

1 MR. SOPER: I would like to ask to have  
2 the Exhibit being handed out marked as State 199, I  
3 think is where we are.

4 JUDGE FARRAR: No, 200.

5 MR. SOPER: I think I'm being corrected.  
6 Is that right?

7 MR. TURK: 199.

8 DR. SOLER: This is 199.

9 JUDGE FARRAR: It should be 200.

10 MR. SOPER: 200, I'm sorry.

11 (STATE EXHIBIT-200 MARKED.)

12 MR. TRAVIESO-DIAZ: Mr. Soper, I see  
13 that the document has a number of sections in  
14 Japanese characters. Can you provide a  
15 translation?

16 MR. SOPER: I thought everyone here  
17 could read that.

18 MR. TRAVIESO-DIAZ: I have many  
19 limitations and this is one of them.

20 Q. (By Mr. Soper) Dr. Singh, do you have  
21 Exhibit 190 before you, sir?

22 JUDGE FARRAR: 200.

23 Q. (By Mr. Soper) Excuse me. I still have  
24 mine marked 199. Exhibit 200?

25 DR. SINGH: Is this the flier that you

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1 passed out, is that the document you're referring  
2 to?

3 Q. It says on the front page, "Large-Scale  
4 Three-Dimensional Shaking Table."

5 A. Yes. I have it in my hands, yes.

6 MR. TRAVIESO-DIAZ: Mr. Chairman, before  
7 we go on, I am going to have a standing objection  
8 on all questions on this Exhibit given that half of  
9 it you can't understand what it says and we don't  
10 know what meaningful information may be in the  
11 Japanese portion of it and that he may be asking  
12 the witness to talk about.

13 JUDGE FARRAR: Can't we safely assume,  
14 just like the documents you get up in Canada that  
15 have French on one side and English on the other,  
16 that we've got a column here that is in Japanese  
17 and a column that's in English?

18 MR. TRAVIESO-DIAZ: Mr. Chairman, that  
19 may be the case, but I'm not willing or prepared to  
20 make that assumption because I don't really know  
21 what is in the document. Given that half of it is  
22 in foreign language, I don't know.

23 JUDGE FARRAR: We'll note your objection  
24 and keep going.

25 Q. (By Mr. Soper) And at the bottom of the

1 front page appears Public Works Research Institute.  
2 Are you familiar at all with the Public Works  
3 Research Institute, Dr. Singh?

4 DR. SINGH: No, I am not.

5 Q. Are you aware of the existence of this  
6 particular -- well, let me ask, have you had a  
7 chance to look through this document?

8 DR. SINGH: I am looking through this as  
9 you are speaking to me.

10 Q. Do you want to take just a moment and  
11 look through it?

12 DR. SINGH: If I'll need to read further  
13 I will -- let's, to expedite, go ahead, ask me the  
14 question. If I need to read, I will read it.

15 Q. Does it appear to you, sir, to be a  
16 brochure describing the shake table that is  
17 available at this particular institution?

18 DR. SINGH: Depending on the date of  
19 this document it may or may not be available, but  
20 they claim in this flier that there is a large  
21 shake table on which they test large structures,  
22 but they are all anchored or fixed structures.  
23 That's what I've gathered so far reading this.

24 Q. And anchored or fixed, in what sense do  
25 you mean?

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1 DR. SINGH: Like a bridge is fixed, like  
2 a building is anchored or fixed. That's what it  
3 seems to say as far as I've read it.

4 Q. And what are you reading that causes you  
5 to conclude that?

6 DR. SINGH: Well, I can read it to you.  
7 There's a few sentences which are available in  
8 English. "The schematic illustration shows," I'm  
9 reading from this flier, "The schematic  
10 illustration shows an experiment of a bridge  
11 foundation with its subsoil, where the response of  
12 the bridge piers and the superstructure are  
13 numerically computed and then applied to the  
14 foundation model experimentally, whereas the  
15 reaction force is measured at the foundation and  
16 fed back to the computation."

17 I see diagrams in here. I see no  
18 evidence of any claim in this flier that they would  
19 compute and come out with meaningful results for  
20 free-standing large structures.

21 Q. If I could refer you to the third page,  
22 sir, at the top left where it says Table size, with  
23 the width of 8 meters?

24 DR. SOLER: You've got to go the other  
25 way to the specification page.

1 DR. SINGH: Oh, the other way.

2 DR. SOLER: That page.

3 DR. SINGH: Okay.

4 Q. (By Mr. Soper) The page number, I  
5 guess, would actually be -- this doesn't have a  
6 page number. It's the third page of the Exhibit.  
7 Are you with me, sir?

8 DR. SINGH: I think I found the page  
9 that you're referring to.

10 Q. At the top it provides table size, 8  
11 meters by 8 meters; do you see that?

12 DR. SINGH: Yes, I do.

13 Q. And loading capacity rated at 100 tons  
14 force?

15 DR. SINGH: Yes.

16 Q. And maximum of 300 tons force?

17 DR. SINGH: Yes.

18 Q. Now, those specifications, the table  
19 size and the loading capacity, this, of course,  
20 would handle things I think larger than what you  
21 would consider as small equipment. Would you  
22 agree?

23 DR. SINGH: Yes.

24 Q. And, sir, do you know from your own  
25 expertise and knowledge in mechanical engineering

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1 that in Japan there are shake tables larger than  
2 this even? You're aware of that, are you not, sir?

3 DR. SINGH: I'm not aware of that.

4 Q. And are you aware that the Public Works  
5 Research Institute, in fact, is building itself a  
6 larger shake table than this?

7 DR. SINGH: I don't even know the  
8 institute, let alone what they are building.

9 Q. I see. So you don't have any knowledge,  
10 in your years of experience in mechanical  
11 engineering, of shake tables of this size; is that  
12 right?

13 DR. SINGH: I have not worked with shake  
14 tables of this size.

15 Q. How about the awareness of their  
16 existence?

17 DR. SINGH: I could not -- I would only  
18 be speculating. I'm not aware of their existence.

19 Q. Now, I think you told us that in '97 or  
20 '98 the NRC changed their mind about shake table  
21 tests?

22 MR. TRAVIESO-DIAZ: Objection. This is  
23 a mischaracterization of the testimony.

24 DR. SINGH: I did not say that.

25 MR. SOPER: Well, my question is --

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1 DR. SINGH: I did not say that.

2 Q. (By Mr. Soper) Okay. Then my next  
3 question is, did they at some period in time change  
4 their mind about shake table tests?

5 DR. SINGH: I cannot speak on their  
6 behalf.

7 MR. TRAVIESO-DIAZ: Objection.

8 Q. (By Mr. Soper) When did they last  
9 inquire from you as to any inquiry regarding shake  
10 table tests?

11 DR. SINGH: Not in recent years. I  
12 think the only time the shake table or any  
13 experimental discussions that occurred, it occurred  
14 in the brief episode that we have gone over before.

15 Q. And those documents I think are all  
16 dated in -- I take it you mean the documents shown  
17 in Exhibit 197?

18 DR. SINGH: That is correct.

19 Q. You are aware, sir, are you not, Dr.  
20 Singh, that Dr. Luk conducted studies in this  
21 matter of free-standing casks on behalf of the NRC?

22 DR. SINGH: Your question is too  
23 imprecise for me to answer. What do you mean by  
24 studies of this nature?

25 MR. TURK: I would ask for the question

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1 to be restated. I don't understand it either.

2 MR. TRAVIESO-DIAZ: I'd object to the  
3 form, but the witness did himself.

4 Q. (By Mr. Soper) Well, actually what I  
5 had tried to do is repeat word for word Dr.  
6 Turk's -- or excuse me, Mr. Turk's representation.  
7 And let me just read it from page 6757 of the  
8 transcript.

9 "As Dr. Luk's testimony will make clear  
10 today, he has been conducting a study on behalf of  
11 the NRC's Office of Nuclear Regulatory Research  
12 related to the stability of free-standing casks at  
13 Independent Spent Fuel Storage installations and he  
14 has also modeled a site specific cask pad and soil  
15 foundation model with respect to the PFS facility."

16 You are aware of that, are you, sir?

17 DR. SINGH: Yes. The way you phrased  
18 that I can answer that. The way you phrased before  
19 I could not answer the question.

20 Q. I see. I think this is much better, I'm  
21 glad you asked the question.

22 Do you have any recollection of talking  
23 with Dr. Luk about shake table tests for the PFS  
24 site?

25 DR. SINGH: Not specifically shake table

1 test. He had called me I believe once to ask about  
2 the availability of a cask. I thought it was for  
3 destructive missile and other impact testing. But  
4 regardless, I informed him that a cask that Holtec  
5 had built as a prototype, a HI-STAR cask, which is  
6 really the cask used in transport, was available  
7 from Exelon, at the time I guess they were  
8 Commonwealth Edison, and he could contact them or  
9 his business people could contact them for the  
10 cask. That's the only conversation I recall with  
11 Vincent Luk.

12 Q. Let me read you Dr. Luk's testimony and  
13 then I'll ask you a question about it. I'm reading  
14 from page 6966, May 6, 2002.

15 MR. GAUKLER: Would you allow us to get  
16 there first?

17 DR. SINGH: I need to see it.

18 MR. SOPER: We'll pass that on if it's  
19 helpful.

20 MR. TURK: What page are you looking at,  
21 Mr. Soper?

22 MR. SOPER: I'm looking right now at  
23 page 6966.

24 DR. SOLER: We didn't get that page.

25 MR. SOPER: I didn't give you that page?

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1 MS. NAKAHARA: Sorry. Off the record.

2 (Discussion held off the record.)

3 MR. SOPER: This is not going to be a  
4 complex question. Your Honor, I am just going to  
5 read one answer of Dr. Luk and then ask Dr. Singh a  
6 question.

7 JUDGE FARRAR: What day's transcript is  
8 this?

9 MR. SOPER: May 6, 2002.

10 JUDGE FARRAR: That's our problem, this  
11 document says May 7th.

12 MR. SOPER: Well, I have another  
13 question for May 7th as well.

14 MR. TRAVIESO-DIAZ: I would reserve any  
15 objections depending on the nature of the question.

16 JUDGE FARRAR: Why don't we see if the  
17 question is simple enough, let's try it and we've  
18 got a copy here of a May 6 and 7th transcript.

19 MR. SOPER: Reading from page 6966, the  
20 question to Dr. Luk was, "Dr. Luk, on the question  
21 about the shaking table, I take it that it" --  
22 excuse me. Let me reread it.

23 "Dr. Luk, on the question about the  
24 shaking table, I take it that it is -- there's an  
25 interruption -- excuse me. Let me start again and

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1 explain what I'm doing here.

2 The question is stopped and there is a  
3 pause. I don't know how to do that in reading it,  
4 but let me try it again.

5 JUDGE FARRAR: Who is the questioner,  
6 me?

7 MR. TURK: Judge Farrar.

8 MR. SOPER: It is, Judge. I'm sorry.

9 MR. TURK: It was not so much a pause as  
10 a studied consideration of the question.

11 JUDGE FARRAR: Exactly what I intended.

12 Q. (By Mr. Soper) Judge Farrar asked Dr.  
13 Luk on the question about the shaking table, "I  
14 take it, is that a real table, not a model table?"

15 "Dr. Luk: At the very start of this  
16 project I visited UC Berkeley as well as UC San  
17 Diego. Both of those have sizable shake tables,  
18 but the one I use at Berkeley, if you don't mind me  
19 saying, is a little old. So we are trying to focus  
20 on the one at UC San Diego, but they need some  
21 upgrade before they can conduct any tests for the  
22 cask. And I think the latest information I got is  
23 that UC San Diego actually filed a proposal to the  
24 National Science Foundation to do the upgrades, and  
25 they did ask me for a letter of recommendation. So

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1 I included that. So hopefully that facility will  
2 be enhanced so that, you know, when the appropriate  
3 time comes we can conduct this kind of shake table  
4 test on the cask."

5 Now, do you recall that testimony, Dr.  
6 Singh?

7 DR. SINGH: No, I don't. I read a good  
8 bit of Vincent Luk's testimony, but I did not -- I  
9 skipped over that piece. Thank you for reading it  
10 to me.

11 Q. I see. So Dr. Luk did not mention to  
12 you anything about conducting a shake table test?

13 DR. SINGH: You know, I don't recall his  
14 phone call. There was only one phone call, I  
15 believe, in the context of the shake table. I  
16 recall him asking if a cask was available, but  
17 that's about all I remember. And he also asked if  
18 I -- the more I think about it, he also asked if I  
19 had any limiting technical work that was in the  
20 public domain that he could have to read. I  
21 believe I sent him a paper that we had published at  
22 the time. But that's about all I remember. I do  
23 not remember him explaining to me what he was going  
24 to do with the cask.

25 Now, realize that I get phone calls from

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1 people at national laboratories who are seeking to  
2 develop projects to work for the government all the  
3 time and they are making proposals to the NRC and  
4 other agencies all the time. So this was one of  
5 those phone calls.

6 Q. Now, didn't Dr. Luk call you on the  
7 phone and, in fact, ask you to provide a cask so  
8 that he could do a shake table test?

9 DR. SINGH: That was -- the purpose of  
10 his call was to ask if a cask was available. To  
11 what he would do with it, I don't remember. I  
12 don't remember if he discussed it. I don't  
13 remember if he talked about shake tables at all.

14 Q. And did you ever get back to him on that  
15 request?

16 DR. SINGH: I answered him I think in  
17 the same phone call. I told him that there was a  
18 shake -- that there was a -- strike that. I told  
19 him there was a cask available that Commonwealth  
20 Edison at the Dresden station was using to teach  
21 their personnel how to handle casks. That cask was  
22 anatomically similar to our certified HI-STAR 100,  
23 and he could contact them or anyone else, his  
24 business people could contact them to get hold of  
25 that cask.

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1 Q. Now, are you saying when he called you  
2 on the phone and asked you to provide a cask you  
3 don't remember whether he said it was for a shake  
4 table or he did not say that it was for a shake  
5 table?

6 DR. SINGH: I don't remember what it  
7 was.

8 Q. So he might have asked you for a cask to  
9 run a shake table test?

10 MR. TURK: Objection.

11 DR. SINGH: He may have told me --

12 MR. TRAVIESO-DIAZ: First, we have gone  
13 over the ground three times already, and secondly,  
14 this is speculative at this point.

15 DR. SINGH: Anything I tell you would be  
16 based on my memory and I can't do any better.

17 JUDGE FARRAR: Objection, overruled.  
18 Keep going.

19 MR. SOPER: That's all I had, your  
20 Honor. Thank you very much.

21 JUDGE FARRAR: Can we finish these  
22 witnesses in the next two minutes? Is there any  
23 redirect by the Applicant?

24 MR. TRAVIESO-DIAZ: I have two  
25 questions, if I may.

1 JUDGE FARRAR: Okay.

2

3

REDIRECT EXAMINATION

4

BY MR. TRAVIESO-DIAZ:

5

Q. Question number one. In response to a

6

series of questions to you by Mr. O'Neill, and this

7

for you, Mr. Soler, you said that your evaluation

8

for the potential problems with the SAP 2000 runs

9

that Dr. Khan performed has shifted such that your

10

view is that this perhaps a useful program for

11

purposes of performance beyond what is -- beyond

12

what its capabilities are. Was that causing the

13

results you observed; is that correct?

14

DR. SOLER: That is correct. And May I

15

elaborate on that a little bit?

16

Q. Let me just ask you a follow-up question

17

on both. You also said that he asked you

18

specifically about the choice of input parameters

19

that Dr. Khan used in his testimony. In your

20

answer in which you say that your present view is

21

that the main difficulty or the difficulty is with

22

the limitations of the program, you are not

23

implying that you believe that his choice of input

24

parameters that Dr. Khan used was appropriate, do

25

you?

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1 DR. SOLER: No. I believe I did include  
2 they were unrealistic, or I should have. I believe  
3 his low values of stiffness, 1 million pounds per  
4 inch, his low values of damping, 1 percent, do not  
5 accurately reflect the true behavior in this  
6 situation. Now --

7 Q. Please tell me.

8 DR. SOLER: Now, to elaborate a little  
9 further on your first question, which I didn't get  
10 the chance to do when directly asked, there are a  
11 number of runs performed by Dr. Khan, and many of  
12 them actually support our results rather than  
13 refute the results. When he used large enough  
14 values of stiffness and large enough values of  
15 damping to accurately predict a simulation that  
16 resulted in small deflections, I would view his  
17 results as confirming some of the analyses that we  
18 did.

19 It's only when he used input values that  
20 led the computer program to try to simulate a large  
21 deflection or rotation phenomena that he ran into  
22 trouble. So, therefore, it was us running SAP 2000  
23 with his input data for values of stiffness and  
24 damping that might be appropriate would give  
25 perfectly reasonable results, and I believe that we

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1 discussed this at length during his deposition.

2 Q. Dr. Soper would not let you answer the  
3 question -- Mr. Soper wouldn't let you answer the  
4 question as to elaborate on why you used a run for  
5 a single case of the various ones that Dr. Khan  
6 used. Why did you run only one case and later on  
7 run 20?

8 DR. SOLER: The thing we were looking  
9 for was to basically try to find out whether or not  
10 a 40-foot movement was reasonable. To take any of  
11 his other cases, say, for instance, cases 5 through  
12 11 -- I'm looking at the wrong table, pardon me.  
13 Referring to Table 3, taking values that were  
14 similar in the small deflection range, we would  
15 have simply said, Well, this value confirms what  
16 we've asked. Now, I believe that if you plot some  
17 of his data where he has results in which only one  
18 parameter is varied from among the set of data and  
19 you plot that parameter versus his displacement,  
20 you find you get a characteristic curve which  
21 indicates a nonconvergence. The deflection is very  
22 large for what I'll call the unrealistic case, yet  
23 when the parameters become more realistic the  
24 deflection becomes smaller and relatively  
25 insensitive to the input value for that particular

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1 parameter.

2 Now, that's a classic sign of a  
3 nonconverging solution, and that's what led us to  
4 believe, having done no other calculations, that it  
5 could be a convergence problem. Because it was  
6 only later when we focused in on what I'll call the  
7 offensive solution that he developed that we began  
8 to see that using his same parameters we could not  
9 duplicate his result with the program that we used.  
10 And I would surmise, but I can't prove  
11 definitively, that we wouldn't have reproduced  
12 these results with any other program capable to do  
13 large deflections.

