses due to required load combinations results in...."

certain maximum calculated stresses.

And can you then determine whether or not you are at the yield point of the structural steel -- I'm sorry, the steel reinforcing material in the concrete?

A I think you can, yes.

Q All right.

Now I've been asking you to look at this, and I realize that it's certainly a mouthful for me. I guess I asked you whether you had seen this before. Did you study--

A I had not time to completely analyze it although I do remember getting these, and my first thing is to get

eb53

1 them and bring all my books up to date, and then re-read them
2 and see how they affect the-- I'm still in the process of
3 working through them.

4 Q Now the correlation that's in the answer to Ques-
5 tion 40, Part 4, between crack size and stress on the concrete
6 is based on certain references which are found on page 40-13,
7 References 7, 8 and 9. And my question to you first is:

8 Are you familiar specifically with any of those
9 references?

10 A No, I'm not.

11 Q Are you familiar with the work of any of the indi-
12 viduals who are listed as authors of those references?

13 A I heard of these particular names but I'm not
14 familiar with what particular work is associated with each
15 or any of these.

16 Q Mr. Matra, we've been talking about crack width.

17 A Yes.

18 Q Now I'd like to return to crack length because I
19 assume that that's a form of crack propagation as well.

20 A Yes.

21 Q Are there objective criteria that could be estab-
22 lished for allowable crack propagation in terms of crack

eb54

1 length?

2 A When you talk about crack propagation, then you
3 talk about criteria, I mean we don't-- I would think myself--
4 I'm just talking now as a structural engineer. I would not
5 want any crack propagation after a certain period of time
6 in a building. If it continues to propagate then I think you
7 have a problem and I think this must be established.

8 Q And when you use the word "propagate" you mean
9 any increase in length?

10 A Any increase in crack width, crack length. If
11 this is a continuous process then there's a reason for it.
12 Something's happening, and I think the problem needs investi-
13 gation.

14 Q All right.

15 Let's assume that a certain amount of differential
16 settlement has occurred as of a certain date and that over
17 the remaining lifetime of the structure, in this case 40
18 years, additional differential settlement is predicted to
19 occur but it is otherwise acceptable in terms of soil proper-
20 ties and so on.

21 Would you expect that as that differential settlement
22 occurs over the 40-year lifetime of the structure that there

eb55

1 may be some additional cracking that will take place?

2 A There may be. I'm not saying there won't be.

3 Q And if it was within known limits, would that be
4 acceptable?

5 A Within known limits in your design as it had been
6 preset, yes.

7 Q And is there any way that you know of of correlat-
8 ing say an additional half inch of settlement to the length
9 of a crack in concrete?

10 A Other than tests and running some more analytical
11 results, there probably is no way that I know of. Let's put
12 it that way.

2.600

13 Q So it would just be really a case of observation
14 over the lifetime of the plant, of how much--

15 A As well as a little more thorough analysis.

16 You could run an analysis, let's say a real crude
17 analysis first, and then, in the local area, run a more
18 detailed, a more refined analysis to determine -- or problem
19 area -- and from your coarse analysis get your loads to
20 apply on your -- in your local and get -- and analyze the
21 local problem with a lot more....

22 If you cut down the size of the problem you cut

eb56

1 down the cost in running the problem. These gentlemen I
2 believe are structural individuals and they should know.

3 Q Mr. Dahr is. Mr. Brenner is half structural and
4 half a lawyer.

B3

5 Let me just go back for a second to the tension
6 field analysis.

7 A All right.

8 Q First of all, would you agree that concrete is
9 regarded as a heterogeneous material?

10 A Yes.

11 Q And would you agree that steel is a homogeneous
12 material?

13 A Yes.

14 Q Can we agree that tension field analysis is used
15 for analyzing homogeneous materials?

16 A The use that I have seen in aircraft structures,
17 it is on homogeneous, particular type materials. That does
18 not mean that a similar type analysis cannot be performed
19 on structures, buildings, or anything along these particular
20 lines. I feel that we can get the tension field values in
21 these cases.

22 It depends on how you model your material and how

eb57

1 you look at it. You have to maybe work with 3D elements or
2 you have to work with other type of....You have to be more
3 disciplined, shall I say, in your modeling techniques to do
4 it.

5 Q And once again, the result of tension field analy-
6 sis is to determine the local stresses on the reinforcing
7 steel. Is that correct?

8 A Also, whether the crack-- If you have a tension
9 in the concrete....I mean, are you making an assumption here
10 that you have reinforced steel in all parts of the building,
11 or are there certain parts of the building that don't have
12 reinforced steel?

13 Q I represent to you that it is a completely rein-
14 forced steel structure.

15 A Then when this was designed you determined for
16 certain tension loads on a particular building, I'm pretty
17 sure. Now, because of some sort of problem, either a fill
18 problem or some settlement problem you now don't basically
19 have the boundary, the same boundary conditions that you
20 originally had....

21 Under these conditions then you have changed your
22 problem. Where you had a certain amount of tension load

eb58

1 before you may have more or may not, as the case may be.
2 And because of this you have caused cracks, or could have. ...
3 caused cracks.

4 So what I'm asking here, if you see cracks and
5 there are problems in here, some sort of analysis or analy-
6 sis technique -- it's up to you, up to Bechtel to do this,
7 or Consumers Power Company to check it.

8 Basically, that's what the whole purpose of the
9 question is. We're not telling you how to do it or--

10 Q I understand. I'm not being contentious. I'm
11 really trying to understand.

12 But it is a fact, is it not, that concrete -- the
13 existence of any crack in concrete indicates that in that
14 local area that material has failed?

15 A That's correct, surface cracking.

16 Q At the surface at least there has been failure of
17 the concrete material.

18 A Yes.

19 Q And if we assume that no credit in terms of tensile
20 strength is taken for the concrete, then isn't the only area
21 of interest to a structural engineer the question of whether
22 or not the reinforcing steel has reached its yield point and

eb59

1 then its failure point?

2 A Yes, that's of interest; right.

3 Q And in fact the cracking of the concrete is only
4 an indication that some additional strain has been ex-
5 perienceed by the reinforcing steel that is under the concrete?

6 A I think we're getting something here that is very
7 basic. Number one, I don't think the building, you know,
8 should have a crack or maybe as many cracks as it does have,
9 and the mere fact that it does, says that something is
10 basically wrong, something is going on inside.

11 And I think myself as an engineer would want
12 to find out what has gone wrong, why is this happening?

13 I don't design a building for a crack. I say
14 that the steel is going to take most of this load, but also
15 when I say this I'm saying that the concrete will not crack.
16 I mean maybe certain individuals don't do this or-- When
17 you design maybe up closer to the ultimate in the yield
18 range then yes, you're going to get these cracks, but then
19 that tells you you're designing it or the loads on it are
20 above those which it was designed for.

21 And I think then you take a look at it and say
22 Gee, is it still good, or should we have to do something?

eb60

1 That's basically what we're getting at here.

2 Q Fair enough.

C3

3 I'd like you to look at Item Number 9 and the
4 attachment to Rinaldi Deposition Exhibit 7.

3.070

5 (Handing document to the witness.)

6 A Okay.

7 Q That refers to applicable American Concrete
8 Institute codes, does it not?

9 A Yes.

10 Well, on these particular codes what I normally
11 do here, I get directions from NRC. In this case I've spoken
12 with Frank Rinaldi on what is acceptable at this time when
13 I'm looking at this particular work. And I use these codes
14 as a check.

15 Q I see.

16 And what, if anything, did Mr. Rinaldi tell you
17 about the applicability of the ACI 318 code versus the ACI
18 349 code?

19 A 318 and 349? I think that what they're saying
20 is I think that 349 as modified by the Reg. Guide is the
21 acceptable criteria right at the present moment when I wrote
22 this.

eb61

1 Q Do you know when ACI 349 was published?

2 A I would say after a lot of the work had been done
3 on the Midland plant, yes.

4 Q So it may very well be that the Midland plant will
5 not satisfy all of the criteria of ACI 349?

6 A This is correct, but that doesn't mean that we
7 shouldn't check it. I mean I think, myself, I look at does
8 that load exist there and do they want to check it to these
9 criteria, and if they want to check it to these criteria I'm
10 going to check it to these criteria.

11 The mere fact that, shall I say, some other plant
12 has been designed to a different criteria does not, to me,
13 mean that that plant is safe. Maybe the ultimate design
14 load that was applied to that never occurred. If you follow
15 my logic here.

16 We're talking here you have a building, you have
17 a building and this is designed to some other criteria, so
18 now we're saying we're trying to restrict it to a new
19 particular criteria which apparently Midland was not designed
20 to because it wasn't given to them. So it is all logical.

21 But that doesn't mean we shouldn't check it.
22 Because this other plant maybe never got the seismic load

eb62

1 maybe, or the other loads that the differences in the parti-
2 cular criteria---

3 Q Of course there is no way of knowing whether--

4 A Not at the present moment.

5 Q -- they'd really experience those loads either?

6 A Right. But we could at least check them out.

3.130

7 Q Now do you know what was done with all these
8 different items that are found in the attachment to Rinaldi
9 Deposition Exhibit Number 7?

10 A You mean by whom?

11 Q By Mr. Rinaldi.

12 A What was done?

13 Q Yes. What did he do with them? Do you know how
14 he transmitted them to the applicant?

15 A I do not know how he transmitted them to the
16 applicant.

17 Q All right.

18 Did you ever see the NRC staff interrogatories to
19 Consumers Power Company which are dated November 26, 1978?

20 (Handing document to the witness.)

21 A Yes. In fact, we had a hand in making this here,
22 which came from a lot of these questions in here. (Indicating.)

eb63

1 Q And what you're indicating-- Because the record
2 can't reflect when you say "come from here to here," what
3 you're saying is that many of the data requests, the open
4 items that are found in the attachment to Rinaldi Deposition
5 Exhibit 7 were later made into interrogatories and served on
6 the applicant.

7 A Only on the settlement problem, if I'm not mis-
8 taken.

9 Q All right, sir.

10 A Not all the questions in here were.

11 Q And specifically Item Number 9, dealing with the
12 ACI 349 code versus the ACI 318 code, is not found in the
13 interrogatories that are directed to the applicant. Is that
14 not correct?

15 Do you want to take a look?

16 A It may be. Does that deal with settlement?

17 I'm just saying when we were given groundrules to
18 do these--

19 Q Do the interrogatories?

20 A Right.

21 (Continuing) -- they said only pertaining to the
22 settlement problem, if I'm not mistaken, and that's what is in

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here.

But you're referring to Number 9. It may not be in there. You may be right.

Q Okay.

A I don't think it's in there.

Q That is you don't think the ACI 349 code question is in the interrogatories. Is that correct?

A I don't think so.

Q All right.

A At least I don't see those particular numbers, skimming right through it. No, I don't see it in here.

Q Thank you.

Now I show you a document that was marked yesterday as Rinaldi Deposition Exhibit Number 8 for identification.

(Handing document to the witness.)

I ask you first if that is in your handwriting.

A Yes, it is.

Q Can you tell us the approximate date when that document was prepared?

A Oh. I was doing this to help myself basically understand what has been done and what questions were asked and what their responses basically were, and also to see

eb65

1 whether the responses are satisfactory; in other words to
2 get a better understanding of what's going on with respect
3 to the Midland Plant.

4 And what I did is read the particular questions
5 and responses to the particular question, and as I did this,
6 I put them down. And I probably could get the date probably
7 more accurately from when the latest question was issued.

8 Q I represent to you that-- When we're talking about
9 questions we're talking about 50-54(f) questions.

10 A Yes.

11 Q And we had previously been discussing the appli-
12 cant's response to Question 40. And on the second page of
13 Exhibit 8 we only go up to Question 35, so that this document
14 was prepared some time prior to the time you reviewed or
15 received the latest applicant responses.

16 A That's correct. I mean I stopped, in other words,
17 doing this. I did this to become familiar, and also has
18 everything been answered. I don't know-- Preceding myself
19 getting involved in the project, a lot of questions had been
20 asked and everything else, what has been asked; what answers
21 have been given, what are the problems, so I could better
22 understand and talk about these.

eb66

1 Q After the first two pages of Exhibit 8 there are
2 references to questions that bear a different number iden-
3 tification.

4 A Yes. They were on the plant fill, questions on
5 plant fill, I believe.

6 Q And were those questions that were part of the
7 FSAR review, do you know?

8 A Well, I used them myself as being part of-- You
9 mean in the FSAR?

10 Q Yes.

11 A To become familiar what is the problem, to become
12 familiar. So I did read these responses to the plant fill,
13 the questions and answers, anything I could use to help more
14 or less understand the problem. And then I did look at it,
15 yes.

16 Q All right.

17 And on the first two pages, after each number
18 there is just -- what? -- a brief description of what the
19 subject matter is?

20 A Right. So as to familiarize myself again. I
21 noticed that some of them were answered "Not applicable,"
22 and then I went back and, say, read it again and again,

eb67

1 what's going on in the communication here.