14 The reason we focused primarily on this  
15 case is because, in my opinion, the state Has built  
16 -- their whole case rests on this one run, that  
17 somehow you're going to get these immense moments  
18 and you really don't know what's going on.

19 MR. TRAVIESO-DIAZ: Thank you, Dr.  
20 Soler. That's all I have.

21 JUDGE FARRAR: Mr. O'Neill, can we stop  
22 the ball from bouncing at this point?

23 MR. O'NEILL: Yes, we can.

24 JUDGE FARRAR: Thank you. Mr. Soper?

25 MR. SOPER: We're finished for right

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1 now.

2 JUDGE FARRAR: Then we can excuse these  
3 witnesses for now. Before we go to lunch we have  
4 two documents, State 197 and Applicant PFS 225 that  
5 have "Confidential" stamps on them. And I'm  
6 advised that our secretary gets nervous that even  
7 if we say in the transcript that they're not  
8 confidential, people there will lock them up just  
9 out of an abundance of caution. Let's go off the  
10 record for a minute.

11 (Discussion held off the record.)

12 JUDGE FARRAR: Back on the record. I'm  
13 advised, I think, that the Exhibits that have been  
14 admitted or submitted have not gone anywhere yet.  
15 Can we get a, before we actually admit it, a new  
16 version of PFS 225 that would just have the  
17 "Company Private" information stricken off the  
18 bottom? I'm assuming that that's on there just  
19 because it's always on your cover sheets, or is  
20 there anything in here?

21 DR. SINGH: No, we will release it here.

22 JUDGE FARRAR: Now, remembering our  
23 conversation of a few weeks ago, I don't want you  
24 to release anything you don't have to, but this  
25 strikes me as a litigation document.

1 DR. SINGH: Yes.

2 MR. DELLIGATTI: Your Honor, it will  
3 need to be off of every page to stop the problem.  
4 If it's on any page, they will lock up that page.

5 JUDGE FARRAR: Well, on 225 it's only on  
6 one. Well --

7 DR. SINGH: We can get it sanitized.

8 MR. TRAVIESO-DIAZ: If I can make an  
9 offer. Dr. Soler will be here on Saturday, you'll  
10 recall. Maybe at this time we can submit a clean  
11 copy if it's agreeable to Holtec.

12 DR. SINGH: It's agreeable to us.

13 JUDGE FARRAR: Okay, thank you. And  
14 then on State 197, which is PFS Confidential, can  
15 you all consult with your clients and see if that  
16 needs to remain that way again? If it does, that's  
17 fine, but if it doesn't.

18 MR. TRAVIESO-DIAZ: But this doesn't  
19 apply because this is a historic document as  
20 opposed to something that is now. So it will have  
21 to be recreated without a stamp.

22 MR. TURK: It could be lined through.

23 MR. TRAVIESO-DIAZ: Or it could be lined  
24 through, yes.

25 JUDGE FARRAR: Line it through and put

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1 some someone's initials on it, the initials and  
2 date or something. That way you preserve the  
3 historical character, but also relieve the people  
4 back home, relieve their anxiety.

5 MR. TURK: We have one more.

6 MR. SOPER: Before we break I would just  
7 offer State Exhibit 200. I don't believe I did  
8 that.

9 JUDGE FARRAR: Let me guess.

10 MR. TRAVIESO-DIAZ: Mr. Chairman, if  
11 there is such a thing as a strong objection, I will  
12 put a strong objection to the admission of this  
13 document.

14 JUDGE FARRAR: I'm getting very good at  
15 this.

16 MR. O'NEILL: Your Honor, I renew the  
17 objection to it too.

18 JUDGE FARRAR: Somehow I knew that was  
19 coming. I take it the objection is these people,  
20 these witnesses don't know anything about it.

21 MR. TRAVIESO-DIAZ: There's three  
22 objections that I can think of off the top of my  
23 head. Number one, the documents are in a foreign  
24 language, I don't know what it says. Second, the  
25 witnesses have never seen this document before.

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1 And third, they cannot authenticate the truth of  
2 anything that's contained. So if Mr. Soper wants  
3 to have this document admitted into evidence, he  
4 better bring somebody from Japan.

5 MR. SOPER: We have another witness that  
6 will identify it.

7 JUDGE FARRAR: All right. Then we will  
8 deny its admission now. It's five of 1:00. Let's  
9 be back at 2:00 and we'll have Dr. Arabasz again.  
10 Mr. Turk, you will -- let's see if we can't finish  
11 Dr. Arabasz today.

12 MR. TURK: We're coming back at two  
13 o'clock?

14 JUDGE FARRAR: Two o'clock. Let's get  
15 to the point as quickly as we can on future  
16 questions.

17 (Noon recess taken.)

18 (STATE EXHIBITS-201 THROUGH -209  
19 WERE MARKED.)

20 JUDGE FARRAR: We're back for the  
21 afternoon session.

22 And, Ms. Chancellor, thank you for the  
23 good idea of having the reporter mark all of your  
24 exhibits for later, having them premarked for  
25 identification.

1 MS. CHANCELLOR: You're welcome,  
2 Your Honor.

3 JUDGE FARRAR: That will help us.  
4 Then, if there are no other matters,  
5 we're ready to resume Mr. Turk's cross-examination  
6 of Dr. Arabasz.

7 If I forget, counsel will remind me.  
8 When we finish this evening, let's have an  
9 off-the-record discussion about facility needs in  
10 Rockville, and any of the Staff people who have  
11 been involved in these before are welcome to help  
12 us talk about how we get everybody equipped there.

13 MS. CHANCELLOR: Thank you, Your Honor.

14 JUDGE FARRAR: Go ahead. Mr. Turk.

15 MR. TURK: Thank you, Your Honor.  
16 Actually, just for interest's sake, I might mention  
17 that Dr. Arabasz and I had an interesting  
18 discussion off the record before we started and  
19 discovered our ancestors come from the same small  
20 area in Europe. Some of our ancestors.

21

22 RESUMED CROSS EXAMINATION

23 BY MR. TURK:

24 Q. Dr. Arabasz, before we broke this  
25 morning, we were talking about that one portion of

1 the SER supplement that is discussed in your  
2 testimony, and I'd like to ask you along the same  
3 line -- maybe you can confirm to me -- when I go  
4 back and look at your prefiled testimony, I see  
5 only two other references to the SER supplement.  
6 And the ones -- the references that I see appear on  
7 page 9 in the first paragraph in Answer 11. That's  
8 the first reference where you say, "The Staff's  
9 reliance on DOE-STD-1020-94 in its December 1999  
10 PSER, its September 2000 FSER and its December 21,  
11 2000 SSER" --

12 A. Yes.

13 Q. That's probably a typo. That should be  
14 December 21, 2001?

15 A. Yes, that appears to be a typo.

16 Q. Okay. That's the one reference that I  
17 found. And then again at the top of page No. 11 at  
18 the end of your Answer No. 12, you again refer to  
19 the 1020 standard from the DOE, and you say that  
20 "The new DOE-STD-1020-2001 was released before the  
21 Staff issued the SSER, yet the Staff makes no  
22 mention of it and still relies on the 1994  
23 version."

24 Those are the two references that I find  
25 to the Staff's SSER No. 2 in your testimony, apart

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1 from the paragraph that we discussed before we  
2 broke.

3 A. Yes. And there would also be the one at  
4 the bottom -- I'm reading down at the bottom of  
5 page 3. That says, "The Staff's continued reliance  
6 on the same rationale in its SSER..."

7 Q. And what --

8 A. And where -- let's see. The last -- the  
9 bottom of page 3 in item 7 refers to the SSER  
10 defined in item 5 as the version of December 21,  
11 2001.

12 Q. Okay. And that's it? Those are the  
13 only references to the SSER?

14 A. I would have to go through line by line,  
15 but I'll accept your representation.

16 Q. Incidentally, the one that you just  
17 mentioned on the bottom of page 3, that's paragraph  
18 No. 7 in this testimony, do I understand this  
19 paragraph correctly to be these are concerns that  
20 are addressed by the State's engineering experts,  
21 not by you? The sentence reads the Staff is  
22 continuing to rely on the same rationale "despite  
23 many concerns raised by the State regarding  
24 non-conservatism in the engineering design of the  
25 PFS facility."

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1           A.       The rationale referred to in the first  
2 part of the sentence simply or, in effect, relates  
3 to the bullet reasons, the reasons that are  
4 bulleted in the various versions of the SSER --  
5 excuse me, in the various version of the SER.

6           Q.       For instance, if we look at Staff  
7 Exhibit PP, those are the bullets at the bottom of  
8 page 33, continuing on to the top of page 34?

9           A.       Correct.

10          Q.       Okay. But the nonconservatism in  
11 engineering design that you refer to in that  
12 paragraph No. 7 on page 3 of your testimony, what  
13 you're referring to there is the testimony of other  
14 State experts?

15          A.       Correct.

16          Q.       You're not offering an opinion yourself  
17 as to whether these engineering design concerns are  
18 valid or not, you're deferring to them?

19          A.       Correct.

20          Q.       Okay. It's correct, then, that if we  
21 look at Staff Exhibit PP, starting on the middle of  
22 page 18, there's a discussion of slip tendency?

23          A.       I see that.

24          Q.       That's not addressed in your testimony?

25          A.       No, it is not.

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1 Q. On the next page, page 19, the issue of  
2 distributions of site-to-source distances, that's  
3 not addressed in your testimony?

4 A. Correct.

5 Q. Maximum magnitudes, starting at the  
6 bottom of page 19, continuing as bracketed into  
7 page 20, that's not addressed in your testimony?

8 A. Correct.

9 Q. At the bottom of page 21 and all of page  
10 22, revisions by Geomatrix to its ground motion  
11 modeling 2001, that's not addressed in your  
12 testimony?

13 A. Correct.

14 Q. The table on page 23 which lays out the  
15 changes in the design ground motions, that's not  
16 addressed in your testimony?

17 A. Correct.

18 Q. Nor at the bottom of the page where  
19 there's a discussion of the process used to  
20 estimate ground motion, continuing on to the next  
21 page where there's a further discussion of the  
22 Geomatrix modeling, that's not addressed in your  
23 testimony?

24 A. Correct. And if I might add, I was  
25 aware through this process of the evolution of

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1 these issues and did not judge that they materially  
2 changed the arguments that I had put forward in the  
3 December 21 response to Applicant's motion and then  
4 also in preparing this prefiled testimony.

5 Q. I'll come to that.

6 By the way, you mentioned December 21.  
7 I think it was the December 7th response by the  
8 State?

9 A. Excuse me.

10 Q. Page 25 of the table that compares  
11 ground motion modeling and soil velocity profiles,  
12 that discussion is not addressed in your testimony,  
13 nor is the following discussion on site response  
14 effects, continuing on to page 26, correct?

15 A. Correct.

16 Q. The bottom of page 26, continuing on to  
17 the top of page 27, through most of page 27 where  
18 the Staff discusses the peak ground accelerations  
19 and the ground model attenuation model, that's not  
20 addressed in your testimony?

21 A. Correct.

22 Q. In essence, the Staff's discussion which  
23 in this SER supplement reckons that the PFS PSHA  
24 formed by Geomatrix, the Staff consideration that  
25 that PSHA is conservative, as presented in all

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1 these bracketed sections of the SSER, that's not  
2 addressed in your testimony?

3 A. Correct.

4 Q. Instead, what you focused upon were the  
5 bullets, as you mentioned previously?

6 A. I satisfied myself with the analysis  
7 performed by or for the Staff that the Applicant's  
8 ground motion analyses had been significantly  
9 scrutinized and confirmed my judgment about the  
10 adequacy of the Staff's P-S-H-A results -- excuse  
11 me, of the Applicant's P-S-H-A results.

12 Q. If the Staff is correct as its testimony  
13 in its SER supplement which, again, Staff Exhibit C  
14 as well as Staff Exhibit PP, if the Staff is  
15 correct that the Geomatrix PSHA for the site is  
16 conservative, would that, in effect, mean that when  
17 Geomatrix is presenting a ground motion as being  
18 the 2,000-year ground motion, in effect, they may  
19 well be presenting a ground motion for a larger  
20 return period such as a 2500 or a 3,000 or a 4,000  
21 or some number higher than the 2,000-year return  
22 period, correct?

23 MS. CHANCELLOR: Point of clarification.  
24 Is this a hypothetical question?

25 MR. TURK: Yes, it's a hypothetical

1 question. The question began with an if, if the  
2 Staff is correct.

3 THE WITNESS: Again, characterizing this  
4 hypothetical question with a capital H, that logic  
5 would follow.

6 Q. (By Mr. Turk) You yourself consider the  
7 PFS PSHA performed by Geomatrix to be conservative,  
8 do you not?

9 A. I can't recall words to that effect. I  
10 would not be -- well, I will see if I'll be  
11 surprised, but to the best of my memory, I do not  
12 recall that characterization.

13 MR. TURK: May I have a moment,  
14 Your Honor?

15 JUDGE FARRAR: Yes.

16 (A discussion was held off the record.)

17 Q. (By Mr. Turk) Dr. Arabasz, in April of  
18 1999 you prepared two documents, did you not, with  
19 respect to the PFS site, one document entitled  
20 Fault Evaluation Study and Seismic Hazard  
21 Assessment (Geomatrix, February 1999)--And Other  
22 Companion Reports? That's a document dated April  
23 21, 1999 authored by Walter J. Arabasz and James C.  
24 Pechmann. Do you recall authoring a document by  
25 that name on that date?

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1 A. Yes, I do.

2 Q. And on the same date you also authored a  
3 document, again with Dr. Pechmann, entitled "Issues  
4 and Perspectives Relating to Hazard Assessment of  
5 Earthquake Ground Shaking and Surface Fault  
6 Displacement for Licensing the Private Fuel Storage  
7 Facility, Skull Valley, Utah," again dated April  
8 21, 1999. Do you recall that?

9 A. Correct. Yes, I do recall that.

10 Q. Do you have a copy of those documents  
11 with you?

12 A. No, I do not.

13 MR. TURK: May I approach, Your Honor?

14 JUDGE FARRAR: Yes.

15 MR. TURK: And for the record, let me  
16 indicate this is a document which had previously  
17 had certain portions redacted by the State of Utah  
18 which they provided to us today.

19 Q. I'm going to ask you about one of those  
20 documents at this time, but I'll give you both of  
21 them so you have them handy.

22 A. I understand.

23 MR. TURK: And I understand that counsel  
24 for PFS and the State have these as well.

25 Your Honor, I'll distribute copies to

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1 the Board as well.

2 JUDGE FARRAR: All right.

3 MS. CHANCELLOR: May I ask if Mr. Turk  
4 is also distributing the cover letter which states  
5 that one of the documents was prepared for internal  
6 use by the Department of Environmental Quality and  
7 the attorney general's office and is labeled  
8 "Confidential--Attorney Client Privilege"?

9 MR. TURK: Your Honor, I'm not proposing  
10 an exhibit at this time. I'm asking Dr. Arabasz to  
11 look at a document that he authored. And if the  
12 State wants to put something into evidence, we can  
13 talk about that, but for right now, I'm only asking  
14 about the contents of the document.

15 JUDGE FARRAR: Okay. So you don't want  
16 this marked at this time?

17 MR. TURK: No, Your Honor.

18 JUDGE FARRAR: Okay. And this document,  
19 Ms. Chancellor, has on it attorney work product on  
20 the cover, so that will be a reminder to us --  
21 actually, there's two documents?

22 MR. O'NEILL: Yes.

23 JUDGE FARRAR: Okay. This says  
24 "Confidential--Attorney Client Privilege," so that  
25 will be a reminder to us, for now, of the statement

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1 you just made. Let's see where Mr. Turk goes, and  
2 we'll see what, if anything, we need to do.

3 MS. CHANCELLOR: Okay. Thank you.

4 MR. TURK: First of all, let me indicate  
5 that the State has waived whatever privilege  
6 they've raised on these. They distributed it to us  
7 without any redaction at this time without any  
8 reservation.

9 MS. CHANCELLOR: I believe there was a  
10 small reservation. In order to move the  
11 proceedings along, the State was willing to waive  
12 its attorney-client privilege and attorney work  
13 product.

14 JUDGE FARRAR: Let's not argue that now.  
15 Let's see where we go, and then if we need to take  
16 up something like that, we can.

17 MR. TURK: Okay.

18 Q. If you would, Dr. Arabasz, look at the  
19 document entitled "Fault Evaluation Study and  
20 Seismic Hazard Assessment" first.

21 A. Yes.

22 Q. I would ask you to turn to page 4. And,  
23 by the way, I guess for background we should  
24 establish you prepared this document as part of the  
25 State of Utah's effort to assess seismic hazard at

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1 the PFS site; is that correct?

2 A. It was a -- let's see -- a review  
3 undertaken for the state for -- in this instance  
4 for the Utah Department of Environmental Quality to  
5 provide DEQ with a scientific opinion about the --  
6 the quality of the work performed by the Applicant  
7 and submitted in its application.

8 Q. Okay. If you would, take a look at page  
9 4, general comment No. 9, or I guess it's paragraph  
10 9 entitled "General Comment" --

11 A. I see that.

12 Q. -- in this paragraph you're discussing  
13 the Geomatrix PSHA of February 1999, correct?

14 A. That's correct.

15 Q. And I would ask you to look at that  
16 paragraph, and then let's read into the record --  
17 I'll read it, you tell me if I've done it  
18 correctly, the last two sentences of that  
19 paragraph. In fact, why don't we read the whole  
20 paragraph. I'll do that if you don't mind.

21 A. Yes.

22 Q. 9. General Comment: We have reviewed  
23 this report carefully and have no criticisms to  
24 offer. The equal hazard spectra, which form the  
25 starting point of the analysis, can be verified by

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1 comparison of Figure 1 to Figures 6-23 and 6-24 in  
2 the Geomatrix February 1999 report (Geomatrix,  
3 1999a). Given the input parameters, the results of  
4 the disaggregation of the PSHA leads to weighted  
5 average magnitudes  $\bar{M}$  --  $\bar{M}$  over the top of the  
6  $\bar{M}$  -- and distances  $\bar{D}$ , with a bar over the  $\bar{D}$ , that  
7 appear to be reasonable. Also, the development of  
8 the site-specific response spectra, incorporating  
9 near-source effects, appears to have been done  
10 correctly and conservatively.