2 Q So this was--

3 A It's a work sheet I would call it.

4 Q Sure.

5 And it was done by you fairly early in your assign-
6 ment?

7 A When I first got involved in trying to read and
8 understand everything. You just don't do it by reading. I
9 just took mental notes and physical notes on this particular...

10 What's there? What do I have? To solve any
11 problem or to do any work you have to know what you've got.

12 Q Okay.

13 On the second page at the very bottom there's a
14 reference to Question 130.17, and I believe in parentheses
15 are the numbers 3.A.1, close paren. And that I think refers
16 to an FSAR section, does it not?

17 A I believe so.

18 Q And the very bottom line on the page states
19 "Request not justified," and "not justified" is underlined.

20 Is that your comment on the request, or is that
21 what the response--

22 A That's what the response was saying. I just put

eb68

1 down what the response was saying.

2 Q I see.

3 All right. Now I think you said earlier,
4 Mr. Matra, that one of your responsibilities was to prepare
5 a draft Safety Evaluation Report.

6 A Yes.

7 Q And are you the fellow who actually sat down and
8 wrote the words?

9 A Yes.

10 Q Okay. We'll get to the exact documents in just
11 a second.

12 But generally how did the drafting process take
13 place?

14 A Okay. There was basically an outline in the
15 Regulatory Guides which show the format and what's acceptable
16 and what isn't, and basically reading from my working notes
17 and the Regulatory Guide and cross-referencing them, what
18 is acceptable and what isn't, then I sat down and started
19 writing.

20 Q Okay. Is that correct?

21 There was nobody working for you at this point in
22 time who did any of the analytical work or any of the drafting.

eb69

1 was there?

2 A -- Not for me, no. I did consult a lot of Rinaldi
3 in this case, and with Dr. Huang after we had written the
4 thing and asked for his particular comments, what does he
5 think about certain things,--

6 Q Okay.

7 A -- or to find out what Regulatory Guide I should
8 be using, and things like that.

9 Q I'd like to show you a document that was marked
10 yesterday as Rinaldi Deposition Exhibit 9 for identification.

11 (Handing document to the witness.)

12 I ask you to just look at all the pages of that,
13 and will you tell me if you have ever seen the document before
14 today?

15 (Witness reviewing document.)

16 A I think I've probably seen this document before.

17 Q All right, sir.

18 Is that one of the documents that Mr. Rinaldi or
19 someone from the NRC supplied to you in connection with your
20 preparation of the Safety Evaluation Report?

21 A In the preparation for the Safety Evaluation Report,
22 I did have a -- well, from another plan or something, more or

eb70

1 less they had forms which-- You say okay, these are the
2 things, the sections on structures that-- You may have them
3 there. And that I basically used as the general format and
4 all to follow.

5 MR. MILLER: I would like the Reporter to mark
6 as Matra Deposition Exhibit 2 a multi-page document entitled
7 "Facility Review - Administrative Data." It bears no date--
8 Well, at the bottom it says SEB Form 18 dated 1 October 1979.

9 (Whereupon, the document
10 referred to was marked as
11 Matra Deposition Exhibit 2
12 for identification.)

13 BY MR. MILLER:

14 Q Mr. Matra, I show you a document marked Matra
15 Deposition Exhibit 2 for identification and ask you if you
16 have ever seen it before.

17 (Handing document to the witness.)

18 A Yes. It looks like it is in my handwriting.

19 Q And could you tell me whether that is the document
20 which you've been referring to before that provided the
21 format for the drafting of the Safety Evaluation Report?

22 A This is what I used to put a lot of the

eb71

1 information-- When I was evaluating the Safety Evaluation
2 Report I put this on the side and then wrote comments as I
3 read the article and compared, and then wrote the Safety
4 Evaluation Report.

5 Q I think you said that you were reading the Safety
6 Evaluation Report. Did you mean the final--

7 A The final-- The FSAR.

8 Q Okay.

9 A In other words I wrote in here, and they had cer-
10 tain questions that they asked on seismic. A detailed plan
11 including a description, et cetera, is provided, and if that
12 was in there, yeah, okay.

13 Q Did you circle it? Is that your indication that
14 it was satisfactory?

15 A Yes. And I give the page and everything in there.

16 Q All right.

17 So this was really kind of a first step in--

18 A Right. It's working papers is what they are,
19 before I wrote the Safety Evaluation Report.

20 Q Turning to numbered page 33, that is the page that
21 talks about the concrete containment. And the handwriting
22 there is all yours. Is that correct?

eb72

1 A I believe so, yes.

2 Q All right.

3 Now moving on to page 41 which is headed Section
4 3.8.5, Foundations, could you read into the record the words
5 that appear about a quarter of the way down the page?

6 A This one here you mean?

7 Q Yes, sir.

8 A "Talk about containment, auxiliary build-
9 ing, diesel generator building and service water
10 pump structure. What about borated water structure
11 tanks? Also method of shear is not fully described."

12 Q And does that handwritten note indicate to you
13 that the FSAR did not talk about the borated water storage
14 tanks?

15 A At this time when I did this-- Now sometimes when
16 I read it I pick it up later on,--

17 Q Yes.

18 A -- but at the time, yes.

19 Q Okay.

20 Then down under Subparagraph C, Loads and Load
21 Combinations, the handwritten words appear in the left-hand
22 margin, "Need further check."

eb73

1 A Right. In other words at this time we were talk-
2 ing here about different Regulatory Guides and different --
3 whether they're the same or what they are. I wanted to know
4 and I wanted to check them myself before-- Rather than stop
5 and do it, I just wrote to myself to get back and do it. In
6 other words I wanted to satisfy myself about that.

7 Q Can you find for me in this document -- and I
8 realize it's a fairly thick one -- your initial analysis of
9 the structural problems, if any, that were caused by the soil
10 settlement at the Midland site?

11 A My analysis?

12 Q Yes. Is it found in this document?

13 A No, you won't find my analysis of any of the
14 buildings in this document. We're going to perform a struc-
15 tural analysis. We have asked for information and up to
16 date have not received any on it.

17 And by "information" I'm referring to-- Let's
18 see. In one of the questions--

19 Q Are you referring to answers to these interroga-
20 tories? Is that what you mean?

21 A That's correct. That's some of it. Like we want
22 to run a seismic analysis on the containment building, and

eb74

1 we're picking another building to run it. To run these we
 2 would need some of the material properties, some of the
 3 constants that were used. Not that we're going to run the
 4 same analysis; it's just going to be silly to run it again.
 5 Our analysis is going to be different than what Bechtel or
 6 Consumers Power people have done. Our model is going to be
 7 different. And we're just independently going to either
 8 agree or disagree.

9 Q But with respect to the soils settlement issue,
 10 these interrogatories represent, do they not, all the out-
 11 standing--

12 A -- questions that we had.

13 Q -- questions that you had?

14 A Yes.

15 Q Now I used the word "analysis" when I asked you
 16 about where in Matra Deposition Exhibit 2 I would find the
 17 foundation questions. I used the word "analysis."

18 Where are they discussed in this document, quite
 19 apart from any analysis, in other words the foundation problem
 20 arising from the soils settlement at the Midland site?

21 A You mean in here?

22 Q Yes, sir.

eb75

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A I don't understand your question. I'm sorry.

Q Is there any part of this document that purports to discuss the foundation as a result of the -- and the effect of the soils settlement on the foundations?

A What you mean is to get information out of the FSAR on foundations, and I think one of the titles here..... Like here, "Response spectra applicability for various foundation locations."

So throughout here they....

So if it is in here, other than that, I just pulled it out of the FSAR, any information on the questions, the questions and answers that they were asking.

Q Okay.

At about the middle of this document there's a handwritten sheet headed 3.8, Design of Category I Structures.

A Yes.

Q And about halfway down the page there's a reference to page 3.8-5, and I assume that's 3.8-5 of the FSAR. Is that correct?

A Yes, I believe so.

Q It says "Equation A-1 left out live load."

A Here I was comparing what was used and what was in

eb76 1 the spec.

2 Q And based on your analysis on that day you--

3 A I didn't see it in there; that's correct. I was
4 just comparing what is the difference, what does this mean,
5 will it hurt us, will it be....

6 Q All right.

7 Then 2 under that says "Used 1.05 instead of 1.0
8 for a factor of dead load."

9 A Well, that's conservative. In this case they're
10 using more.

11 Q And 3 is "A factor of one-half," and there's a
12 question mark over it.

13 A I didn't see it. Either one had it or the other
14 didn't.

15 Q And what is number 4 on that page?

16 A Oh, "Left out pipe reaction load."

17 Q I see.

18 And then over at the left there is the word
19 "abnormal." What does that refer to?

20 A Oh, they had different conditions in the spec.
21 This was an abnormal condition, and this is "abnormal/
22 severe environmental." They are conditions in the spec that

eb77

1 I was looking at at the time.

2 Q And then your analysis of these various equations
3 continues on the next page. Is that correct?

4 A Right.

5 Q And did you resolve to your own satisfaction that
6 these equations did in fact meet the applicable specifications?

7 A At this particular time I mean I was only com-
8 paring numbers, not magnitudes, and one would have to know
9 what each component and what its effect is to tell the over-
10 all picture. And I believe, if I'm not mistaken, that in
11 some of the response and answers some of this was being done
12 by Bechtel or Consumers Power at that time to make a compari-
13 son, and later on I found some of these in my questions and
14 answers.

15 Q Okay.

16 MR. MILLER: I'm about to change subjects so this
17 is as good a time as any to break for lunch.

18 (Whereupon, at 11:54 a.m., the taking of the
19 deposition was recessed to reconvene at 12:45 p.m.
20 the same day.)

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AFTERNOON SESSION

(1:25 p.m.)

Whereupon,

JOHN P. MATRA, JR.

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

DIRECT EXAMINATION (Continued)

BY MR. MILLER:

Q Mr. Matra, I show you a document that has pre-
viously been marked as Rinaldi Deposition Exhibit 10 for
identification and I ask you whether you ever saw that docu-
ment before.

(Handing document to the witness.)

A I think I have seen this document before.

Q Did you have any hand in the preparation of that
document?

A On this document? No.

Q Is that something that had been prepared by
Mr. Lipinski, do you know, of the NRC?

A That I don't know.

Q What use, if any, did you make of the document
in your analysis?

eb79

1 A Just for information's sake on what has been done
2 and what the status of things was.

3 Q Did you accept the conclusions that are expressed
4 in Exhibit 10, or did you go back and review the FSAR and
5 associated materials and reach your own conclusions?

6 A I went back to the FSAR and reached my own conclu-
7 sions.

8 Q Now I'd like to show you two documents that have
9 been marked Rinaldi Deposition Exhibits 11 and 12.

10 (Handing documents to the witness.)

11 As you can see, there is a handwritten comment,
12 a handwritten word "Draft" on the first page of Exhibit 11.
13 And there are in addition certain other differences in the
14 content of the two documents.

15 A Yes.

16 Q It was Mr. Rinaldi's recollection yesterday that
17 Exhibit 11 was prepared prior to Exhibit 12.

18 Would you take a look and see whether-- Well,
19 first of all have you seen these documents before?

20 A Yes, I have.

21 Q And you are the John Matra, Jr. that is referred
22 to as author? Is that right?

eb80

- 1 A That's correct.
- 2 Q All right.
- 3 A In fact, you can see some of the original writing
4 in here that was in this book in here, the yellow pages.
- 5 Q If you look at the back of Exhibit 12 you'll see
6 that there are certain--
- 7 A This was done -- I'm definitely sure was done
8 later than this one. (Indicating.)
- 9 Q Exhibit 12 was done after Exhibit 11; is that
10 correct?
- 11 A This is correct.
- 12 Q So Exhibit 12 represents--
- 13 A -- a later version of this.
- 14 Q And that's your most recent draft, if you will,
15 of the Safety Evaluation Report for the structural engineer-
16 ing with respect to Midland?
- 17 A Yes.
- 18 Q Is that right?
- 19 A That's right.
- 20 Q Thank you.
- 21 Now at the top of page 11 of Exhibit 12, Mr. Matra,
22 there's a reference to the electrical duct banks.

eb81

1 A Yes.

2 Q And the final sentence in that paragraph concludes
3 with the words:

4 "We agree with the applicant that as long
5 as the pressure and water type conditions around the
6 cables are not included in the design requirements,
7 minor cracking of duct banks are not objectionable."

8 And do you agree with that statement?

9 A Yes, I do.

10 Q All right.

11 And do you have any reason to believe, as you sit
12 here today, that there is anything other than minor cracking
13 of the duct banks which has occurred at the Midland site?

14 A Well, when you take the whole thing in its con-
15 text, we agree with the applicant that as long as pressure and
16 water type conditions around the cable are not included in
17 the design requirements....Is it a design requirement? I
18 don't know.