11 Have I read that correctly?

12 A. Yes, you have.

13 MS. CHANCELLOR: Except that you said  
14 PSHA and it's P-S-H-A, as Dr. Arabasz has reminded  
15 you.

16 Q. (By Mr. Turk) We should point that here  
17 what you're doing is you're comparing the February  
18 1999 PFS PSHA with the April '99 revision; is that  
19 correct? Or am I -- tell me the difference between  
20 the 1999a and the 1999b Geomatrix papers.

21 MS. CHANCELLOR: Your Honor, a point of  
22 reference is that Mr. Turk is reading the answer to  
23 a comment about a document but we don't have in the  
24 record what specifically that document is and what  
25 page numbers in that document this comment is

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1 referring to.

2 MR. TURK: I think Dr. Arabasz authored  
3 the document. He can make whatever explanation he  
4 feels necessary.

5 JUDGE FARRAR: Again, Ms. Chancellor,  
6 that seems like a good point. But let's just bear  
7 it in mind as the examination continues, and you  
8 can challenge what Mr. Turk does on that basis at  
9 the appropriate time.

10 MS. CHANCELLOR: That's fine,  
11 Your Honor. Thank you.

12 THE WITNESS: Without the -- the  
13 references before me, I would be uncertain what the  
14 comparison was. If you're -- let's see. Have you  
15 asked me to focus on the last sentence yet?

16 Q. (By Mr. Turk) No.

17 A. Okay.

18 Q. If you look at the beginning, just  
19 before the place where general comment appears in  
20 this document, there's a reference to a document,  
21 and it reads, "Geomatrix Consultants, Inc., 1999b,  
22 Development of design ground motions for the  
23 Private Fuel Storage Facility: Report prepared  
24 Stone & Webster Engineering Corporation, March  
25 1999" -- and it lists various pages submitted by

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1 PFS to NRC as an attachment to letter to M.  
2 Delligatti dated April 2, 1999, regarding request  
3 for exemption to 10 CFR 72.102(f)(1).

4 That's the document that you were  
5 evaluating in this paragraph, is it not?

6 A. Yes.

7 Q. And, in fact, that's the Geomatrix PSHA  
8 that was offered by PFS in support of its exemption  
9 request, correct?

10 A. What is offered is an analysis taking  
11 the results of the P-S-H-A to response spectra.

12 Q. I have before me the request for  
13 exemption dated April 2, 1999 submitted by PFS to  
14 the NRC through Mr. Delligatti, and looking at that  
15 document, I see attached to it a document entitled  
16 the same as appears in your reference at the top of  
17 this paragraph, that is, the document entitled  
18 Development of Design Ground Motions for the PFS --  
19 Private Fuel Storage Facility dated March 1999  
20 prepared by Geomatrix Consultants, Inc. for Stone &  
21 Webster Engineering Corporation. That's the  
22 document that you're discussing in this comment,  
23 correct?

24 A. That appears to be correct, yes.

25 Q. And is it not true, then, that in this

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1 paragraph numbered 9, you have reached a conclusion  
2 that in this document submitted in support of the  
3 PFS seismic exemption request, Geomatrix developed  
4 site-specific response spectra incorporated  
5 near-source effects which "appears to have been  
6 done correctly and conservatively"?

7 A. The conclusion reached is not so simple.  
8 There are two steps. There are the results of the  
9 PSHA spell and then the propagation of those  
10 results into P-S-H-A design response spectra as  
11 specified by standard review plan, and what the  
12 last sentence refers to is specifically the  
13 development of the site response spectra following  
14 the standard review plan as having been done  
15 correctly and conservatively.

16 Q. And when we refer to a site-specific  
17 response spectra and when you refer to it and when  
18 Geomatrix refers to it in its report attached to  
19 the PFS exemption request, what we're talking about  
20 is the seismic hazard curve that is developed by  
21 Geomatrix -- that was developed by Geomatrix for  
22 the PFS site; is that correct?

23 A. That's correct.

24 Q. And your conclusion was that that was  
25 developed correctly and conservatively?

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1           A.       That's correct.

2           MR. TURK:   Okay.  I'd like you to --  
3           incidentally, may I ask counsel for the State to  
4           confirm the paragraph we've just discussed was  
5           redacted from the document previously and that  
6           paragraph has now been supplied to us today for the  
7           first time.

8           MS. CHANCELLOR:  Yes, Mr. Turk, I can  
9           confirm that.

10          MR. TURK:  Thank you.

11          Q.       I'd like to ask you to turn to the  
12          second of the two documents dated April 21, 1999  
13          entitled "Issues and Perspectives Relating to  
14          Hazard Assessment of Earthquake Ground Shaking" --  
15          it's a long title.  Do you know which one I'm  
16          referring to?  It's the one we mentioned before.

17          A.       Yes, I have that in front of me.

18          Q.       I'd ask you to turn to page 1 of this  
19          document.  Now this is a document, by the way, that  
20          you originally had submitted to the State with a  
21          marking on it that said "Confidential--Attorney  
22          Client Privilege."

23          A.       That's correct, and with a communication  
24          memo signaling that it was intended only for  
25          internal use by the Department of Environmental

1 Quality and the attorney general's office, as I  
2 recall.

3 Q. On page 1, the introduction states that,  
4 "The purpose here is to present our shared  
5 perspectives on some key issues involved in (1) the  
6 assessment of ground-shaking and fault-displacement  
7 hazard at the proposed PFS site in Skull Valley and  
8 (2) seismic design and emergency plans for the  
9 proposed facility as they relate to PFS's license  
10 application to NRC and PFS's request for an  
11 exemption to 10 CFR 72.102(f)(1)," correct?

12 A. Correct.

13 Q. And you indicate also in the next  
14 paragraph that "This communication is intended for  
15 internal use by DEQ and the Utah Attorney General's  
16 Office and is an informal summary of our views at  
17 this stage of the process," correct?

18 A. Correct.

19 Q. In the next section of this paper, also  
20 on page 1, entitled "Status of Hazard  
21 Characterization" -- and, by the way, this is  
22 something we addressed previously in examination  
23 the last time we met.

24 A. Yes, we did.

25 Q. For instance, in the first paragraph

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1 under that title the last sentence reads, "Between  
2 the two of us" -- meaning yourself and Dr. Pechmann  
3 -- "we've read the report carefully, reviewed it  
4 critically, and can find only minor details to  
5 quibble with." We discussed that previously?

6 A. Yes, we did.

7 Q. In the next paragraph, which the State's  
8 provided to us today for the first time, I'd like  
9 to read the following statement: The way Geomatrix  
10 has investigated and documented faulting near and  
11 beneath the PFSF site, in our opinion, greatly  
12 reduces technical concerns but any potential  
13 unknown dangers that haven't been considered in the  
14 seismic analysis. Credit them for working hard to  
15 preclude any surprises in the geological framework  
16 of the site." Then it continues, Furthermore,  
17 they've been pushed by NRC Staff comments and RAIs  
18 (e.g., References 4, 5, 6, 7 and 11), which  
19 ultimately have had the effect of obviating many  
20 criticisms we posed earlier, both in our review of  
21 the SAR (Reference 12) and at our informal  
22 discovery meeting with PFS and Geomatrix on  
23 February 19, 1999.

24 Is it correct -- I would ask this to  
25 counsel for the State again. At the beginning of

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1 that paragraph that I just read -- well, stop --  
2 let me stop myself.

3 Dr. Arabasz, did I read that paragraph  
4 correctly?

5 A. Yes, you did, Mr. Turk.

6 MR. TURK: And I would ask counsel for  
7 the State to confirm that the beginning of that  
8 paragraph, up until the statement that,  
9 "Furthermore, they've been pushed by NRC staff,"  
10 that entire statement in the paragraph before the  
11 word "furthermore" was provided to us today for the  
12 first time.

13 MS. CHANCELLOR: That's correct. The  
14 two sentences and the beginning of the second  
15 paragraph on the status of hazard characterization  
16 has been produced to you for the first time today.

17 Q. (By Mr. Turk) And, Dr. Arabasz, I think  
18 it's fair to say, then, that you are satisfied that  
19 Geomatrix did a good job in assessing the potential  
20 seismic hazard at the site as indicated in this  
21 paragraph?

22 A. As of the date of February 1999,  
23 correct.

24 Q. All right. Also --

25 JUDGE FARRAR: Let's go off the record

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1 for a moment and let me see counsel at the bench.

2 (A discussion was held off the record.)

3 JUDGE FARRAR: All right. We had a  
4 little off-the-record conference about the status  
5 and background of these documents.

6 So go ahead, Mr. Turk.

7 MR. TURK: Okay. Your Honor I would  
8 like to put on the record one statement about the  
9 discussion we just had. As I indicated in  
10 side-bar --

11 MS. CHANCELLOR: Is counsel testifying,  
12 Your Honor?

13 MR. TURK: Let me make the statement,  
14 and Ms. Chancellor can address it.

15 MS. CHANCELLOR: Why is counsel making a  
16 statement?

17 JUDGE FARRAR: This is kind of unringing  
18 the bell. Once you make the statement, it's on the  
19 record, so why don't you tell us --

20 MR. TURK: Should we go off the record?

21 JUDGE FARRAR: -- off the record what  
22 you want to say.

23 (A discussion was held off the record.)

24 JUDGE FARRAR: Back on the record.

25 MR. TURK: Your Honor, in lieu of the

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1 statement I was going to make, let me state we are  
2 joined today by Mr. Charles Miller, who's deputy  
3 director of the spent fuel project office. I would  
4 ask him to stand and identify himself.

5 JUDGE FARRAR: Okay.

6 MR. TURK: Mr. Miller stopped in once  
7 before. I don't know if he picks these days  
8 deliberately or not, but he's here with us today so  
9 I'd like to introduce him.

10 JUDGE FARRAR: Delighted to have him.

11 Q. (By Mr. Turk) Dr. Arabasz, looking at  
12 this document that we were just discussing --

13 A. Excuse me.

14 Q. Yes.

15 A. This was the issues and perspectives  
16 document again?

17 Q. Yes.

18 A. Yes.

19 Q. If you would, turn to page 2 of the  
20 document, and there's a section entitled "Request  
21 for Exemption to 10 CFR 72.102(f)(1)." Do you see  
22 that in the middle of the page?

23 A. I do.

24 Q. And there are two paragraphs. I'd like  
25 to read the -- portions of these two paragraphs

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1 into the record.

2 A key point made in PFS's request for an  
3 exemption to 10 CFR 72.101(f)(1), reference 10,  
4 page 5, is that the expected radiological  
5 consequences of a hypothetical accident condition  
6 are, quote, below the 100 millirem public dose  
7 limit of 10 CFR 20.1301(a)(1), close quote.

8 By the way, those are inner quotes that  
9 I just listed. As an aside, I just mention that.

10 And the document goes on to state,  
11 "Accordingly, 'PFS proposes that the DE for the  
12 PFSF be calculated based on PSHA methodology for  
13 the 1,000 year recurrence interval, based on  
14 consideration of the relative risk associated with  
15 this event.' Under a probabilistic, risk-informed  
16 graded approach, seismic design levels are linked  
17 to risk conditions, so careful scrutiny of PFS's  
18 asserted accident conditions is warranted. Such an  
19 evaluation is beyond our expertise."

20 Did I read that paragraph correctly?

21 A. Yes, you did.

22 Q. And when you say such an evaluation is  
23 beyond your -- yours and Dr. Pechmann's expertise,  
24 I assume what you're talking about there is the  
25 radiological risk posed by ISFSI?

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1 A. Correct.

2 Q. Quote, whether a deterministic or a  
3 probabilistic seismic hazard analysis governs the  
4 design earthquake ground motions at the PFS site --  
5 I'm sorry, PFSF site, hinges on the outcome of the  
6 request for an exemption. Relevant details of NRC  
7 guidance on this matter are laid out in reference  
8 10. If, indeed, the dry storage casks and  
9 canisters, even under the conditions of a major  
10 seismic event, are as safe as asserted by PFS and  
11 believed by NRC staff, then we can think of no  
12 compelling argument to put forward against awarding  
13 the exemption. PFS's arguments for allowing a  
14 probabilistic graded approach for the design of the  
15 Skull Valley facility are consistent with the  
16 weight of NRC opinion and intent in the rulemaking  
17 plan for revision to Part 72, Reference 9.

18 A. Yes, you did.

19 Q. And, incidentally, the word "against" in  
20 that statement is underlined in your text, right?

21 A. Correct.

22 Q. And that's the underlining you put in?

23 A. Correct.

24 MR. TURK: Your Honor, I don't propose  
25 to enter these documents into the record. I think

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1 I've questioned to the extent I'm interested in  
2 doing so. If the State or PFS wants to go further,  
3 I leave it to them.

4 MS. CHANCELLOR: Was there a question --  
5 other than just reading into the record, could the  
6 witness explain --

7 MR. TURK: I will leave that -- any  
8 other questions for redirect.

9 JUDGE FARRAR: That would be for you to  
10 do on redirect.

11 Q. (By Mr. Turk) I believe it's true,  
12 Dr. Arabasz, that -- maybe you've stated this  
13 already. Forgive me if it's repetitious -- you  
14 have not performed a P-S-H-A for the PFS facility,  
15 correct?

16 A. Correct.

17 Q. At different places in your testimony  
18 you refer to the rulemaking plans, the 1998  
19 rulemaking plan in SECY-98-126 or the modified  
20 rulemaking plan in SECY-01-178. You understand, do  
21 you not, that neither of those rulemaking plans  
22 constitute binding regulations?

23 A. I understand that.

24 Q. And the fact that the Staff had proposed  
25 those as rulemaking plans does not mean that the

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1 Staff has to follow them in any licensing  
2 proceeding, as you understand NRC requirements,  
3 correct, or would you accept that statement from me  
4 as being correct?

5 A. Correct.

6 Q. You also mentioned in your testimony the  
7 Staff's preliminary SER which was introduced  
8 previously in this proceeding as Staff Exhibit A.  
9 Was it -- and you indicate, by the way, that the  
10 Staff and PFS have presented a moving target, in  
11 your words. Did you understand that the  
12 preliminary SER issued by the Staff in 1999 had  
13 recommended granting of the seismic exemption  
14 requests from PFS?

15 A. Could you refresh my memory of the date  
16 of the preliminary SER?

17 Q. Yes. December 15, 1999.

18 A. That's consistent with general memory,  
19 yes.

20 MR. TURK: Your Honor, I'd like to pass  
21 out at this time a portion of Staff Exhibit A. I  
22 won't ask for this to be admitted to the record  
23 either. It is already part of the record in its  
24 complete form.

25 Your Honor, what I'm distributing is a

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1 portion of Staff Exhibit A as it was admitted in  
2 the year 2000 safety hearings. The exhibit, of  
3 course, as admitted, was much larger than what I'm  
4 distributing now, and, again, I'm not asking for  
5 this to be admitted because it would be redundant.

6 Q. Dr. Arabasz, this is the document, is it  
7 not, that you referred to in your testimony as the  
8 preliminary SER, or, I should say, these are  
9 portions of that document, correct?

10 A. Yes. I'll -- correct -- identified --  
11 there's some difference between the State's  
12 acronyms used for the various versions of the SER  
13 and the Staff's -- I'm just taking care to answer  
14 correctly -- and, yes, that appears to be correct.

15 Q. For instance, on page 3 of your prefiled  
16 testimony in Answer 4, paragraph No. 3 states that  
17 "The Staff's review of PFS's request and finding  
18 that use of a 1,000-year return-period value was  
19 not acceptable" --

20 A. Excuse me. I've lost the place --

21 Q. I'm sorry. If you would, turn to page 3  
22 of your prefiled testimony.

23 A. Yes.

24 Q. And it's paragraph 3 in Answer 4.

25 A. Okay.

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1 Q. And there's a discussion of the Staff's  
2 review of the PFS exemption request.

3 A. Yes.

4 Q. And in that paragraph numbered 3, you  
5 state that the Staff found, quote, use of a P-S-H-A  
6 with a 2,000-year return period value could be  
7 acceptable for reasons provided by the Staff, and  
8 you cite the Staff's preliminary SER, December 15,  
9 1999, at 2-41 to 2-45.

10 A. Yes.

11 Q. And this is the document that you're  
12 referring to in your testimony?

13 A. Yes.

14 Q. And, likewise, there are other places in  
15 your testimony where you refer to the preliminary  
16 SER. Sometimes I think you list it as the PSER.  
17 And in all those instances this is the document  
18 that you're referring to?

19 A. Correct.

20 Q. For example, at the bottom of page 13,  
21 going on to the top of page 14 --

22 A. Excuse me. This is my testimony?

23 Q. In your testimony. This has to do with  
24 paragraph 6 of Part E of Contention Utah L/QQ. And  
25 I think you'll find that if you go to the bottom of

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1 page 12 where the question is, "Please describe  
2 your concerns about Subsection E.6 of the Unified  
3 Contention Utah L/QQ."

4 A. Yes.

5 Q. Correct?

6 At the bottom of page 13, part of your  
7 answer to that question addresses Part B of  
8 Subsection 6 of the contention, Part E, in which  
9 you address what you describe as, "a metric that  
10 the Staff put forward for justifying the accuracy  
11 of a 2,000-year return period" --

12 A. I've lost it. Excuse me, please,  
13 Mr. Turk.

14 Q. I'm sorry. There are a lot of number  
15 paragraphs and numbered contention parts. I know  
16 it's confusing.

17 A. Which page are you on at the moment?

18 Q. On the bottom of page 13 of your  
19 testimony --

20 A. Yes.

21 Q. -- the paragraph begins, "Part (b) of  
22 Subsection 6" --

23 A. Yes, I see that.

24 Q. -- "(The significance of a 20-year  
25 licensing period versus a 30- to 40-year

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1 operational period)" -- you state -- I've just  
2 quoted that, and it goes on to say, "concerns a  
3 metric the Staff put forward for justifying the  
4 adequacy of a 2,000-year return period for seismic  
5 design of the PFS facility, namely, a 99-percent  
6 probability that the DBE not be exceeded in the  
7 20-year licensing period of the facility."

8 Do you see that paragraph?

9 A. Yes, I do.

10 Q. Then you go on to quote from a staff  
11 document. You say, "The Staff wrote," and you have  
12 an indented paragraph in which the Staff addressed  
13 a 99-percent likelihood of not being exceeded in  
14 the 20-year licensing period.