19 Therefore I said then minor cracks are not objec-
20 tionable. As long as you don't have an obstruction or--

21 Q As you may recall, this was the structure, that is,
22 the duct banks, that were tested by means of rabbit--

eb82

1 A A pass-through.

2 Q A pass-through, right. And that would establish
3 that there was no obstruction. Isn't that correct?

4 A Yes.

5 Q All right, sir.

6 Numbered item 2 on page 11 deals with the tension
7 field data.

8 A Yes.

9 Q Was that tension field data, was that a request
10 that you made, or was that originally Dr. Huang's idea?

B4

11 A I think it is both of ours. There should be some
12 method to check the propagation of the cracks and we both
13 more or less sat down and discussed this and said Well, this
14 is a method that we probably can use to check.

15 Q All right, sir.

16 Over on page 12 of Exhibit 12, the first sentence
17 at the top of the page reads:

18 "The corrective actions undertaken and/
19 or proposed by the applicant for the structures in
20 question do not recommend the most conservative
21 and permanent remedial action."

22 A This is correct.

eb83

1 Q My question to you first of all is:

2 At the date this was written, how many corrective
3 actions had been undertaken by the applicant to your know-
4 ledge?

5 A You mean....When I'm writing this we're referring
6 to a number. One was some bolts that had sheared for some
7 reason, and it sounded like a stress/corrosion type problem
8 in which there were preloaded bolts--

9 Q Reactor anchor bolts?

10 A Correct.

11 And the other is a tentative fix in the service
12 water building in which they drove a pile down and jacked up
13 part of the building and used that as part of the support.

14 Q You don't know-- That hasn't been done yet, has
15 it?

16 A No, I'm talking about proposed--

17 Q Okay.

18 A -- corrective actions:

19 Another one was undermine and put core bells
20 underneath one of the structures, and I forget which one,
21 what the name of that one is.

22 Q Isn't it also the service water pump structure as

eb84

1 your second paragraph indicates here?

2 A Yes. On the service water building, this is the
3 one with the piles and the core bell on the outside which
4 they used to jack up part of the building. And yes, we had
5 a lot of questions on that particular design.

6 Q All right, sir.

7 Assume with me that instead of piles caissons were
8 actually inserted under the service water pump structure.
9 Would that be the equivalent of the abutments that are re-
10 ferred to in the second sentence?

11 A No. I'm referring to going right down to solid
12 ground, just like you do in a dam or--

13 Q In other words a solid concrete structure?

14 A Yes.

15 What the basic problem here is I don't see where
16 we can take out the lateral loads in a pile, a driven pile
17 as recommended here, say for an earthquake. I think the thing
18 is going to slip. There is no mechanism shown unless there
19 is some and they have some lateral attachment.

20 In other words, I don't have all the details in
21 their analysis or what they have proposed here to really
22 accept it in our mind. If they can show this then--

eb85

1 Q Then you would accept it?

2 A Sure.

3 Q All right.

4 A Like they're using bolts in here and bending it
5 looks-- They're relying on friction to take out the loads.
6 I don't think this is a good engineering practice way of
7 doing it. I think you should substantiate it somehow with
8 some other -- maybe some tests or whatever it is. I don't
9 put in a bolt, design it and then bend it. That's not the
10 way the bolt is used.

11 And how else are they taking out some of these
12 loads? I question it. I mean if they can show this-- I
13 didn't perform the analysis although I would like to see what
14 they've done and then perform my own analysis.

15 Q All right.

16 I want to get on to the second sentence here where
17 you talk about abutments.

18 What you're looking for in abutments is what? A
19 solid concrete structure under each of the four walls of the
20 building?

21 A It doesn't have to be all the way around but over
22 most or some of it, yes, down at the base.

eb86

1 In this case in the service water tank they have
2 this thing out cantilevered which is on -- part of it is like
3 on fill. The building itself is not designed that way.

4 Q It has to be supported in some way--

5 A Well, if it is designed that way then it's okay,
6 but the original building was not designed that way and once
7 this happens then I think they should do an analysis. I don't
8 think by jacking it up the way they've done and not perform
9 a seismic analysis or anything-- I don't see anything to
10 take out the side load or the horizontal load. They show it
11 to take the vertical load. But is that going to happen? In
12 other words I question it.

13 Q The last portion of Exhibit 12 consists of a
14 series of handwritten sheets. Are those in your handwriting,
15 sir?

16 A Yes, they are.

17 Q And were they prepared at the same time as this
18 latest draft of the Safety Evaluation Report?

19 A After the latest draft. In other words I looked
20 in here-- Some of these you'll find in here, some of the
21 questions. They may be more elaborated in here. And so we
22 wanted to ask these questions and get some answers in

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response.

Q All right.

A Some of these are the open items mentioned.

MR. MILLER: I would like the Reporter to mark as Matra Deposition Exhibit 3 for identification a type-written document, undated, which just has a front page with the words "Questions and Open Items."

(Whereupon, the document referred to was marked as Matra Deposition Exhibit 3 for identification.)

BY MR. MILLER:

Q Mr. Matra, is Matra Deposition Exhibit 3 the type-written version of these handwritten sheets that are found in Rinaldi Deposition Exhibit 12?

(Handing document to the witness.)

A I believe they are.

Q Now Question 3, the second sentence of that says:

"We require as necessary the revision of structural analyses of all Category I structures affected by the settlement action in the plant fill area."

eb88

1 A The fact is there I think Consumers Power in their
2 reports indicate that they were going to do that anyway
3 and which I read after this had been written.

4 Q In any event there's a commitment to do it. You
5 haven't seen--

6 A It hasn't been done, to my knowledge. I haven't
7 seen it. But maybe it has now. I don't know.

8 Q In terms of the applicability of the various
9 codes and Regulatory Guides, you rely on Mr. Rinaldi for
10 that, do you not?

11 A This is correct.

12 Q Okay.

13 Mr. Matra, I show you a document that has been
14 previously marked as Rinaldi Deposition Exhibit 13 which he
15 identified as the contract between the Naval Surface Weapons
16 Center and the Nuclear Regulatory Commission.

17 (Handing document to the witness.)

18 Have you ever seen that document before?

19 A Yes, I have.

20 Q All right.

21 On the last page--

22 A The last page. Okay.

eb89

1 Q -- numbered page 9 there there's a reference to
2 reporting requirements. It says:

3 "Upon the completion of each subtask of
4 each task, the contractor will provide the cogni-
5 zant NRC Branch Chief with a letter report which
6 includes as appropriate recommended requests for
7 additional information, Safety Evaluation Report
8 input, supplemental safety report input, independent
9 analysis results and other related technical docu-
10 ments."

11 Are whatever written reports were submitted to
12 Mr. Rinaldi included in those three binders which we looked at
13 earlier today?

14 A Everything to date that we have done. Of course
15 we're still working on the task, but it is included in those
16 three binders.

17 Q Turning back in the contract to a description of
18 the subtasks for the Midland Project, is it fair to say
19 that only the first two subtasks have been performed? Is
20 that right?

21 A That's more or less correct. That's right.
22 Basically the first two we've been working on, and of course

eb90

1 we're beginning to get involved in the design audit and
2 things like that, which is going to be set up. The date is
3 going to be set up.

4 Q The last subtask on numbered page 4 of Exhibit 13
5 refers to a confirmatory independent structural analysis.

6 A That's correct.

7 Q Is that what you were referring to before which
8 is yet to be performed?

9 A That's one of the items, as well as the audit,
10 that has still to be performed here. And on the previous
11 page, "Conduct a design audit."

12 Q All right.

13 Has the Category I structure, in addition to the
14 facility containment structure, that has to be analyzed by
15 you been selected?

16 A Definitely not. We have a number that have been
17 considered. The service water building is one of them. Of
18 course the containment building is another.

19 Q Well, the containment is required,--

20 A Right.

21 Q -- in any event.

22 A As I said, of course the containment is another.

eb91

1 And if time permits we may also get involved in another. It
2 depends on how fast we work.

3 Q But as it stand right now--

4 A We just mentioned some rather than selected a
5 couple. And a lot of this is going to depend also on the
6 audit of the data. We may get some of the information we
7 want from the audit and therefore it would be to our satis-
8 faction.

9 MR. MILLER: I would like the Reporter to mark
10 as Matra Deposition Exhibit 4 a handwritten document which
11 appears to be a request -- a requisition from Mr. Matra to
12 Butler Analyses, Towson, Maryland, and it has a date of June
13 6th, 1980.

14 (Whereupon, the document
15 referred to was marked as
16 Matra Deposition Exhibit 4
17 for identification.)

18 BY MR. MILLER:

19 Q Mr. Matra, I show you a document that has been
20 marked as Matra Deposition Exhibit Number 4.

21 (Handing document to the witness.)

22 Have you seen that document?

eb92

1 A Yes, I wrote it.

2 Q It is in your handwriting?

3 A Yes.

4 Q Will you tell me the circumstances under which
5 you prepared this document?

6 A Yes. We want to get an improvement, what we feel
7 will be an improvement in our analysis and we wanted to
8 prepare more or less a preprocessor which we can now use in
9 conjunction with the NASTRAN program in running a seismic
10 analysis and also to get loads on floors.

11 Right now for example in the model that I see I
12 see a stick model in which, at each floor level, we may get
13 a moment and a shear and we take that moment on as direct
14 load where our containment building, for example, is a
15 cylindrical building with a thick wall all the way around
16 and you're going to get local moments. As this building
17 bends it is not going to bend as a stick model; you're going
18 to get local moments and shears all the way around.

19 And I think these type of loads should be put on
20 your building to design it and check it out. True, this
21 maybe is more than what has been done, but I think it is along
22 the lines that we want to pursue and run our analysis with.

4.222

eb93

1 We think it's a more accurate method of doing it.

C4

2 Q Do you know whether the applicant has conducted
3 that type of an analysis, the type that you just described
4 in your previous answer?

5 A You mean the applicant, myself?

6 Q No, no. I'm sorry. Consumers Power Company and
7 Bechtel.

4.244

8 A Has done a stick analysis. They show this in
9 their particular -- in the FSAR. They show-- In the seismic
10 they get the floor loads and the thing as a stick analysis
11 and then run it through, and then they apply this on a finite
12 element, if I'm not mistaken.

13 But that's not the real true loads that's going
14 to be on the structure. In other words if you look at the
15 building itself you're going to get -- locally you're going
16 to get-- The way they do it they get tension and compression,
17 take out your moment or compression loads and tension loads
18 on maybe one side of the building where you get a local
19 bending in these particular cases.

20 And this is what we're after here, to find out
21 what effect this has.

22 Q Is this analysis related at all to the soils

eb94

1 settlement issues, or is this something that is independent
2 really of that matter?

3 A I think it's independent. The soil settlement
4 problem is another problem, but I bought everything I had
5 over and this happened to be in there.

6 Q Fine.

7 And have you actually let the contract to Butler
8 Analysis?

9 A The contract has been let and completed and we're
10 now in the process of -- well, running and checking it, the
11 subroutine, and checking it out with an actual structure.

12 Q Does the NRC have any computer models that would
13 simulate the situation that you've described; that is, did
14 they use the analytical technique and type of model that you
15 described for the containment building or did they just use
16 a stick model also?

17 A Does the NRC use....I don't know what the NRC
18 really uses in this case. I just can't tell you what we've done.

19 Q Okay.

20 Did you check with Mr. Rinaldi, for example, be-
21 fore going ahead with this contract?

22 A Yes, we did.

eb95

1 Q And did he say anything to you about whether or
2 not the NRC had taken such an approach to seismic analysis
3 of the containment structure?

4 A I feel-- I don't know in general what his comment
5 was. He didn't stop us, or whether he felt-- I don't think
6 that this type of analysis has been run, let's put it that
7 way, not to my knowledge, unless it is someplace else in the
8 literature.

9 Q Mr. Matra, a little earlier today when you spoke J
10 about the Corps of Engineers and documents that it had sub-
11 mitted to the applicant, if we look at page 7 of the attach-
12 ment to the cover letter of Rinaldi Deposition Exhibit 16,
13 we see Item -- well, it's Subparagraph B about the middle of
14 page 7 and it reads as follows:

15 "The bottom of the borated tanks, being
16 flexible, could warp under differential settlement.
17 Evaluate what additional stresses could be induced
18 in the ring beams, tank walls and tank bottoms be-
19 cause of the settlement and compare with allowable
20 stresses. Furnish the computations on stresses,
21 including method, assumptions and adopted soil
22 properties in the analysis."

eb96

1 When you reviewed this document you reviewed it
2 before it was sent out to the applicant, did you not?

3 A I believe this document itself was sent from
4 George Lear, the Hydraulic and Geotechnical Engineering
5 Branch.

6 Q Yes, it was.

7 A And if I'm not mistaken -- I'm trying to recall
8 from memory now -- I might have been given this to read or
9 make some comments on, I don't really recall right now, but
10 to say whether anything looks wrong from our point of view.
11 But that's about it.

12 Q My question is did you see it before it was re-
13 leased to the public or released to Consumers Power?

14 A I don't think so. Maybe I did. I really don't
15 know.

16 Q All right.

17 With specific reference to Subparagraph B in the
18 middle of page 7, is that an observation that you as the
19 structural engineering contractor made to the NRC or was that
20 the Corps of Engineers' own idea?