15 A. Yes.

16 Q. And at the top of page 14 you provide  
17 the citation for that paragraph, and that citation  
18 is to the preliminary SER at page 2-45, correct?

19 A. Correct.

20 Q. And then if we turn to page 2-45 of  
21 Staff Exhibit A, the very top bullet on that page  
22 which begins with the words "The Uniform Building  
23 Code" --

24 A. I see that.

25 Q. -- that's the paragraph in which the

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1 Staff provides what you describe as a metric,  
2 correct?

3 A. Correct.

4 Q. That's the paragraph you're referring to  
5 in your testimony?

6 A. Correct.

7 Q. And you agree this paragraph does not  
8 appear in the Staff's SER issued in September of  
9 2000 or in SER Supplement No. 2 issued in December  
10 of 2001?

11 A. I agree and have noted that it appears  
12 in the modified rulemaking plan.

13 Q. Okay. But it's not used as a basis in  
14 either the SER of September 2000 or SER Supplement  
15 No. 2 for the PFS site issued in December 21, 2001.

16 A. Correct.

17 Q. And if you continue on that page, page  
18 2-45 of Staff Exhibit A, after the bullets end,  
19 there's a paragraph that begins "Therefore."

20 A. I see that.

21 Q. And let me read that into the record so  
22 it's all here in one place. Quote, Therefore the  
23 Staff concludes that additional analyses are needed  
24 to assess ground vibrations of the Facility and to  
25 approve the applicant's request for an exemption to

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1 10 CFR 72.102(f)(1). The Staff agrees that the use  
2 of the P-S-H-A methodology is acceptable, however,  
3 the SAR analyses need to be revised to consider a  
4 2,000-year return period rather than a 1,000-year  
5 return period. These analyses are required to  
6 verify compliance with the applicable requirements  
7 of 10 CFR Part 72, Subpart E.

8 Have I read that correctly?

9 A. Yes, you did.

10 Q. And, in fact, what the Staff is stating  
11 there is that they had not yet made a determination  
12 whether to accept the PFS exemption request -- or  
13 to grant it or not, correct?

14 A. I understand that.

15 Q. And on the next page as well under  
16 Evaluation Findings -- I'm sorry. At page 2-52 --  
17 it's the next page in the handout that I've  
18 distributed. Page 2-52 of Staff Exhibit A under  
19 paragraph 2.2, Evaluation Findings, there's a  
20 statement that reads, "The staff has reviewed the  
21 site characteristics presented in the SAR. At this  
22 time, the staff cannot make a determination that  
23 the requirements in 10 CFR Part 72, Subpart E,  
24 Siting Evaluation Factors, have been fully  
25 satisfied. As discussed above, additional

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1 information and analyses are required for the Staff  
2 to complete its review."

3 Do you see that paragraph?

4 A. Yes, I do.

5 Q. And, again, in effect, the Staff is  
6 stating it has not yet reached a position on  
7 whether or not PFS has done an adequate job in  
8 evaluating siting evaluation factors as required in  
9 Subpart E of 10 CFR Part 72, correct?

10 A. That's correct, but it had apparently  
11 reached the conclusion of acceptability of a  
12 2,000-year return period.

13 Q. Well, let's look at that. If you go  
14 down on that page, 2-52 of Staff Exhibit A, there  
15 is a paragraph which is labeled as an open item,  
16 2-3. Do you see that?

17 A. Yes, I do.

18 Q. And that open item is identified as  
19 seismic and exemption request. Do you see that?

20 A. Yes, I do.

21 Q. And let me read that into the record as  
22 well. "As discussed in Section 2.1.6.2 of the SER,  
23 the staff has determined that additional  
24 information is needed to assess the effects of  
25 ground vibrations on the Facility. The applicant

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1 has requested an exemption to 10 CFR 72.102(f)(1)  
2 and proposes to use a PSHA approach with a  
3 1,000-year return period instead of the DSHA  
4 approach. The Staff agrees with the PSHA approach,  
5 but it should use a 2,000-year return period  
6 instead of the applicant-proposed 1,000-year return  
7 period."

8 Have I read that correctly?

9 A. Yes, you did.

10 Q. Now, that doesn't say that the Staff has  
11 decided to accept 2,000 years, it's just  
12 recommending that the Applicant use a 2,000-year  
13 return period in its analysis, correct?

14 A. Correct. Going back to page 2-44, then  
15 the Staff's offered reasons that the 2,000-year  
16 return value can be acceptable for the following  
17 reasons.

18 Q. Exactly. The statement, in fact, reads,  
19 "the staff has determined that a 2,000-year return  
20 value with the PSHA methodology can be acceptable  
21 for the following reasons." They didn't make an  
22 statement that its excessive. They stated an  
23 opinion that if PFS was to come in with the  
24 2,000-year return period, that's something that  
25 could be acceptable or can be acceptable.

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1 A. Correct.

2 Q. All right. And, in fact, it was in the  
3 September 2000 SER when the Staff made the  
4 determination that they did accept the P-S-H-A with  
5 a 2000-year return period, and, therefore, the  
6 Staff approved or recommended approving the seismic  
7 exemption request, correct?

8 A. Which year again, please?

9 Q. September 2000.

10 A. Yes.

11 Q. Part of your criticism about the Staff's  
12 and PFS's moving target, as you described, was the  
13 fact that -- included the fact that this lifetime  
14 risk for the operational period of the PFS facility  
15 was mentioned as a justification indication in the  
16 preliminary SER but it was not carried forward in  
17 subsequent Staff documents with respect to the PFS  
18 facility, correct?

19 A. That would be part of the moving  
20 target -- excuse me. Let me read my testimony,  
21 please.

22 In context, on page 3 of my testimony,  
23 Answer 4, my testimony reads, "Since then,  
24 considerations by both the Applicant and the NRC  
25 Staff regarding the seismic design basis ground

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1 motions -- or, for simplified reference, the design  
2 basis earthquake ('DBE') -- for the PFS facility  
3 have continually evolved" -- and I'll stop here.  
4 What I'm referring to in context are the  
5 considerations. And then the text continues  
6 "providing a 'moving target' for critical  
7 evaluation."

8 Q. I see. That's Answer 4, page 3 of your  
9 testimony?

10 A. That's correct, yes.

11 Q. You would agree that when the Staff  
12 issued its SER, they weren't intending to be a  
13 target for anyone, would you not?

14 A. I'll accept that.

15 Q. So when you describe the Staff's  
16 position as being a moving target, you're really  
17 referring to the fact that you were asked to review  
18 different documents that may have contained  
19 different statements? That's the target aspect of  
20 it, that you had to evaluate those different  
21 papers?

22 A. In effect, yes. It's a reflection of  
23 the evolution of the process and new information  
24 that's been introduced and various changes in the  
25 process, yes.

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1 Q. Okay. On page 9183 of your testimony on  
2 May 17 -- do you have that before you?

3 A. Page 9183?

4 Q. Yes.

5 A. Yes, I have that.

6 Q. Near the top of the page, again you  
7 refer to a moving target. Can you see that?

8 A. Yes, I see that.

9 Q. And, again, there you're referring to  
10 the use of an annual probability versus a total. I  
11 take it by that you mean a lifetime or operational  
12 period exceedance probability?

13 A. Correct.

14 Q. And that's the difference, one document  
15 is an annual and this previous preliminary SER  
16 document used that as well as an operational period  
17 risk, right?

18 A. In part, what I was alluding to there  
19 were statements, I believe, in the Staff's prefiled  
20 testimony arguing, in effect, for the annual  
21 probability and that consideration of a total  
22 exceedance probability was inappropriate. To the  
23 best of my memory, that's the characterization.  
24 And so when this question was posed to me, I was  
25 aware of this perspective, that the Staff had

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1 introduced this reasoning relating to a total  
2 exceedance probability over the lifetime of the  
3 facility and in its prefiled testimony agreeing  
4 with Dr. Cornell's position that one should only  
5 consider the annual risk.

6 Q. And in this same page, page 9183 of your  
7 previous cross-examination --

8 A. Yes.

9 Q. -- if you look at the next paragraph  
10 which begins, If you track me, you have to track  
11 the Staff because they were the initiators of the  
12 rationale put forward -- do you see that?

13 A. Yes, I see that.

14 Q. And, again, you say that in the  
15 preliminary SER the Staff introduced the comparison  
16 of building codes. And you go on, again, to  
17 discuss the premise of a lifetime consideration  
18 versus an annual consideration of the probability  
19 of exceedance.

20 A. I see that.

21 Q. And, again, what you're saying here is  
22 that the preliminary SER contained that operational  
23 or lifetime period mean annual probability of  
24 exceedance versus the SER of the year 2000 which  
25 used the annual -- mean annual probability of

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1 exceedance only, correct?

2 A. Correct. And in my prefiled testify, as  
3 I go on to consider this matter, I can judge that  
4 the Staff, for whatever reason, introduced this  
5 argument early and then set it aside and had moved  
6 on. But as I referred to in my prefiled testimony,  
7 it was somewhat confusing to me then that the --  
8 that the Staff introduced a similar rationale in  
9 the modified rulemaking plan to justify the  
10 2,000-year return period. And I describe that in  
11 my prefiled testimony.

12 It will take me a moment to recover the  
13 page.

14 Q. I recall that part of your testimony,  
15 and you're correct, in the modified rulemaking plan  
16 the Staff did make a mention of a lifetime sort of  
17 consideration analogy, as I recall.

18 A. Yes.

19 MR. TURK: And those documents, by the  
20 way, are in the record. If anybody wants to turn  
21 to them, they can find them.

22 Q. In effect, then, as you say, the Staff  
23 has moved on in the PFS licensing proceeding and  
24 has abandoned that lifetime or operational period  
25 consideration of mean annual probability

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1 exceedance.

2 A. Sensu strictu, it has, yes.

3 Q. I'm sorry, sir?

4 A. Sensu strictu, in the strict sense. To  
5 appearances, it has not, because somewhere in its  
6 tool kit of reasons, there it is in the modified  
7 rulemaking plan.

8 Q. Whether it survives in the rulemaking is  
9 something we all have to wait and see, correct?

10 A. Correct.

11 Q. Now, by the way, also on page 9183 you  
12 refer to other errors in the preliminary SER  
13 concerning --

14 A. Excuse me. I've -- I've lost the train  
15 of thought.

16 Q. I'm sorry? Did you want to add  
17 something?

18 A. No. I just want to make sure that I'm  
19 listening correctly to your question.

20 Q. On page 9183 of your  
21 cross-examination --

22 A. Yes.

23 Q. -- you refer to some errors that you say  
24 were introduced by the Staff. You say they refer  
25 to an obsolete document, the 1994 UBC --

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1           A.       That's correct.

2           Q.       -- which had been superseded. That's  
3 not an error that was repeated in the September  
4 2000 SER, is it?

5           A.       Thankfully, no.

6           Q.       Now, we talked the last time we met  
7 about whether it's more appropriate to use a mean  
8 annual probability of exceedance or a lifetime  
9 probability of exceedance. Is that the right term,  
10 mean lifetime probability of exceedance?

11          A.       A total probability of exceedance which  
12 considers the exposure time.

13          Q.       You would agree, would you not, that it  
14 is more appropriate for the Staff, in developing  
15 the SER, to use a mean annual probability of  
16 exceedance rather than a lifetime probability of  
17 exceedance, metric, correct?

18          A.       We've been over this ground in prior  
19 testimony. Allow me just for a moment to gather my  
20 thoughts.

21                    I'm ambivalent as I describe it at  
22 length in my prefiled testimony where this issue is  
23 put forward by Dr. Cornell that was put forward in  
24 the deposition process in October of 2001, and I  
25 was asked to respond to it then. In general, I

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1 defer to Dr. Cornell. At the time in my prefiled  
2 testimony and in the response to the Applicant's  
3 motion for summary disposition at the end of 2001,  
4 I begged to reconsider, and when I was  
5 cross-examined by Mr. Cornell -- excuse me, by  
6 Mr. Gaukler, if I recall my testimony correctly, I  
7 said at the end of the day I might agree with  
8 Dr. Cornell, but he needed to give me a better  
9 basis than the Pate-Cornell paper.

10 Q. Dr. Arabasz, you are the author of an  
11 article entitled "An Introduction to Probabilistic  
12 Seismic Hazard Analysis," by yourself and R.K.  
13 McGuire?

14 A. Correct.

15 Q. Do you recall the approximate date of  
16 that article?

17 A. No, I do not, and I sigh because I'm not  
18 even certain I could tell you what day of the week  
19 it is or what month it is, Mr. Turk.

20 Q. But I know we're in Utah.  
21 I'd like to -- do you have a copy of  
22 that article with you?

23 A. No, I do not.

24 Q. In fact, Dr. Arabasz, you are quite  
25 familiar with probabilistic seismic analysis,

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1 correct?

2 A. Correct.

3 Q. And this article is essentially a primer  
4 in how to conduct P-S-H-A analyses, correct?

5 A. Correct.

6 MR. TURK: Unfortunately, I don't have  
7 copies to distribute to everyone. Should we take a  
8 moment off the record so I can show this to other  
9 counsel?

10 JUDGE FARRAR: Yes.

11 MS. CHANCELLOR: It's fine, Mr. Turk.  
12 Just go ahead and ask Dr. Arabasz a question.  
13 Maybe you could show Dr. Arabasz the document  
14 rather than me.

15 MR. TURK: What I'd like to do,  
16 Your Honor, I'd offer it to other counsel to look  
17 at it, but we'll read it into the record. And I'll  
18 stand with Dr. Arabasz, with your permission, just  
19 so we read it into the record correctly.

20 JUDGE FARRAR: All right.

21 MR. TURK: May we have just a moment,  
22 Your Honor?

23 JUDGE FARRAR: Yes.

24 (A discussion was held off the record.)

25 MR. TURK: Your Honor, with permission,

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1 may I approach the witness?

2 JUDGE FARRAR: Yes, you may.

3 Q. (By Mr. Turk) I apologize, Dr. Arabasz.  
4 This is one of the ones that I did not make copies  
5 of.

6 I place before you a document entitled  
7 "An Introduction to Probabilistic Seismic Analysis"  
8 by R.K. McGuire and W.J. Arabasz. Is this the  
9 article that you co-authored?

10 A. Correct.

11 Q. And this document appears to have been  
12 published in a well respected journal, although I  
13 don't know which one. Do you recall? Is it --  
14 here it is.

15 A. Correct. It's a review volume or a  
16 special volume of the Society of Exploration  
17 Geophysicists.

18 Q. And it's a volume entitled Hazard  
19 Analysis, edited by S.H. Ward, and it's entitled  
20 Geotechnical and Environmental Geophysics Society  
21 of Exploration Geophysicists, Volume 1, it appears.

22 A. The type -- the full citation would  
23 appear in my curriculum vita.

24 Q. Okay. And I'd ask you to turn to two  
25 different statements that appear in this document.

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1 First of all, at page 343 of the article -- and the  
2 article begins at page 333, so this is 10 pages in  
3 -- there's a section entitled "Time Distribution,"  
4 and in this section of the article is it correct  
5 that you describe how to formulate an estimation of  
6 the time distribution to be used in a seismic  
7 hazard analysis, probabilistically?

8 A. It would be more correct to say Robert  
9 McGuire is formulating.

10 Q. Okay. I'd like you to read the two  
11 sentences that begin under the section Time  
12 Distribution. I've marked them in yellow in the  
13 copy in front of you.

14 A. The probability analysis that we are  
15 interested in summarily described by the equation  
16 in Figure 5d contains an important term -- the term  
17 is  $\nu_i$  -- continuing, that relates to the time  
18 distribution of earthquakes. For a given source,  
19  $\nu_i$ , is the mean rate of occurrence -- or,  
20 equivalently, the expected number -- of future  
21 earthquakes of  $M$  sub not less than  $M$  less than or  
22 equal to  $M$  sub max for a time period  $t$ .

23 MR. TURK: Thank you.

24 And just for the reporter's sake, the  
25 equation that Dr. Arabasz just read appears with

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1 those three different M numbers separated by the --  
2 off the record.

3 (A discussion was held off the record.)

4 MR. TURK: Perhaps we could just admit  
5 those pages into the record as an exhibit. During  
6 the next break I'll get copies.

7 JUDGE FARRAR: All right.

8 Q. (By Mr. Turk) So it's correct, then,  
9 that in this article the mean rate of occurrence is  
10 what you believe or what's described in this  
11 article as being the correct way of describing  
12 earthquake occurrence probability?

13 A. Earthquake occurrence, correct. That's  
14 a hazard term.

15 Q. Okay. I'd like to also ask you to read  
16 on page 345 of this article, under the section  
17 entitled "Calculation of Seismic Hazard" -- let's  
18 see which of these sentences to read. If you  
19 would, begin with the sentence that reads, "The  
20 probability of exceeding down," to the end of that  
21 paragraph.

22 A. This copy is somewhat fuzzy, but I'll do  
23 my best.

24 The probability of exceeding a  
25 ground-motion amplitude a superscript -- and I

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1 can't read what the small symbol is.

2 Q. Looks like an a prime something.

3 A. -- is calculated for one possible  
4 earthquake magnitude and location. That result is  
5 multiplied by the probability of occurrence of that  
6 magnitude at that location. And this process is  
7 repeated for all possible magnitudes and locations.  
8 In general, these probabilities are calculated on  
9 an annual basis, i.e., the time period is one year.  
10 This is not a restrictive assumption. The results  
11 can be translated rather easily to other time  
12 periods.

13 Shall I continue?

14 MR. TURK: I think that's fine.

15 Your Honor, may I inquire, if other  
16 counsel wish, I'll copy the two pages. There is  
17 more to this discussion, but it's not what I intend  
18 to focus on in my examination. And I'll be happy  
19 to share the document with you.

20 MS. CHANCELLOR: Whatever we can do to  
21 move it along. I don't care, Your Honor.

22 Q. (By Mr. Turk) Why don't we just read  
23 the rest of that Dr. Arabasz. After the part where  
24 you stopped, would you read what follows?

25 A. Because our usually interest is in low

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1 probability events, the total annual probability of  
2 exceeding some amplitude a superscript -- and,  
3 again, I can't read what symbol is superscripted --  
4 is the sum of annual probabilities from all  
5 possible earthquakes. This simple method for  
6 calculations is the center for all seismic hazard  
7 results.