21 A That was not my idea. It might have been the
22 Corps of Engineers for all I know. I don't know who made it.

eb97

1 Q Is the information that is called for in this Sub-
 2 paragraph B information which you must have in order to
 3 satisfy yourself with respect to the structural adequacy of
 4 the borated water storage tank?

5 A Well, if the tank itself and the foundation --
 6 let's put it this way -- would settle or warp in any way,
 7 then I could run an analysis on that tank and determine what
 8 effect this would have on the structure.

9 I didn't write this particular statement here.

10 Q So in fact as far as you are concerned all that
 11 was necessary for the borated water storage tank is that they
 12 should be loaded to monitor any effects on their supporting
 13 foundations and soils media? And I'm referring to page 12
 14 of Rinaldi Deposition Exhibit 12.

15 A That's what my statements were.

16 MR. MILLER: I would like the Reporter to mark
 17 as Matra Deposition Exhibit Number 5 two handwritten sheets
 18 which are undated. The top line on the first page has the
 19 number 1 encircled, and the word "Ducts."

20 [Faint, illegible text]

21 [Faint, illegible text]

22 [Faint, illegible text]

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(Whereupon, the document referred to was marked as Matra Deposition Exhibit 5 for identification.)

BY MR. MILLER:

Q Mr. Matra, I show you a document that has been marked Matra Deposition Exhibit Number 5 and I ask you first is that document in your handwriting?

(Handing document to the witness.)

A Yes, it is.

Q Will you tell me what these notes are?

A They're just some notes I was taking, or making, in this case with respect to cracks.

Q Let me ask you a few more questions.

The first circled number is 1 and it says "Ducts," and then it says, very faintly, "The applicant has stated," and then "We agree as long as...."

A "....as long as the pressure and tightness is not a requirement." That's what the applicant has stated.

Q And that's with respect to the duct banks. Is that correct?

A That's correct.

eb99

1 Q And is that kind of your preliminary notes with
2 respect to--

3 A -- with respect to some of the positions we've
4 taken. That's all it is.

5 Q All right.

6 A In other words as you're reading this we're not
7 going to remember everything so I just put them down.

8 Q If you would help me out on what follows the number
9 2 in a circle, would you just read that into the record for
10 me?

11 A It says:

12 "2. Cover letter and a paragraph
13 stating that the...."

14 Let's see.

15 "...improved base in the seismic reanalysis. We
16 agree with the applicant will perform seismic re-
17 analysis for Category I structures."

18 Q And that again refers to something we discussed
19 earlier; right?

20 A Yes.

21 Q Okay.

22 A In other words I'm writing myself notes. That's

eb100

1 all they are, because you don't always continuously work on
2 it. You may work on it and put it aside.

3 Q Sure.

4 There doesn't appear to be a numbered paragraph 3.
5 You then jump to numbered paragraph 4. Is that correct?

6 A Well, that's what it looks like, yes.

7 Q And this is:

8 "Procedure for crack repair assuming
9 that the analysis proves satisfactory."

10 Is that correct?

11 A Yes.

12 Q And there you want to know how they are going to
13 go about repairing--

14 A Are they going to leave these cracks there or are
15 they going to fill them up to prevent corrosion of the rebars
16 or what?

17 Q That would be desirable to repair them. Is that
18 right?

19 A Yes, or to do something. I just want to know
20 if anything--

21 Q Numbered paragraph 5 in this exhibit says:

22 "How is the applicant satisfied that the

eb101

1 cracks will not continue to propagate?"

2 A Well, that's a question to myself.

3 Q Right.

4 "6. Question outline in this report and
5 not given to applicant. Write in form of question."

6 A That's right. The questions that I have come up
7 with and not given to the applicant, let's give it to them in
8 some sort of a question.

9 Q Okay.

10 And this was prepared -- what? -- some time in
11 September or October of this year?

12 A Yes, some early part. I don't remember the exact
13 date. I didn't date it because I didn't think it was neces-
14 sary. I normally just throw it away.

15 MR. MILLER: I would like the Reporter to mark as
16 Matra Deposition Exhibit 6 for identification a number of
17 handwritten pages. The first one has a numbered paragraph 3
18 and the top line says "Inconsistencies of Information."

19 (Whereupon, the documents
20 referred to were marked as
21 Matra Deposition Exhibit 6
22 for identification.)

eb102

1 BY MR. MILLER:

2 Q Mr. Matra, I show you a document that has been
3 marked Matra Deposition Exhibit 6 for identification, and
4 I ask you whether that document is in your handwriting.

5 (Handing document to the witness.)

6 A Yes, it is.

7 Q And again, are these notes to yourself?

8 A They are notes to myself that I, when I was read-
9 ing-- In fact I think in this particular one they asked
10 questions and then they re-answered it, and I think it has
11 been answered since then. And that's okay.

12 Q All right.

13 It starts out:

14 "Inconsistencies of information.

15 Clarified in response to NRC request regarding
16 plant fill, Volume 1, page I-4, 4,000 pounds per
17 square foot on a spread footing...."

18 and so forth.

19 Then just before a line up there it says:

20 "Can eliminate action item."

21 Do that mean that you were satisfied?

22 A I think they did answer. They had a question later

eb103

1 on in one of these questions and answers from NRC in which
2 they did answer that so I said eliminate it to myself.

3 Q Okay.

4 A But at the time there was a question raised and it
5 wasn't answered. That's what it amounted to, the part that
6 I was reading, and then I finally got to it and it was
7 answered.

8 Q All right.

9 Now there's another reference to the duct banks
10 on the first page, and we've already discussed that subject
11 sufficiently.

12 On the next page, the first two numbered items
13 have references to pages and I take it that that is where is
14 found--

15 A Where the information is found. "Service re-
16 analysis will be conducted." This is part of those analyses
17 that I talked about, and that's the pages they occur at.

18 Q I see.

19 And that continues on down the page?

20 A That's correct. In other words first I asked the
21 question and then somehow you people either interpreted it
22 or the question was asked prior to this, and I'm just pointing

eb104

1 out where they're answered.

2 Q Okay.

3 On another page there are just three lines.

4 "Through cracks, effects on corrosion,
5 yield of...."

6 Is that "reinforcement"?

7 A Yes.

8 Q What do those words mean, do you recall?

9 A At this time we were looking at cracks and what
10 don't we want. We don't want through cracks. Are there any
11 effects on corrosion? I'm just asking myself basic questions
12 that I could-- More or less it's a thinking process with me.

13 Q And you were concerned about the yield point of
14 the reinforcement steel. Is that correct?

15 A That's correct, on the rebars.

16 Q And we talked about that earlier today.

17 A Yes.

18 Q Okay.

19 The next page has a horrendous series of equations.

20 A These are either one of two places. As you can
21 see, I've taken some and changed them. These were either
22 in the specs or in the FSAR. Right now I don't know which

eb105

1 one. I would have to go back and take a look at it. And I
 2 was comparing these to the ones that are in the spec to see
 3 are they the same. If they aren't what are the differences.

4 Q Which specification were you comparing them to,
 5 sir?

6 A It's the NRC Regulatory Guide.

7 Q 1.142?

8 A I don't know. Don't ask me about numbers. I
 9 would ask Frank and say "Give it to me again."

10 Q Okay.

11 The next to the last page of Exhibit 6 goes back
 12 to differential settlement, and this comment about the self-
 13 limiting effect.

14 Then there's a series of questions, how and why
 15 does this apply to the building structure.

16 A Yes.

17 Q And then right following that the words appear:

18 "Building settles - Wall cracks -

19 Structure weakens -"

20 A I'm just writing thoughts. Okay?

21 Q Okay.

22 Does that necessarily follow that because the wall

eb106

1 cracked the structure is weakened?

2 A Well, if a wall cracks it's not going to be better;
3 that's for sure.

4 Q Well, if the wall is not used-- If the concrete
5 portion of the wall is not used to provide tensile strength,
6 then the structure is not weakened as far as the tensile
7 load bearing capacity. Is that right?

8 A Could you tell me any time a wall is going to
9 crack it's only going to crack where it's not going to be
10 used in tension? I mean I'm making statements that if a
11 structure cracks there's a reason for it cracking. Why is
12 it cracking?

13 So when I'm writing these things I'm writing notes
14 basically to myself and if you want to publish them, publish
15 them but--

16 Q No, I just want to understand.

17 A It's my thinking process. I'm reading something;
18 I write something down. I say--

19 Q This doesn't necessarily represent the last
20 definitive word?

21 A No, I'm writing down things that I could pull back
22 and say Yeah, wait a minute. As I'm reading this thing I'm

ebl07

1 making my own notes.

2 MR. MILLER: Let's take a brief break so I can
3 review my papers. We're close to being finished.

4 (Whereupon, a brief recess was taken after
5 which the deposition again resumed.)

6 MR. MILLER: I just have a very few more ques-
7 tions, Mr. Matra.

8 BY MR. MILLER:

9 Q I would expect, Mr. Matra, that your overall con-
10 cern is that the structural integrity of the buildings at
11 the Midland site has not been impaired by, among other
12 things, the soil settlement that has taken place there. Is
13 that correct?

14 A That's correct.

15 Q And if the applicant can show in fact they retain
16 their integrity and ability to withstand the loads, that
17 that's the bottom line as far as you're concerned?

18 A I'm only looking at it from a strength and
19 structural point of view. Stiffness.

20 Q Now have you and Dr. Huang and Mr. Rinaldi dis-
21 cussed preparation for the evidentiary hearings in the soils
22 proceeding?

ebl08

1 A Other than that fact that we're going to be at
2 the hearing?

3 Q Yes.

4 A And the problems we have. What you have here is
5 what we discussed.

6 Q Has there been any discussion as to who is going
7 to testify on which subject matters?

8 A I think as far as if it comes to testifying it
9 will be either myself and/or Dr. Huang or both of us, as far
10 as I know.

11 Q That about covers the possibilities.

12 A Right. It depends on-- Dr. Huang is an expert,
13 I mean an expert in his particular field and has a lot more--

14 Q What is his specific field, do you know?

15 A Well, it is structures. He has a degree in civil
16 engineering. He has worked in the Martin Company. He has
17 also worked in the building part at Michigan. He went to
18 the University of Michigan. I think one of his teachers, if
19 I'm not mistaken, was even Timoshenko, so he knows structures
20 like the back of his hand and is very fluent in-- Well,
21 you'll meet him so you can judge for yourself.

22 Q Did you know Dr. Huang at the Martin Company as

eb109

1 well?

2 A Yes, I did. I worked with Dr. Huang for at least
3 20 years.

4 Q I see.

5 Did the two of you move from the Martin Company
6 to the Naval Surface Weapons Center at the same time?

7 A That's right.

8 Q Have you received any -- oh, directions from the
9 NRC that any review you undertake with respect to Midland
10 has to be done with particular care because there's a public
11 hearing involved?

12 A I don't know-- You're talking about-- I don't
13 know what you mean by "direction."

14 Q Has anyone ever commented to you that this is --
15 that this review has got to be done more rigorously or more
16 carefully or has to be better documented because there's a
17 public hearing involved?

18 A Not that-- I mean they just tell me to perform a
19 task and I tried to do it the best I could. I felt that at
20 times maybe there's a possibility of a hearing I think in
21 anything that you do along these particular lines, so you
22 prepare yourself accordingly.

eb110

1 Q Okay.

2 Have you had any conversations with Mr. Jones or
3 Mr. Paton or Mr. Olmstead of the NRC legal staff prior to
4 preparation for today's deposition?

5 A Well, I didn't even know I was going to be--

6 Q They just told you to report here with your docu-
7 ments. Is that right?

8 A We were told there's a possibility and the fact
9 that -- and we were given certain depositions that were
10 given by I believe you people or whoever had given them, and
11 I looked them over.

12 Q Whose depositions did you look at? Mr. Dhar's.

13 A Darl Hood's.

14 Q I see.

B5

15 A That's the one I was looking at. There were others
16 involved. I didn't read every word.

17 MR. MILLER: Okay. No further questions. Thank
18 you very much.

19 (Whereupon, at 2:25 p.m., the taking of the
20 deposition was concluded.)

21

22

Subscribed and sworn to before me
this _____ day of _____, 19____. *Ac Federal Reporters, Inc.*

Notary Public


My Commission Expires _____

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CERTIFICATE OF NOTARY PUBLIC AND REPORTER

I, William R. Bloom, the officer before whom the foregoing deposition was taken, do hereby certify that the witness whose testimony appears in the foregoing deposition was duly sworn by me; that the testimony of said witness was taken by me by Stenomask and thereafter reduced to typewriting by me or under my direction; that said deposition is a true record of the testimony given by said witness; that I am neither counsel for, related to, nor employed by any of the parties to the action in which this deposition was taken; and, further, that I am not a relative or employee of any attorney or counsel employed by the parties hereto, nor financially or otherwise interested in the outcome of the action.


Notary Public in and for the
District of Columbia

My commission expires 14 August 1985