8 Q. Is it fair to say, then, Dr. Arabasz,  
9 that in this article, when you are describing the  
10 best method in which to conduct the P-S-H-A or in  
11 which to present P-S-H-A discussions, that you  
12 recommend the use of mean annual probability of  
13 exceedance?

14 A. In the hazard context, not a risk  
15 context, I believe this is straightforwardly part  
16 of a P-S-H-A methodology, and, hence, the Y axis on  
17 a standard as a curve.

18 Q. Okay. And in your last answer you made  
19 a distinction between hazard and risk. In a  
20 probabilistic seismic hazard analysis, in effect,  
21 what is presented on those different charts is the  
22 hazard, not the risk, correct?

23 A. Correct.

24 Q. There's one sentence in particular that  
25 I'd like to come back to now. In the portion of

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1 this paragraph on page 345 that you read, you make  
2 the statement that -- and I'm going to paraphrase  
3 this -- that presenting results for -- I'm sorry.  
4 Let me read it correctly. You state, In general,  
5 quote, these -- I'm sorry, strike that.

6 You state, quote, In general, these  
7 probabilities are calculated on an annual basis,  
8 i.e., the time period is one year. This is not a  
9 restrictive assumption. The results can be  
10 translate rather easily to other time periods,  
11 close quote.

12 When you make the statement in this  
13 article, as I understand what you're stating is  
14 anyone who wants to understand what is the hazard  
15 over the lifetime of the facility can simply  
16 multiply the annual hazard number by the number of  
17 years of the facility and come up with a way of  
18 assessing what's the hazard over the lifetime of  
19 the facility. For instance, a 20-facility,  
20 multiply the annual probability of exceedance by  
21 20, and you get a lifetime hazard probability of  
22 exceedance, correct?

23 A. This is what Dr. McGuire writes, as my  
24 co-author in this paper, and what you describe as a  
25 procedure is correct.

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1 Q. And you don't disagree with that, do  
2 you?

3 A. No.

4 MR. TURK: Your Honor, may I inquire,  
5 when would we like to take an afternoon recess? I  
6 can continue or go forward, based on your  
7 preference. Do you want to continue more?

8 JUDGE FARRAR: Hold on.

9 (The Board confers off the record.)

10 JUDGE FARRAR: Mr. Turk, before we take  
11 a break, how are you doing in terms of your time  
12 estimate?

13 MR. TURK: Well, I will finish with my  
14 cross-examination today, Your Honor. But as I  
15 mentioned before, I thought I would have two more  
16 hours this afternoon. We started at 2:00, and I  
17 expect I will go that long.

18 JUDGE FARRAR: Let's take a break, then,  
19 now. It's a little after 20 after. Let's be back  
20 at 3:35.

21 (A recess was taken.)

22 JUDGE FARRAR: Mr. Turk, you may resume.

23 MR. TURK: Yes, Your Honor. I'm going  
24 to skip some of the items in an effort to move  
25 forward.

1 JUDGE FARRAR: Okay, good.

2 MR. TURK: And I'm going to leave one  
3 item, I'm going to come back to item -- a small  
4 part of item 12, so I'll really be starting with  
5 No. 14. And I'm going to skip over some that  
6 appear later on.

7 JUDGE FARRAR: Okay.

8 MR. TURK: So if you're looking to  
9 follow me, Your Honor, I'll be starting with the  
10 bottom of No. 11, and then I'll move to 14.

11 JUDGE FARRAR: Okay.

12 MS. CHANCELLOR: This is 14 of 33,  
13 Your Honor?

14 JUDGE FARRAR: No, of 31, but each of  
15 the -- they're going to get progressively much  
16 shorter.

17 MS. CHANCELLOR: That's good news.  
18 Thank you.

19 JUDGE FARRAR: My colleague adds, Aren't  
20 they, Mr. Turk?

21 MR. TURK: I understood the instruction  
22 without any confirmation. I put that as a stage  
23 correction.

24 Actually, we'll skip 11 entirely,  
25 Your Honor. I think we've done enough of that.

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1 JUDGE FARRAR: Okay.

2 THE WITNESS: Thank you, Mr. Turk.

3 Q. (By Mr. Turk) I'd like to come and  
4 address some fine points in your testimony. I  
5 think those will move fairly quickly.

6 In Answer No. 10 to your testimony --  
7 this is item No. 14 on the plan, Your Honor --

8 A. What page number, please?

9 Q. This is Answer No. 10 which appears  
10 on --

11 A. Yes, okay. Page 7. I have it.

12 Q. -- on page 7.

13 I was a little unclear about something  
14 that's stated here.

15 Actually, I'll skip this one,  
16 Your Honor, because I can't find it, and we'll move  
17 on. I'll go to No. 18, Your Honor. I give you all  
18 these clues just so you can follow me if you're  
19 interested.

20 JUDGE FARRAR: All right. Thank you.

21 MR. TURK: Then you'll get a sense of  
22 how much more I have to do.

23 Q. Moving to Answer No. 11 of your  
24 testimony, which begins on page 9 --

25 A. Yes.

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1 Q. -- there's a discussion of the DOE-1020  
2 standard. And I think we may have established this  
3 before, but I think, if not, let me just ask you  
4 now. You would agree that the Licensing Board and  
5 the NRC, the Commission are not obliged to follow  
6 the DOE standard if they choose not to, or they may  
7 decide to follow it if they believe it's  
8 appropriate, correct?

9 A. I understand that, yes.

10 Q. At one point in Answer No. 12 in your  
11 testimony, you fault the Staff -- this is at the  
12 top of page 11 of your testimony. At the top of  
13 the page you state, "The new DOE-STD-1020-2001 was  
14 released before the Staff issued the SSER yet the  
15 Staff makes no mention of it and still relies on  
16 the 1994 version."

17 Do you see that in your testimony?

18 A. Yes, I do.

19 Q. What you're referring to in this  
20 sentence is the version of the 1020 standard that  
21 was released by DOE for public comment in the year  
22 2001, correct?

23 A. Correct.

24 Q. And that was a draft document, correct?

25 A. Correct.

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1 Q. It was not a final document such as the  
2 DOE-STD-1020-2002?

3 A. Until January of 2002, correct.

4 Q. So that when the Staff released SER  
5 Supplement No. 2 on September 21st, the final DOE  
6 document, DOE-STD-1020-2002, had not yet been  
7 issued. That's correct?

8 A. I'd like to place my answer in context.  
9 The -- at the beginning of Answer 12, I believe  
10 there's -- there's one of the attachments, Tab --  
11 let's see, I guess it's Tab 126, presumably 126,  
12 that would be appropriately referred to, and there  
13 the information of the dissemination of the draft  
14 standard on August 22, 2001. In the strict sense,  
15 yes, you are correct, the final document was not  
16 released until January 2002.

17 Q. Okay. Let's look at this document for a  
18 second. This is State Exhibit No. 126 which has  
19 been admitted into evidence. That's a two-page  
20 document that has a cover memo in which Richard  
21 Black distributed the draft standard for comment,  
22 and attached to that is page C-6 of DOE-STD-1020,  
23 as you refer to it, 1020-2001, correct?

24 A. Correct.

25 Q. That was just a draft at the time,

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1 correct?

2 A. Correct.

3 Q. And that's not what appears in the final  
4 document issued in the year 2002, is it?

5 A. What is not what appears?

6 Q. Page C-6 of State's Exhibit 126, that's  
7 not a page that appears in its exact form in the  
8 final 2002 document, correct?

9 A. I'd have to compare the two to -- to  
10 answer fully.

11 Q. You don't recall? That's fine if you  
12 don't.

13 A. I don't recall.

14 Q. I'd like to place in front of you, then,  
15 a copy of DOE-STD-1020-2002 dated January 2002 and  
16 ask you to turn to Appendix C and, in particular,  
17 take a look, if you would, at page C-6.

18 Do you have that before you?

19 A. Yes, I do.

20 Q. And if you would take a look at Table  
21 C-3 and compare that table as it appears in the  
22 2002 final edition and the table as it appeared in  
23 the 2001 draft edition which is before us in State  
24 126, do you note that there's a difference in the  
25 table for Performance Categories 1 and 2?

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1 A. Correct, yes.

2 Q. So, in fact, the document did, in fact,  
3 change between the 2001 and 2002 versions, if  
4 nowhere else, at least in this respect?

5 A. Correct.

6 Q. And, in fact, when you cited the 2001  
7 version of this document in your testimony, there  
8 was no introductory section which explained the  
9 reason for the reduction of the PC-3 seismic hazard  
10 exceedance probability going from a  $5 \times 10^{-4}$  to a  
11  $4 \times 10^{-4}$ . That introduction didn't exist in the 2001  
12 document, did it?

13 A. I believe that's correct.

14 MR. TURK: And, by the way, that's  
15 something that we have admitted as a Staff exhibit,  
16 Staff Exhibit II, which is the cover page of the  
17 2002 document with three pages from the forward  
18 which explain the reason for changing the PC-3 from  
19 a  $5 \times 10^{-4}$  to a  $4 \times 10^{-4}$  standard.

20 Q. So that was something that was added  
21 into the 2002 document that didn't exist in the  
22 draft version of the 2001 document, correct?

23 A. Correct.

24 Q. Do you have any problem with the fact  
25 that the Staff didn't cite a draft document when it

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1 released its safety evaluation supplement?

2 A. No serious problem, Mr. Turk.

3 Q. Recognizing the fact that draft  
4 documents can change once the releasing agency  
5 issues the final document?

6 A. Understood.

7 JUDGE FARRAR: Dr. Arabasz, you said "no  
8 serious problem," which leaves us up here wondering  
9 what smaller problem you have, or maybe it was just  
10 a figure of speech.

11 THE WITNESS: It was a figure of speech.  
12 Excuse me, Your Honor.

13 No, I do not have a problem, Mr. Turk,  
14 with that.

15 JUDGE FARRAR: All right.

16 MR. TURK: Your Honor --

17 MS. CHANCELLOR: Mr. Turk, I believe  
18 Dr. Arabasz is handing you back a document.

19 MR. TURK: Oh, thank you. I don't have  
20 enough documents on my desk. I'm happy to have one  
21 more.

22 The afternoon is going to get longer as  
23 I try to find documents. I'd like to distribute  
24 one more document and ask you to bear the burden  
25 that I bear with these documents, and I will ask

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1 that this be marked as an exhibit. I'm  
2 distributing a copy. Again, it has the same cover  
3 page as the 2002 DOE standard followed by the first  
4 15 pages of Appendix C to that document. I would  
5 ask that this document be marked for identification  
6 as Staff Exhibit QQ.

7 (STAFF EXHIBIT-QQ WAS MARKED.)

8 (A discussion was held off the record.)

9 JUDGE FARRAR: The reporter's marked the  
10 document. We're back on the record.

11 Q. (By Mr. Turk) Dr. Arabasz, do you have  
12 this document in front of you which has been marked  
13 for identification as Staff Exhibit QQ?

14 A. Yes, I do.

15 Q. And, in fact, it's correct this has the  
16 cover page of the DOE-STD-1020-2002 followed by  
17 pages C-1 through C-15 of the document?

18 A. Correct.

19 Q. And we were addressing before the fact  
20 that Table C-3 on page C-6 has changed from the way  
21 it appeared in the 2001 version of the document,  
22 and just for the record, why don't we point out  
23 what that change was that was made to that table.  
24 Do you see that table?

25 A. Yes. Unfortunately, I returned the

1 other document, but to my memory, it was the --

2 Q. I'll hand you a copy of State  
3 Exhibit 126 which is the 2001 draft that includes  
4 that table.

5 A. For Performance Category 1, the old  
6 version, excuse me, old being DOE-STD-1020-2001  
7 compared to DOE-STD-1020-2002 -- Performance  
8 Category 2 in the old version has a target seismic  
9 performance goal entered at  $1 \times 10^{-3}$ . In the new  
10 version it's replaced by two asterisks with --

11 MS. CHANCELLOR: Your Honor, could I  
12 interpose an objection? These two documents speak  
13 for themselves. And Dr. Arabasz can read State's  
14 Exhibit 126 and Staff Exhibit QQ, but it seems like  
15 they stand for themselves.

16 MR. TURK: Your Honor, this will be very  
17 brief. There's so much material, so much paper in  
18 the record, I think it's important just to point  
19 out what is the change and move on.

20 JUDGE FARRAR: Well, we do spend a lot  
21 of time reading things. And while if someone had  
22 to decide the case and had nothing but the  
23 transcript in front of them, having it all in one  
24 place would be useful, but we will have the benefit  
25 of everyone's proposed findings and conclusions.

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1 And it will -- we, with the benefit of those  
2 references, could certainly write an opinion that  
3 would -- our opinion will have everything relevant  
4 in one place. So maybe there's a way to speed  
5 things up.

6 MR. TURK: Maybe, if I can just ask the  
7 question in a leading format, we'll move more  
8 quickly.

9 JUDGE FARRAR: Right.

10 Q. (By Mr. Turk) Just to summarize, Dr.  
11 Arabasz, I think what you were stating is that for  
12 PC-1 and PC-2 facilities, the specific target  
13 seismic performance goal and the specific seismic  
14 hazard exceedance probability figures have been  
15 deleted and replaced with these asterisks or double  
16 asterisks as indicated in the text?

17 A. Correct.

18 Q. This document that I've asked to be  
19 marked for identification as Staff Exhibit QQ also  
20 contains a discussion of the seismic risk reduction  
21 factor, does it not?

22 A. Yes, it does.

23 Q. If you look at page C-10 of this  
24 document, for instance, in the large paragraph  
25 which against with the words "Equation" C-6,

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1 approximately eight lines into that paragraph  
2 there's a discussion of the figures that appear  
3 above, and it states, "In these Figures, SF of 0.9  
4 is used for PC 3 and SF of 1.25 is used for PC 4  
5 and the range of from 0.3 to 0.6 has been  
6 considered."

7 Do you see that statement?

8 A. Yes, I do.

9 Q. And that correctly states what you had  
10 previously indicated in your cross-examination  
11 testimony, that for PC-3 the risk reduction factor  
12 of 0.9 has now been introduced in the 2002  
13 document, correct?

14 A. Correct.

15 Q. So that, for instance, although  
16 DOE-STD-1020 has now shifted from a  $5 \times 10^{-4}$  to a  
17  $4 \times 10^{-4}$  standard for PC-3, application of the SF  
18 factor of 0.9, in effect, brings the two design  
19 standards in sync with each other?

20 A. Correct.

21 MR. TURK: Your Honor, I would offer  
22 Staff Exhibit QQ into evidence at this time.

23 MS. CHANCELLOR: No objection,  
24 Your Honor.

25 MR. GAUKLER: No objection, Your Honor.

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1 JUDGE FARRAR: All right. QQ will be  
2 admitted.

3 (STAFF EXHIBIT-QQ WILL BE ADMITTED.)

4 Q. (By Mr. Turk) In Answer No. 13 of your  
5 testimony, you discuss the Staff's citation to the  
6 TMI-2 ISFSI experience or exemption, and you  
7 indicate in your testimony that -- and this is on  
8 page 12. In the first large paragraph beginning,  
9 with the words "Ultimately" --

10 A. Yes, I see that.

11 Q. -- the second sentence states, "What the  
12 NRC approved in terms of a design-basis ground  
13 motion was a design value higher than 2,000-year  
14 return period mean ground motion from the PSHA."

15 Do you see that sentence?

16 A. Yes, I do.

17 Q. You have heard the testimony of Dr. Chen  
18 who was involved in the TMI-2 exemption request  
19 review for the Staff who indicated that what we had  
20 approved, in fact, was a 2,000-year return period  
21 ground motion. Do you recall that testimony?

22 A. Not those precise words. I was here  
23 for -- present during Dr. Chen's testimony, and  
24 basically I consider this a nuance as it relates to  
25 the word "approved."

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1 Q. Well, in fact, the --

2 A. The distinction between the  
3 determination of an acceptability of the 2000-year  
4 return period and approval of DOE's -- DOE Idaho's  
5 proposed use of a .36 g ground motion value higher  
6 than the 2000-year value.

7 Q. In fact, DOE had a preexisting design  
8 standard that used a .36 g design criterium?

9 A. Correct, and their proposal to use that  
10 same ground motion value, in my understanding, was  
11 an explicit part of their exemption request.

12 Q. Do you dispute the Staff's view that  
13 what -- that what the Staff had approved was the  
14 use of a 2,000-year return period design ground  
15 motion?

16 A. I accept that representation. As I read  
17 documents, again, I come back to what I believe is  
18 a nuance.

19 Q. Just so we put it in one place, do you  
20 have a copy of Staff Exhibit S before you?

21 A. Yes, I do.

22 Q. Staff Exhibit S is a copy of a SECY  
23 paper, SECY-98-071 dated April 8, 1998 from L.  
24 Joseph Cowan, executive director for operations to  
25 the commissioners. And I'd like you to turn, if

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1 you would, to page 3 of the attachment to that SECY  
2 paper. And to make it easy, let me count the  
3 pages. On the eighth page of this exhibit, which  
4 is part of the SER attached to the SECY paper --

5 A. Yes, I see that.

6 Q. -- do you see the paragraph entitled  
7 "Conclusions"?

8 A. Yes, I do.

9 Q. I'm going to read the second sentence,  
10 and, if you would, tell me if I read it correctly.  
11 And then I'm going to skip down and read another  
12 sentence, and I'll ask you the same question.

13 It begins by indicating that DOE Idaho  
14 had completed both a deterministic seismic hazard  
15 analysis as well as a probabilistic seismic hazard  
16 analysis --

17 A. Excuse me. Are you --

18 Q. I'm paraphrasing.

19 A. Yes, okay.

20 Q. And then I will quote. Quote, The Staff  
21 has evaluated these analyses and finds the  
22 resultant values acceptable, 0.56 g PGA for an SSE  
23 by the deterministic method and 0.30 g PGA mean  
24 ground motion for a 2,000-year return period by the  
25 probabilistic method.

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1 Did I read that correctly?

2 A. Yes, you did.

3 Q. And it goes on to state, quote,

4 Considering the lack of radiological consequences  
5 from credible accidents and the minor consequences  
6 from beyond design basis accidents, the Staff finds  
7 the present Part 72 requirement for an ISFSI DE to  
8 be an unnecessary regulatory burden.

9 Did I read that correctly?

10 A. Yes, you did.

11 MR. TURK: Just for completeness, Your  
12 Honor, in one place, I'll read it all.

13 The next sentence, quote, The Staff  
14 finds acceptable the risk graded approach to  
15 seismic hazard characterization and design in  
16 DOE-STD-1020 which is similar to the risk graded  
17 approach to design basis events in Part 60.

18 Have I read that correctly?

19 A. Yes, you did.

20 Q. All right. The next sentence, Given the  
21 absence of radiological consequences from any  
22 credible seismic event, the Staff finds that the  
23 DOE-STD-1020 risk graded approach using 2,000-year  
24 return period mean ground motion as the DE is  
25 adequately conservative.

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1 Have I read it correctly?

2 A. Correct.

3 Q. It goes on with another sentence about  
4 the 20-year life of the facility, and it then  
5 states, that the -- quote, The DE proposed by DOE  
6 Idaho for the -- and, by the way, in the text it  
7 says ID for Idaho. The DE proposed for DOE, dash,  
8 i.e., for the ISFSI, 0.36 g PGA with an appropriate  
9 response spectrum, exceeds the 0.30 g PGA value for  
10 the 2,000-year return period mean ground motion.  
11 Therefore, the Staff concludes that granting the  
12 requested exemption from 10 CFR 72.102(f)(1) will  
13 maintain an adequate design margin for seismic  
14 events and will not be inimical to public health  
15 and safety, close quote.

16 Have I read that correctly?

17 A. Yes, you did.

18 Q. In effect, then, the Staff reached a  
19 judgment that the use of a 2,000-year return period  
20 ground motion with the probabilistic seismic hazard  
21 analysis for that facility was acceptable, with the  
22 understanding that the actual design of the  
23 facility would be designed higher, to a 0.36 g  
24 level, correct?

25 A. That's correct. My understanding of

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1 this issue is that the proposal of the .36 g design  
2 basis motion was before the Staff, they recognized  
3 that was to be the design basis, and they approved  
4 it. I used the word "approve" in my understanding  
5 of the last paragraph of the third page of the  
6 Staff Exhibit S which begins with the sentence, In  
7 summary, the Staff finds that the design earthquake  
8 proposed by DOE-ID for the TMI-2 I-S-F-S-I (0.35 g  
9 peak ground acceleration with an appropriate  
10 response spectrum) adequately protects health and  
11 safety.

12 Q. Are you reading -- what are you reading  
13 now?

14 A. I'm reading the -- from the bottom of  
15 the third page of Staff Exhibit S which is part of  
16 the S-E-C-Y from L. Joseph Cowan to the  
17 Commissioners.

18 Q. So we're really reading the same  
19 document, and you have your interpretation?

20 A. Yes. And we visited this issue,  
21 Mr. Turk, in my deposition last October. And I  
22 referred to an NRC transcript of a public hearing  
23 in which Stephen McDuffie, who identified himself  
24 as the staff person who had written the  
25 justification for the exemption, expressed a

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1 position, and I have the document with me. Perhaps  
2 I could refer to it and quote what Mr. McDuffie  
3 said exactly.

4 Q. All right. I don't think you need to.  
5 I have limited time available and --

6 A. Okay. Basically --

7 Q. -- I'd like to focus on my remaining  
8 questions.

9 A. -- he said we -- the Staff considered  
10 that the 2,000-year design basis motion would be  
11 acceptable. DOE was proposing .36 g, so we went  
12 ahead with the exemption.

13 MR. TURK: Okay. Your Honor, if I've  
14 not already done so -- did I offer QQ into  
15 evidence? I believe I did. If not, I would offer  
16 it.

17 Offered and admitted already?

18 JUDGE FARRAR: Yes, we did.

19 MR. TURK: Okay.

20 Q. By the way, that was not a hearing that  
21 you attended, it was a public meeting, correct,  
22 with Mr. McDuffie?

23 A. Correct, and what I base my information  
24 on is reading of the transcript.

25 MR. TURK: Your Honor, may we go off the

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1 record for a moment?

2 JUDGE FARRAR: Certainly.

3 (A discussion was held off the record.)

4 (STAFF EXHIBIT-RR WAS MARKED.)

5 MR. TURK: Your Honor, for the record,  
6 let me indicate that I've distributed a copy of  
7 three pages from the article by Dr. Arabasz and  
8 R.K. McGuire. These are the cover page and pages  
9 343 and 345 from the article entitled "An  
10 Introduction to Probabilistic Seismic Hazard  
11 Analysis." And I've asked this to be marked as  
12 Staff Exhibit RR for identification, and I would  
13 offer it into evidence at this time.

14 JUDGE FARRAR: All right. The reporter  
15 has already marked it. Any objection?

16 MS. CHANCELLOR: No objection,  
17 Your Honor.

18 MR. GAUKLER: No objection.

19 JUDGE FARRAR: Then RR will be admitted.

20 (STAFF EXHIBIT-RR WAS ADMITTED.)

21 Q. (By Mr. Turk) Dr. Arabasz, again,  
22 turning to your prefiled testimony, Answer 13 on  
23 page 12 --

24 A. I see that.

25 Q. -- there's a paragraph -- the very last

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1 paragraph of this answer states, "On April 8, 1998  
2 the NRC informed the DOE" -- and then it provides a  
3 quotation and a citation to SECY-98-071. Should  
4 that be corrected to say the NRC informed the  
5 Commission rather than DOE? Do you recognize  
6 what --

7 A. I don't know without the documents in  
8 front of me. I'm not certain.

9 Q. Well, you cite SECY-98-071. Is it  
10 correct that's Staff Exhibit S that you do have in  
11 front of you?

12 A. Yes.

13 Q. And you cite page 3 of this document?  
14 This is a minor point, I'm sure.

15 A. I'll accept your representation.

16 Q. Okay. The SECY paper 98-071 was, in  
17 effect, a proposal from the Staff to the Commission  
18 recommending the grant of the seismic exemption to  
19 the DOE Idaho ISFSI for TMI-2, correct?

20 Item 21, Your Honor.

21 A. As you've described, correct.

22 MS. CHANCELLOR: Your Honor, if this  
23 line of questioning goes to the citation, we'll  
24 stipulate that that should be the Commission rather  
25 than DOE, if that helps.

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1 JUDGE FARRAR: All right.

2 Q. (By Mr. Turk) The actual issuance of  
3 the seismic exemption to DOE Idaho for that  
4 facility did not take place until some time later;  
5 is that correct? Do you know?

6 A. That would appear to be logical. I'd  
7 accept that.

8 JUDGE FARRAR: Mr. Turk?

9 MR. TURK: Yes.

10 JUDGE FARRAR: Maybe I should have  
11 thought of this earlier, but on these things that  
12 go to what the Staff was doing, would it be quicker  
13 to put on a staff rebuttal witness who says, Here's  
14 what we did, A, B, C, D, E on such and such a date?  
15 In other words, here's a witness who's not familiar  
16 with the Staff's internal workings. It's kind of  
17 laborious to get him to acknowledge something that  
18 everybody sitting on your side of the room knows  
19 instinctively is true. Could it be established  
20 that way? Maybe I should have thought of that  
21 sooner.

22 MR. TURK: It could be established that  
23 way, Your Honor, but then you're presented with two  
24 conflicting pieces of testimony and you have to  
25 decide which is correct. If I establish it with

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1 cross-examination, then perhaps the statement by  
2 Dr. Arabasz would be corrected or retracted or at  
3 least put in the proper context. So I think I need  
4 to do it with cross-examination, although you're  
5 certainly right we could make a case through  
6 rebuttal as well.

7 JUDGE FARRAR: Well, this one, for  
8 example, what a SECY papers says, if you guys  
9 produced the paper, then I don't care what he said.  
10 The official document is going to control. But  
11 maybe we can use that for a future reference.

12 MR. TURK: All right. I appreciate  
13 that. I'll try to make this brief.

14 JUDGE FARRAR: Okay.

15 MR. TURK: I have a document dated  
16 March 19, 1999 before me. I don't have copies of  
17 this one, but I don't intend to make it an exhibit  
18 anyway.

19 With your permission, may I approach the  
20 witness?

21 JUDGE FARRAR: Certainly.

22 MR. TURK: And I'll represent that this  
23 is, in fact, the document by which the NRC issued  
24 the ISFSI to the TMI-2 facility at DOE Idaho.

25 MS. CHANCELLOR: You mean the license

1 rather than -- the issue of the license?

2 MR. TURK: I'm sorry. This is the issue  
3 of the license that contains the exemption.

4 MS. CHANCELLOR: Your Honor, I'd be  
5 happy to work with Mr. Turk and stipulate to some  
6 of these minor points.

7 Q. (By Mr. Turk) Do you have this document  
8 in front of you?

9 A. I do.

10 Q. And, in fact, it's a letter from E.  
11 William Brach, director of the Spent Fuel Project  
12 Office, to Warren E. Bergholz, acting manager at  
13 Idaho Operations Office of DOE, dated March 19th of  
14 1999?

15 A. Correct.

16 Q. The subject is issuance of materials  
17 license SNM-2508 for the Three Mile Island, Unit 2,  
18 Independent Spent Fuel Storage Installation,  
19 correct?

20 A. Correct.

21 Q. And I'd like you to turn, if you would,  
22 to -- inside this document do you see the next page  
23 of the document before you is entitled, U.S.  
24 Department of Energy, Docket No. 72-20 -- I'm  
25 sorry, Idaho Operations Office, Docket No. 72-20,

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1 TMI-2 Independent Spent Fuel Storage Installation,  
2 Materials License No. SNM-2508?

3 A. Yes, I see this.

4 Q. And this is the actual license? It's  
5 the regulatory findings issued upon issuance of the  
6 license? Do you understand that?

7 A. Yes.

8 Q. And attached to it is the actual license  
9 itself. Do you see that?

10 A. Yes, I do.

11 Q. And I would --

12 A. And I'm pleased to see what one actually  
13 looks like.

14 Q. Okay. So, in fact, then, the Staff  
15 issued the license -- and I should point out --  
16 let's take a look at one other thing in the  
17 license. Do you see paragraph 12 which states,  
18 "Pursuant to 10 CFR 72.7, the licensee is hereby  
19 exempted from the following," item a), Requirements  
20 of 10 CFR 72.102(f)(1) related to specified seismic  
21 criteria of 10 CFR Part 100, Appendix A? Do you  
22 see that?

23 A. Yes, I see this.

24 Q. And then there are several other  
25 exemptions. But that one is one of the specific

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1 exemptions mentioned in this paragraph 12 of the  
2 license, correct?

3 A. Correct.

4 Q. Now, in your -- in your testimony on  
5 page 12 in Answer 13, that same paragraph that we  
6 were discussing a few minutes ago which begins with  
7 the words "On April 8, 1998, the NRC informed" --

8 A. I have that in front of me, yes.

9 Q. -- you indicate that after the issuance  
10 of SECY-98-071, quote, Two months later in June  
11 1998, the Part 72 Rulemaking Plan, SECY-98-126, was  
12 released, with allowance only for design basis  
13 ground motions with mean annual probabilities of  
14 exceedance corresponding to return periods of 1,000  
15 years and 10,000 years depending on risk, close  
16 quote.

17 Do you see that statement?

18 A. Yes, I do.

19 Q. In effect, what you're stating there is  
20 that after -- in your view, after the Staff had  
21 issued the SECY-98-071 paper, the rulemaking plan  
22 was released which had a two-tier proposal for  
23 consideration of seismic risk.

24 A. In my view, that's correct.

25 Q. As you now see from the March 19

1 document, the actual issuance of the exemption to  
2 DOE Idaho for the TMI-2 ISFSI came after the  
3 rulemaking plan had been released in 98-126,  
4 correct?

5 A. I accept your time line but stand amazed  
6 at the inner workings of the NRC in this regard.

7 Q. But the fact is that the rulemaking plan  
8 was issued with a two-tier structure, and,  
9 nonetheless, in March of 1999 after the rulemaking  
10 plan was released, the TMI-2 ISFSI exemption was  
11 issued by the Commission with a single-tier design  
12 ground motion, correct? Just if you could answer  
13 yes or no without regard to what significance to  
14 attach to it.

15 A. Forgive me. I lost track of the  
16 sequencing in the question.

17 Q. I'm sorry.

18 MS. CHANCELLOR: I believe this has been  
19 asked and answered, Your Honor.

20 MR. TURK: Your Honor, it would go much  
21 faster if counsel for the State would allow me to  
22 proceed without interruption. It has not been  
23 asked or answered.

24 JUDGE FARRAR: I cannot agree that that  
25 has been a problem.

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1 Do you remember the question?

2 THE WITNESS: No, and this was my  
3 hesitancy in answering --

4 JUDGE FARRAR: And counsel can ask you  
5 to give a yes or no answer, which we like you to  
6 do, and then you can always explain.

7 THE WITNESS: I need to have the  
8 question simply reread, please.

9 (The question was read as follows:

10 "Question: But the fact is that the  
11 rulemaking plan was issued with a two-tier  
12 structure, and, nonetheless, in March of 1999,  
13 after the rulemaking plan was released, the  
14 TMI-2 ISFSI exemption was issued by the  
15 Commission with a single-tier design ground  
16 motion, correct? Just if you could answer yes  
17 or no without regard to what significance to  
18 attach to it.")

19 THE WITNESS: I'm just confused by the  
20 single tier in the exemption, meaning simply that  
21 the 2,000-year --

22 Q. (By Mr. Turk) Okay. There was a  
23 single -- there was a single design earthquake --  
24 I'm sorry. Strike that.

25 The exemption issued for the TMI-2 ISFSI

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1 did not use a 1,000/10,000 two-tier structure for  
2 deciding what seismic hazard ground motion to  
3 establish for the facility, correct?

4 A. Correct.

5 Q. So the actual exemption did not follow  
6 the rulemaking plan?

7 A. As you've explained it, correct.

8 Q. You agree with that?

9 A. Yes.

10 MR. TURK: Your Honor, skipping down to  
11 item 27.

12 Q. In Answer 15 of your testimony, on  
13 page 16 -- this is well into the answer --

14 A. Yes.

15 Q. -- you go into a discussion of a paper  
16 by Pate-Cornell.

17 May we go off the record for a moment?

18 JUDGE FARRAR: Yes, certainly.

19 (A discussion was held off the record.)

20 MR. TURK: I'm ready to go back on the  
21 record now.

22 JUDGE FARRAR: All right.

23 MR. TURK: Your Honor, counsel for PFS  
24 has directed me to page 53 of the prefiled  
25 testimony of Dr. C. Allin Cornell in which I see a

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1 one-sentence reference to the Pate-Cornell paper.  
2 This is at the beginning of Answer 94.

3 Q. Dr. Arabasz, quite frankly, I was  
4 surprised to see this entire discussion of the  
5 Pate-Cornell paper which seems to take up all of  
6 page 16 of your testimony. Is it correct that this  
7 is material that was drawn from your declaration of  
8 December 6, 2001 and simply reinserted into the  
9 testimony virtually verbatim?

10 A. Correct.

11 Q. So what you were addressing in these  
12 three paragraphs on page 16 of your prefiled  
13 testimony was essentially the Applicant's motion  
14 for summary disposition?

15 A. The -- the argument presented there,  
16 correct.

17 MR. TURK: Your Honor, I would move to  
18 strike these three paragraphs as not being relevant  
19 to an issue presented in testimony before you.  
20 It's a rebuttal to a paper by Dr. Cornell and one  
21 other author which has not been placed into  
22 evidence before you, and it seems to be irrelevant  
23 to anything that you need to decide, except to the  
24 extent that there is one sentence in Dr. Cornell's  
25 prefiled testimony that summarizes the Cornell-Pate

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1 paper.

2 And, for the record, should I read that  
3 in, or do you have that testimony handy?

4 JUDGE FARRAR: Read the sentence.

5 MR. TURK: The sentence? The question  
6 has to do with whether a 20-year operating life  
7 versus a 40-year operating life affects the choice  
8 of a design basis earthquake. Dr. Cornell answers,  
9 No -- quote, No. In virtually all areas of public  
10 safety hazards -- I'm sorry. In virtually in all  
11 areas of public safety, hazards are measured in  
12 terms of frequency of occurrence, e.g., as measured  
13 in annual probabilities and probabilities for a  
14 50-year period or in per human lifetime units, and  
15 the same safety criteria are specified regardless  
16 of the length of the activity in question, the  
17 exposure time, the estimated facility life or  
18 licensing duration. Citation Reference 12,  
19 Cornell-Pate paper. And that -- close quote.

20 And that one sentence is the only thing  
21 the Applicant has put forward.

22 JUDGE FARRAR: Unfortunately, I seem to  
23 recall Dr. Cornell and I had a long discussion  
24 about this subject, while he was testifying, about  
25 living in apartment buildings and how long and so

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1       forth. So even though it may have only taken a  
2       line of their -- of his prefiled testimony, we did  
3       go into that subject at some length. So I don't  
4       know how we can strike Dr. Arabasz's testimony  
5       unless we also strike the sentence from  
6       Dr. Cornell's prefiled testimony and strike any  
7       discussion we had of it, which makes a lot of  
8       sense.

9                   Ms. Chancellor, maybe I'm --

10                   MS. CHANCELLOR: We also had to  
11       anticipate what PFS may file in its prefiled  
12       testimony, and the only thing that we had to  
13       anticipate was PFS's motion for summary  
14       disposition.

15                   JUDGE FARRAR: No one's criticizing you  
16       for having this in here. That's part of the  
17       problem of simultaneous direct filings.

18                   MS. CHANCELLOR: But that said,  
19       Dr. Cornell still does rely on the Pate-Cornell for  
20       annual probabilities. And there was a long  
21       discussion between counsel for PFS and Dr. Arabasz,  
22       and I believe also Mr. Turk may have gotten into  
23       this, or did. And Dr. Cornell said -- Dr. Arabasz  
24       said that Dr. Cornell would have to produce  
25       something other than the Pate-Cornell paper to

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1 convince him of his -- of his reasoning and his  
2 logic, so I think it's directly on point.

3 And as you have said, we typically don't  
4 go back and strike testimony that has -- that's in  
5 the record. We use cross-examination for that, to  
6 test the accuracy of the testimony.

7 So I think the objection has no basis.

8 JUDGE FARRAR: Let me ask Mr. Gaukler  
9 for his thoughts since this is his witness.

10 MR. GAUKLER: Two things, two thoughts,  
11 Your Honor. First of all, this whole issue  
12 concerns something which Mr. Turk has been saying  
13 was not a basis of the Staff's granting of the  
14 exemption. If we agree that wasn't a basis for  
15 granting the exemption, then the State's whole  
16 issue will go away, but I don't know whether the  
17 State will agree with that or not.

18 Secondly, while we do rely upon the Pate  
19 paper in the general sense and in the sense that  
20 to -- can I just state background? There was -- in  
21 terms of the initial declaration of Dr. Cornell --  
22 and this is just for background to understand how  
23 everything came about -- he made a reference to  
24 annual probabilities, and then Dr. Arabasz made his  
25 point in his declaration. And we've modified

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1 somewhat what Dr. Cornell has said based on what --  
2 Dr. Arabasz's critique in the sense that annual  
3 probabilities -- you'll notice now in his testimony  
4 he talks about frequencies, annual frequency of  
5 every 50 years. This is really another way of just  
6 saying annual probability. So we rely upon the  
7 general concept that annual probability is the  
8 correct way to go regardless of the units you  
9 express it in.

10 JUDGE FARRAR: The last time we -- when  
11 Dr. Cornell was on the stand, we still had pending  
12 Utah SS with the 20/40-year problem. Now that we  
13 no longer have that pending, does that make this  
14 issue less relevant?

15 MR. GAUKLER: That goes back to my first  
16 question, is this really an issue at all anymore,  
17 this whole thing of 20 versus 40, and can we just  
18 do away with it since the Staff no longer expressly  
19 relies upon it as a basis for granting the  
20 exemption?

21 MS. CHANCELLOR: If I may, Your Honor,  
22 the operating period of the facility still shows up  
23 in the latest rulemaking plan for Part 72, and I  
24 don't agree with Mr. Gaukler's premise that if this  
25 has no basis for granting the exemption, it should

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1 be struck out, because it goes to challenging part  
2 of Dr. Cornell's logic. And this is one part of  
3 Dr. Arabasz's testimony where he does discuss what  
4 he anticipates Dr. Cornell will be testifying to  
5 and, in fact, what Dr. Cornell does rely on, to  
6 some extent, in his testimony.

7 MR. GAUKLER: We're getting into that  
8 circular argument that the only reason why Dr.  
9 Arabasz mentioned it in the first place is because  
10 the Staff relied upon it, therefore, the only  
11 reason that we addressed it in ours is because Dr.  
12 Arabasz mentioned it. And so now we get into a  
13 circular loop here.

14 MS. CHANCELLOR: That's the reason why  
15 it should stay in, Your Honor.

16 MR. GAUKLER: So we had raised it so  
17 that we -- to respond to a basis raised in the  
18 contention by the State. That's how come we  
19 addressed it.

20 MR. TURK: I think where we are at this  
21 point, Your Honor, based on the cross-examination  
22 that preceded this point today, is Dr. Arabasz's  
23 article that he authored utilizes mean probability  
24 of exceedance as a proper way to conduct a PSHA,  
25 which I don't think was a disagreement among the

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1 parties, stating the hazard as an annual  
2 probability of exceedance, mean probability of  
3 exceedance is a way to state the hazard.

4 I think all of this is -- is history,  
5 ancient history, as Ms. Chancellor stated, or  
6 pertains to the rulemaking plan which has not been  
7 adopted by the Commission as either a proposed  
8 regulation or final regulation. Maybe it's just of  
9 historical interest, but it's not something that we  
10 have to decide upon in your decision. And if we  
11 all stipulate to that, maybe the best thing is to  
12 leave it in and just consider it historical  
13 information.

14 MS. CHANCELLOR: Your Honor, we won't  
15 stipulate to it. We --

16 JUDGE FARRAR: Why don't we leave it in  
17 without you needing to cross-examine Dr. Arabasz on  
18 page 16?

19 MR. TURK: I will not cross-examine on  
20 page 16.

21 JUDGE FARRAR: Fine. It's in. Let's  
22 move on.

23 MR. TURK: The understanding -- I'm  
24 sorry. I will not cross-examine based on my  
25 understanding that's just of historical interest,

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1 but if the State intends to cite it as reasons why  
2 you should use a lifetime hazard statement --

3 MS. CHANCELLOR: Your Honor, we may cite  
4 it for the Staff's fuzzy logic.

5 MR. TURK: Our what?

6 MS. CHANCELLOR: Fuzzy logic.

7 MR. TURK: You can say that more loudly.  
8 I just wanted to hear what it was.

9 MS. CHANCELLOR: We're still on the  
10 record.

11 MR. TURK: Are we?

12 (The Board confers off the record.)

13 JUDGE FARRAR: Mr. Turk, in terms of  
14 Dr. Arabasz's paper which you've questioned him on,  
15 you're saying that what he says there is consistent  
16 with Dr. Cornell's view?

17 MR. TURK: Oh, to the contrary.  
18 Dr. Cornell relies upon an annual probability of  
19 exceedance standard as does the Staff, as Dr.  
20 Arabasz's article does.

21 JUDGE FARRAR: Does?

22 MR. TURK: Yes.

23 JUDGE FARRAR: So that article is  
24 consistent now with Dr. Cornell's view?

25 MR. TURK: Dr. Arabasz's article.

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1 JUDGE FARRAR: Is consistent with  
2 Dr. Cornell's view?

3 MR. TURK: Yes, as I understand it.

4 JUDGE FARRAR: Then why doesn't the  
5 testimony of Dr. Arabasz just stand? You've got  
6 his article in there, the issue's been thoroughly  
7 ventilated, and people can argue whatever they  
8 want. In other words, suppose you cross-examined  
9 for the next whatever period of time, what more  
10 would you get out of Dr. Arabasz than you've  
11 already gotten from his paper?

12 MR. TURK: I would not take anything  
13 else, and I'm willing to pass it.

14 JUDGE FARRAR: Fine. Let's go.

15 MR. TURK: May I take a few moments,  
16 Your Honor?

17 JUDGE FARRAR: Yes, certainly.

18 MR. TURK: In fact -- I don't know if  
19 anybody needs a break -- I'd like to look at my  
20 papers and see if there's anything else that I want  
21 to raise with Dr. Arabasz as opposed to rebuttal  
22 from Dr. Stamatakos. But I can do that in a few  
23 minutes, so if you just want to hold in place --

24 JUDGE FARRAR: Let's just take a break  
25 in place here.

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1 (A recess was taken.)

2 MR. TURK: Your Honor, you'll see on the  
3 cross-examination plan items 29 and 30?

4 JUDGE FARRAR: Right.

5 MR. TURK: I have not addressed those  
6 today. We've touched on it previously.

7 JUDGE FARRAR: Right.

8 MR. TURK: Rather than come back to  
9 Dr. Arabasz with those, I intend to produce  
10 Dr. Stamatakos, and he'll address those issues.

11 JUDGE FARRAR: All right.

12 MR. TURK: So with that, I'm prepared to  
13 close my examination now.

14 JUDGE FARRAR: Good. Thank you.

15 MR. TURK: I thank Dr. Arabasz for his  
16 patience and assistance to all of us, at least on  
17 my behalf.

18 JUDGE FARRAR: Thank you, Mr. Turk.

19 (The Board confers off the record.)

20 MR. TURK: We'll get copies of the TMI-2  
21 license that we've discussed, and we'll offer that  
22 exhibit, but otherwise I'm done.

23 I'm sorry, Dr. Lam.

24 JUDGE LAM: Dr. Arabasz, since you are  
25 the earthquake expert from the State, let me ask

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1 you this question that I have on my mind for quite  
2 a while while I was sitting here listening to  
3 everybody's testimony. Now, let me paraphrase what  
4 Dr. Cornell had said earlier in his testimony, that  
5 what we have in front of us is this two-hand  
6 approach. This is Dr. Cornell's phrase. On one  
7 hand we have the seismic standard and requirement,  
8 on the other hand we have how robust the design  
9 structures are. So Dr. Cornell's description of  
10 how we should deal with this as a safety issue is  
11 we have this two-hand approach.

12 Now, what has been on my mind is that it  
13 appears to me that one of these two hands is doing  
14 all the heavy lifting, which is the design  
15 robustness. On the seismic hand, if I may label  
16 that, I see we are dealing with the Applicant  
17 requesting an exemption from a 10,000-year return  
18 interval to a 2,000-year. On the on the other  
19 hand, which is the design robustness hand, I have  
20 heard testimony from Dr. Singh, Dr. Soler, many  
21 other experts, that, Don't worry, we've got plenty  
22 of safety margin data.

23 Now, my question to you is I'm fully  
24 aware that you have handed off how the design  
25 margin should be dealt with to other experts in the

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1 State, array of experts, but let me concentrate on  
2 this seismic hand. In your expert opinion, are we  
3 doing the right thing here by first employing a  
4 two-hand approach, and secondly, relying on one  
5 hand doing most of the heavy lifting?

6 THE WITNESS: The question, are we doing  
7 the right thing with using the two-handed approach,  
8 I -- my testimony in my prior deposition is to say  
9 definitely, yes, I'm emphatically in agreement with  
10 Dr. Cornell.

11 JUDGE LAM: The second question is are  
12 we being uneven here by relying on the design  
13 feature of the cask, of the pad, of the soil?

14 THE WITNESS: The problem, as I see it,  
15 is not being in a fixed reference frame. Where we  
16 don't have fixed stars, we have to advance in a  
17 trial and error way.

18 What is absent in this regulatory  
19 process -- and this is explained in detail in NUREG  
20 6728 that was published or that has an October  
21 date -- is, first of all, the lack of agreement on  
22 a failure probability which enters importantly into  
23 how one looks at those two hands, the hazard  
24 probability and the design conservatisms. These  
25 are fleshed out more in the DOE framework. But if

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1 one sets out to achieve risk consistency across the  
2 country, then these elements that Dr. Cornell has  
3 described and that he elaborates on in Attachment A  
4 of his prefiled testimony become very important.

5 Some of my explanation I anticipate will  
6 be developed more fully with some questioning from  
7 the -- the State's lawyers, but ultimately, if we  
8 do not have a regulatory framework where the  
9 performance goal or the probability of failure is  
10 established, then we enter into a fluid domain. In  
11 my understanding, if we were building a nuclear  
12 power plant, that the right hand -- one would have  
13 confidence in the right-hand side, that the factors  
14 of safety were achieved by following the standard  
15 review plans.

16 Again, in my understanding as a  
17 nonengineer, this is a -- the SSE elements are  
18 nontypical or different from those that would be in  
19 place in a nuclear power plant so that,  
20 unfortunately, your job as the judge in this  
21 hearing, I perceive, will be making some judgment  
22 about whether the asserted conservatisms in design  
23 have been achieved with some confidence. If not,  
24 then the logic takes us back to the other side,  
25 looking to the exceedance probability. The

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1 criteria of the design basis ground motion to  
2 achieve some assurance of -- I guess the words  
3 escape me -- a sufficiently protective outcome.

4 Have I answered your question fully  
5 or --

6 JUDGE LAM: Yes, you did, Dr. Arabasz.  
7 Thank you.

8 JUDGE FARRAR: Ms. Chancellor, any  
9 redirect?

10 MS. CHANCELLOR: Yes, Your Honor.

11 MR. GAUKLER: Your Honor, I have some  
12 recross -- should I wait until after  
13 Ms. Chancellor's redirect? -- based upon the  
14 Board's questions and the Staff. I can wait until  
15 after Ms. Chancellor if it's more efficient. It  
16 makes no difference to me.

17 JUDGE FARRAR: You've had your turn.  
18 According my score card, we had you cross first.

19 MR. GAUKLER: I agree with that.

20 JUDGE FARRAR: But you want another  
21 chance now, and then she could have just one shot  
22 at --

23 MR. GAUKLER: Either way you want to do  
24 it.

25 MS. CHANCELLOR: I prefer to do redirect

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1 of Dr. Arabasz.

2 JUDGE FARRAR: Okay. Then, Mr. Gaukler,  
3 thank you for the suggestion in the name of  
4 efficiency, but it's the State's call on that.

5 Go ahead, Ms. Chancellor.

6 MS. CHANCELLOR: In an effort to be  
7 somewhat efficient, I've had premarked the State's  
8 exhibits, and Ms. Nakahara is now handing out a set  
9 of those exhibits.

10 JUDGE FARRAR: Right.

11 MS. CHANCELLOR: And I will very briefly  
12 describe for the record what these exhibits are.  
13 They're marked on the right-hand side with the  
14 State exhibit number.

15 The first one is State Exhibit 201. The  
16 cover page is Regulatory Guide 1.165. The second  
17 page is one page from Appendix B.

18 State's Exhibit 202 is the topical  
19 report for Yucca Mountain August 1997. The second  
20 page is Table C-2.

21 State's Exhibit 203 is Basis for Seismic  
22 Provisions for DOE-STD-1020 by Kennedy and Short,  
23 two pages, a cover page and an annotated copy of  
24 page A-4 of that document.

25 State's Exhibit 204, Update of

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1 Deterministic Ground Motion Assessments, Revision  
2 1, by Geomatrix, April 2001, on the cover page,  
3 plus Figures 2 and 3.

4 State's Exhibit 205, the first page is  
5 an e-mail communication from Dr. Arabasz to Ivan  
6 Wong. The second page is a paper entitled  
7 "Probabilistic Seismic Hazard Analyses for Ground  
8 Motions and Fault Displacements at Yucca Mountain,  
9 Nevada," page 113, page 137, a cover page entitled  
10 "Probabilistic Seismic Hazard Analysis for Fault  
11 Displacement and Vibratory Ground Motion at Yucca  
12 Mountain, Nevada, Final Report, Volume 1," a cover  
13 page and Figure 7-9. And that comprises State's  
14 Exhibit 205.

15 State's Exhibit 206 is Seismic Hazards  
16 Evaluation of the Los Alamos National Laboratory  
17 dated 24 February 1995, the cover page plus Figures  
18 8-9 and Figure 9-98.

19 State's Exhibit 207, DOE-STD-1020-2002  
20 consisting of a cover page and page C-6, including  
21 Table C-3, and I note that this is duplicative of  
22 one Mr. Turk offered.

23 The next exhibit is State's Exhibit 208,  
24 a one-page document entitled "Risk Reduction Ratio,  
25 Mean Return Period of Design Basis Earthquake (DBE)

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1 Ground Motions, and Target Performance Goal."

2 And, finally, State's Exhibit 209,  
3 consisting of one, two, three, four pages, the  
4 first -- the first three pages are excerpts from  
5 the bullets that Dr. Arabasz was referring to, to  
6 three different versions of the Staff's safety  
7 evaluation report, and the last page are the  
8 bullets on the Staff's modified rulemaking Plan,  
9 SECY-01-0178.

10 These exhibits have been premarked by  
11 the reporter.

12 JUDGE FARRAR: And, again, we appreciate  
13 you having that done during a lunch break.

14 MS. CHANCELLOR: You're welcome,  
15 Your Honor.

16

17 REDIRECT EXAMINATION

18 BY MS. CHANCELLOR:

19 Q. Dr. Arabasz, I would like to first start  
20 out with the document that the State gave to the  
21 Staff in which three paragraphs had previously been  
22 redacted and they have now been released in their  
23 entirety. From the document entitled "Fault  
24 Evaluation Study and Seismic Hazard Assessment"  
25 dated 21 April 1999, on page 4 --

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1 MR. TURK: May I ask if this is the  
2 Staff exhibit?

3 MS. CHANCELLOR: No, it's not. You  
4 didn't offer it into evidence, Mr. Turk.

5 MR. TURK: Oh, I'm sorry. That's  
6 correct. Okay.

7 Q. (By Ms. Chancellor) Dr. Arabasz,  
8 earlier today you were asked a question about  
9 the -- a review comment in this document I referred  
10 to that states, "Also, the development of the  
11 site-specific response spectra, incorporating  
12 near-source effects, appears to have been done  
13 correctly and conservatively." Can you explain  
14 what you meant by conservatively in that statement?

15 A. What I was referring to in the review  
16 comment was simply the step in which the hazard  
17 results were translated into a site-specific  
18 response spectra, and the procedure is described in  
19 Appendix F of Reg Guide 1.165 and simply requires  
20 that the resulting spectra envelope in an  
21 appropriate way the spectra for the controlling  
22 earthquakes. And so conservatively simply means  
23 that an appropriate envelope was achieved.

24 Q. Could you read conservatively to mean  
25 that Geomatrix overestimated the ground motions for

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1 specific return periods?

2 A. No. This would be completely separate  
3 from the P-S-H-A hazard results.

4 Q. And there was a second redaction that  
5 Mr. Turk -- previous redaction that Mr. Turk  
6 referred to, and this is from a document entitled  
7 "Issues and Perspectives Relating to Hazard  
8 Assessment of Earthquake Ground Shaking and Surface  
9 Fault Displacement for Licensing the Private Fuel  
10 Storage Facility, Skull Valley, Utah" dated 21  
11 April 1999 at page 2. And let me read the  
12 sentence, and maybe you can explain your thinking  
13 at this time.

14 Do you have a copy of the document in  
15 front of you, Dr. Arabasz?

16 A. Yes, I do. Which page are you referring  
17 to?

18 Q. Page 2.

19 A. Page 2, yes.

20 Q. The second paragraph under Request for  
21 Exemption to 10 CFR 72.102(f)(1), "If, indeed, the  
22 dry storage casks and canister -- even under the  
23 conditions of a major seismic event -- are safe as  
24 asserted by PFS and believed by the NRC staff, then  
25 we can think of no compelling argument to put

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1 forward against awarding the exemption. PFS's  
2 arguments for allowing a probabilistic rated  
3 approach for design of the Skull Valley facility  
4 are consistent with the weight of NRC opinion and  
5 intent in the Rulemaking Plan for revision to Part  
6 72 (Reference 90)."

7 A. Correct.

8 Q. Could you explain your thinking at that  
9 time?

10 A. This was at an early date, prior to my  
11 being designated a State's witness, and now I come  
12 to understand more fully what the phrase  
13 "Confidential, attorney-client privilege" means.  
14 It was a candid assessment conveyed to the State  
15 after -- and it was described as an informal  
16 summary of our views at this stage of the review  
17 process. Having read the Applicant's exemption  
18 request and the reasoning in the rulemaking plan as  
19 outlined, it seemed impressive. And my candid  
20 assessment at that time was stated beginning with  
21 the "If," here again with a capital I.

22 Subsequent to that statement or delivery  
23 of the report to the Utah Department of  
24 Environmental Quality and the office of the  
25 attorney general, I was informed that there was a

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1 legal process which required a response to the  
2 exemption request, that, in effect, it was a now or  
3 never situation in which a reply had to be made,  
4 and, in effect, think harder, Dr. Arabasz, do you  
5 have any reasons for considering whether the  
6 exemption is fully justified.

7 Mr. Turk put into my hands a document to  
8 which I appended a declaration, I believe, nine  
9 days later, and the -- to the best of my memory,  
10 the circumstances were that it was a legal document  
11 in which the State was arguing whether the  
12 Applicant was required to -- to pursue a different  
13 legal venue rather than requesting the exemption.  
14 I may be confused on this point, but that's my  
15 vague understanding.

16 And then there were various experts and  
17 the attorney general's office counsel that  
18 formulated the basic argument. In my declaration I  
19 indicated that I assisted the Staff -- excuse me, I  
20 assisted counsel and reviewed the document for  
21 correctness as it related to seismic hazard  
22 analysis.

23 Q. And the views expressed in this paper of  
24 April of 1999, are they still views you hold today?

25 A. No, they're not, and they fell by the

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1       wayside pretty quickly with the issuance of the  
2       Staff's reasoning for justifying the 2,000-year  
3       return period ground motion, and that began the --  
4       I guess the trail of my challenging the reasons  
5       that they offered for the 2000-year return period  
6       ground motion.

7           Q.       When you say the Staff's rationale, you  
8       found that unacceptable; is that correct?

9           A.       That's correct. I felt that it invited  
10      challenge.

11          Q.       Mr. Turk asked you some questions on a  
12      paper that you authored with an R.K. McGuire, An  
13      Introduction to Probabilistic Seismic Hazard  
14      Analysis, and does this paper stand for the  
15      proposition that the mean annual probability of  
16      exceedance is irrelevant to the exposure time with  
17      respect to public safety and risk?

18           MR. TURK: Objection, Your Honor, on two  
19      grounds. One, I don't understand the question;  
20      two, the State asking whether an entire paper  
21      stands for a certain limited proposition I think is  
22      an improper attempt to characterize the paper. I  
23      would agree that the entire paper may not be  
24      characterized that way. If she wants to address  
25      those specific statements that we examined, then I

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1 have no problem.

2 MS. CHANCELLOR: I'll limit my question  
3 to the specific portions that Mr. Turk had Dr.  
4 Arabasz read.

5 MR. TURK: Could I then ask for the  
6 question to be restated? Am I getting ahead of  
7 myself?

8 JUDGE FARRAR: By the reporter or by  
9 Ms. Chancellor?

10 MR. TURK: It's up to the questioner, as  
11 far as I'm concerned.

12 JUDGE FARRAR: Ms. Chancellor, can you  
13 ask it again and eliminate the problem?

14 Q. (By Ms. Chancellor) Dr. Arabasz, with  
15 respect to the material that Mr. Turk read from a  
16 paper by McGuire and Arabasz, is it a correct -- is  
17 it correct that the mean annual probability of  
18 exceedance -- what relationship does the mean  
19 annual probability of exceedance have to exposure  
20 time and risk?

21 A. To --

22 MR. TURK: I'm sorry. Exposure time and  
23 risk? I don't understand that. Are you talking  
24 about radiological risk and exposure to  
25 radiological materials or --

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1 Q. (By Ms. Chancellor) Can you --

2 JUDGE FARRAR: Do understand the  
3 question?

4 THE WITNESS: Yes, I do.

5 MS. CHANCELLOR: Thank you.

6 JUDGE FARRAR: Objection overruled.

7 THE WITNESS: On the one hand, we have a  
8 depiction of hazard information as a mean annual  
9 probability of exceedance. This, again, becomes  
10 the Y axis on a hazard curve. This is linked, as I  
11 understood it in Mr. Turk's logic, to the dispute  
12 between myself and Dr. Cornell as it related to  
13 annual versus some other representation of hazard.  
14 The context that Dr. Cornell raised, the annual  
15 probability was one of public safety, and here, in  
16 my mind, public safety introduces the -- the  
17 concept of risk, not just simply how one  
18 scientifically describes frequency of hazard.

19 And I come back to earlier testimony  
20 where I raised the consideration of exposure time  
21 as a legitimate consideration of acceptable public  
22 risk. To the extent that the Staff had used a  
23 metric of the licensing term of the facility, then  
24 it seemed an appropriate one to consider and  
25 address, that in some consideration, if one views a

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1 judgment of acceptable risk to be made on the  
2 probability of exceedance during the exposure time  
3 of the activity or the lifetime of a facility, this  
4 seems -- this seemed to me one possible  
5 consideration. And so the -- the terms of this  
6 consideration needed to be spelled out.

7 Q. (By Ms. Chancellor) Dr. Arabasz, is  
8 there anything in the McGuire and Arabasz paper  
9 which deals with the issue of how the return period  
10 for design ground motions should have been  
11 selected -- should be selected? I beg your pardon.

12 A. To the best of my memory, no.

13 MS. CHANCELLOR: Thank you.

14 I'd like to hand out a couple of  
15 excerpts from the hearing transcript just for ease  
16 of reference. The transcript of May 17, page 9251  
17 I'll be referring to, and the transcript of the  
18 same date, 9258 and 59.

19 Q. Do you have a copy Dr. Arabasz?

20 A. Yes, I do.

21 Q. On page 9251, you were asked a question  
22 by Mr. Turk, "And in the contention, is it not true  
23 that you directly challenged the Staff's adoption  
24 of the 2,000-year return period because in your  
25 view it lacked any consideration of risk? Is that

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1 not part of your contention?"

2 And then on page 9258, Mr. Turk asks you  
3 to turn to the contention filed on November 9 of  
4 2000, and on line 25 he quotes from the contention,  
5 "The point is that the Staff's acceptance of the  
6 mean annual probability of exceedance of  $5 \times 10^{-4}$  is  
7 completely arbitrary. If the Staff chooses not to  
8 use the reference probability for the ISFSI  
9 specified in the Rulemaking Plan, then it should be  
10 determined and justify an alternative reference  
11 probability to make a quantitative risk analysis  
12 using procedures similar to the one referenced in  
13 Appendix B of Reg Guide 1.165."

14 Do you think that Mr. Turk misunderstood  
15 or mischaracterized your view in asking, "And in  
16 the contention is it not true that you directly  
17 challenged the Staff's adoption of a 2,000-year  
18 return period because in your view it lacked any  
19 consideration of risk?"

20 MR. TURK: Objection, Your Honor.  
21 First, she's asking if he thinks I misunderstood  
22 something. That's an improper question. He can't  
23 answer whether I misunderstood or not. But I  
24 quoted from the contention. I don't understand  
25 what she's asking the witness to state other than

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1 to expand upon his prefiled testimony.

2 JUDGE FARRAR: Back when you were on  
3 this day of May 17th, you were at one point asking  
4 Dr. Arabasz if he knew what the Staff knew at a  
5 certain time, and this question seems -- she's  
6 asking him what he thinks you knew.

7 MR. TURK: Right. Ms. Chancellor  
8 objected to the question, and you sustained her  
9 objection, as I recall. You asked me to move on in  
10 a different form, and I agreed to do that.

11 JUDGE FARRAR: You're probably right.

12 Ms. Chancellor, let's make this a little  
13 more clear. At the beginning of the question you  
14 asked about whether Mr. Turk misunderstood, and  
15 then you read this quote. This is from the revised  
16 contention?

17 MR. TURK: It's actually the declaration  
18 of November -- I'm sorry. Yes, it's the -- it's  
19 the contention as filed on November 9, 2000.

20 JUDGE FARRAR: Oh, okay.

21 MR. TURK: This was Part B of old  
22 Contention L. I don't have a problem if she wants  
23 to examine --

24 JUDGE FARRAR: Let's rethink that  
25 question.

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1 MR. GAUKLER: If she just asks him what  
2 do you mean by that statement or what does that  
3 statement mean to you without putting Mr. Turk's  
4 view of what the statement means into the record.

5 MS. CHANCELLOR: That's fine.

6 JUDGE FARRAR: Okay.

7 MS. CHANCELLOR: I'll ask Mr. Gaukler's  
8 question.

9 THE WITNESS: As I return to alertness  
10 here --

11 MR. TURK: Could I hear what the  
12 question was, then?

13 THE WITNESS: -- could I have the  
14 question restated?

15 JUDGE FARRAR: Susette, we're not using  
16 that question.

17 Ms. Chancellor, you've quoted from the  
18 original contention. Now, what do you want to know  
19 about that as it appeared on 9258 and 9259 on May  
20 17th? So we've got that in front of us, what do we  
21 need to know about it?

22 MS. CHANCELLOR: Let me proceed this  
23 way.

24 Q. Dr. Arabasz, in the November 9, 2000  
25 State's request for modification of Utah L, Basis

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1 2, when you refer to risk, are you referring to  
2 radiological risk?

3 A. No. What I'm referring to is the risk  
4 as referenced in Appendix B to Reg Guide 1.165.  
5 And the context there, first of all, of the  
6 citation that -- excuse me, the text that Mr. Turk  
7 asked me to -- to read from the November 9  
8 document, the context, as I recall, began, if one  
9 were considering the reference probability of a --  
10 a nuclear power plant at the PFS site then. And  
11 Regulatory Guide 1.165 in Appendix B begins with  
12 Section B.1 saying, "This appendix describes a  
13 procedure that is acceptable to the NRC staff to  
14 determine the reference probability, an annual  
15 probability of exceeding the Safe Shutdown  
16 Earthquake," and so on. It describes the reference  
17 probability of  $1 \times 10^{-5}$  which we've heard about many  
18 times in this hearing, and then in terms of an  
19 alternative reference probability, it says that --  
20 and I'm reading from part of Section B.3 --

21 Q. This is State's Exhibit 201; is that  
22 correct?

23 A. That's correct. The large paragraph on  
24 the left-hand side of the page, about the fifth  
25 line down begins, This reference probability --

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1 meaning the  $1 \times 10^{-5}$  -- is also to be used in  
2 conjunction with sites not in the eastern and  
3 central United States (CEUS) and for sites for  
4 which LLNL and EPRI methods and data have not been  
5 used or are not available. However, the final SSE  
6 at a higher reference probability may be more  
7 appropriate and acceptable for some sites  
8 considering the slope characteristics of the site  
9 hazard curves, the overall uncertainty in  
10 calculations (i.e., differences between mean and  
11 median hazard estimates) and the knowledge of the  
12 seismic sources that contribute to the hazard.  
13 Reference B.4 includes a procedure to determine an  
14 alternative reference probability on the risk-based  
15 considerations. Its application will also be  
16 reviewed on a case-by-case basis.

17           The reference to B.4 is a position  
18 paper, I believe it was by the Nuclear Energy  
19 Institute, and it simply is a precursor to NUREG  
20 CR-6728 which puts forward thinking about what one  
21 should do if one wants to achieve risk consistency  
22 from site to site across the country. And the  
23 elements that enter into that consideration include  
24 the relative slopes of hazard curves in different  
25 parts of the country, the robustness of the SSCs or

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1 the -- whatever elements are being designed,  
2 basically the design conservatisms and so on.

3 So in that context the risk is risk  
4 consistency for the same probability of failure  
5 across the country. It doesn't relate to  
6 radiological risk or a formal PRA, as understood.

7 Q. So is that what you were referring to on  
8 page 9259 of the transcript?

9 A. Correct. The wording of risk analysis  
10 is referenced to Appendix B in Reg Guide 1.165.

11 MS. CHANCELLOR: Your Honor, I'd move  
12 for admission of State's Exhibit 201.

13 JUDGE FARRAR: Any objection?

14 MR. GAUKLER: No objection.

15 MR. TURK: Voir dire, Your Honor? I  
16 believe the witness misunderstands the document.

17 MS. CHANCELLOR: Whether he  
18 misunderstands the document or not, he has  
19 testified as to what he gets from this document,  
20 and it's relevant to his testimony.

21 (The Board confers off the record.)

22 JUDGE FARRAR: Mr. Turk, you may be  
23 entitled to question this witness about his views,  
24 but I can't see having Staff voir dire on a Staff  
25 document.

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1 MR. TURK: May I make an offer,  
2 Your Honor?

3 JUDGE FARRAR: Yes, go ahead.

4 MR. TURK: If allowed to voir dire, I  
5 would establish that the witness is not familiar  
6 with what is meant in this document by risk, that  
7 he does not understand what is discussed here with  
8 respect to failure probability. In fact, that is a  
9 radiological risk consideration. It is the failure  
10 of the design to achieve its intended function.  
11 And although I certainly don't object to the  
12 Regulatory Guide becoming an exhibit, to the extent  
13 that the State seeks to have this witness interpret  
14 it incorrectly, I think it's inappropriate, and if  
15 he's not clear with the document, then the State  
16 should not be able to offer it for the purpose that  
17 it seeks.

18 JUDGE FARRAR: Okay. The State can't --  
19 this witness, you're saying, is not a valid sponsor  
20 of this document --

21 MR. TURK: Yes.

22 JUDGE FARRAR: -- if, in your judgment,  
23 he doesn't understand it, even though, if anyone  
24 had asked us to take official notice of this  
25 document, we would have?

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1 MR. TURK: Yes.

2 Should I make it easier? Should I  
3 accede to its admission subject to  
4 cross-examination?

5 JUDGE FARRAR: Yeah. That would be, I  
6 think, a better approach.

7 MR. TURK: I so accede.

8 JUDGE FARRAR: Thank you. Then that's  
9 what I thought I suggested.

10 State 201 will be admitted.

11 (STATE EXHIBIT-201 WAS ADMITTED.)

12 MR. TURK: Your Honor, we may also  
13 proffer a larger portion of the document in order  
14 to establish the correct reading of it.

15 JUDGE FARRAR: Right. I think that  
16 would be the better approach.

17 Ms. Chancellor, it's getting late in the  
18 day. This last interchange was more puzzling than  
19 it might have been earlier in the day. Are we  
20 getting ready to -- and I take it you have a  
21 significant amount more for this witness. I had  
22 hoped we might finish him today, but I -- you've  
23 got something left, Mr. Gaukler indicated he had  
24 something. Now Mr. Turk indicated he has  
25 something.

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1 MS. CHANCELLOR: This would be a good  
2 stopping point, Your Honor. And I do have some  
3 more, but it shouldn't be too lengthy.

4 JUDGE FARRAR: Well, I'd say let's start  
5 in the morning when everyone's fresh. We might  
6 make more progress. And I did want to talk to you  
7 all off the record about the logistics in  
8 Rockville.

9 Then assuming we can do this witness by  
10 9:30, 10:00 tomorrow morning, then we'd go to  
11 Dr. Bartlett's testimony? Is that the plan?

12 MS. CHANCELLOR: You mean we'll be  
13 through with Dr. Arabasz by 9:30 or 10:00?

14 JUDGE FARRAR: Finished by 10:00. How  
15 much do you have?

16 MS. CHANCELLOR: I may be finished by  
17 10:00.

18 JUDGE FARRAR: Oh, I thought you --

19 MS. CHANCELLOR: Well, not very much  
20 relative to Mr. Turk's four or five hours.

21 JUDGE FARRAR: All right. Well, we'll  
22 finish some time mid-morning. Then what do we do?

23 MS. CHANCELLOR: Dr. Bartlett.

24 JUDGE FARRAR: Is that an all day  
25 proposition?

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1 MR. TURK: It's Dr. Bartlett on Part E  
2 of the contention only, right?

3 MR. GAUKLER: Right.

4 MS. CHANCELLOR: And, Your Honor, we  
5 have a mock-up of Dr. Bartlett's testimony that  
6 we'll hand out at the end of the day today.

7 JUDGE FARRAR: Bartlett on E, is that  
8 all day?

9 MR. GAUKLER: I would probably have -- I  
10 expect to have less than a half day cross, two to  
11 three hours cross. I don't know how much Mr. Turk  
12 has.

13 (Telephone interruption.)

14 JUDGE FARRAR: Sorry. I forgot to turn  
15 it off.

16 MR. GAUKLER: To the extent that we have  
17 some additional time, I would go into some rebuttal  
18 on E. We have a little bit of rebuttal on E, not  
19 much.

20 JUDGE FARRAR: And who would those be?

21 MR. GAUKLER: Dr. Cornell would be my  
22 rebuttal on E.

23 JUDGE FARRAR: Okay. So someone's here  
24 that, if we finish early, we can use the rest of  
25 the time?

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1 MS. CHANCELLOR: Oh, we can fill the  
2 void, Your Honor.

3 MR. TURK: I suspect, though, that --  
4 because the State has given us a set of  
5 approximately 10 exhibits to be introduced and to  
6 be questioned upon with Dr. Arabasz, I don't think  
7 that we'll end the day except concluding on  
8 Dr. Bartlett on E, and the Staff would probably  
9 have approximately two hours of cross-examination.

10 JUDGE FARRAR: Okay.

11 MR. TURK: Certainly we're willing to  
12 work towards finishing sooner and doing more if we  
13 can.

14 JUDGE FARRAR: Okay. And just to make  
15 sure we're putting the week to good use, what's  
16 happening?

17 MR. GAUKLER: First thing Friday morning  
18 is completion of Dr. Ostadan and Dr. Bartlett on D,  
19 which is the -- we're trying to get all of D done,  
20 if at all possible, by the end of the weekend.

21 JUDGE FARRAR: And you have a rebuttal  
22 witness on Saturday?

23 MR. GAUKLER: A string of them. And the  
24 idea is as I agreed with Ms. Chancellor and I think  
25 with Your Honor is to try to prefile as much of the

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1 rebuttal as possible to expedite Saturday.

2 JUDGE FARRAR: Okay. Then let's resume  
3 at 9:00 tomorrow morning with Dr. Arabasz, and  
4 we'll go off the record now to discuss logistics in  
5 Rockville.

6 (The proceeding concluded for the day  
7 at 5:35 p.m.)

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CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: Private Fuel Storage, LLC

Docket Number: Docket No. 72-22-ISFSI

ASLBP No. 97-732-02-ISFSI

Location: Salt Lake City, Utah

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and, thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

15/ Diana Kent  
Diana Kent  
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