

**NUCLEAR REGULATORY COMMISSION**

**ORIGINAL**

Title: Advisory Committee on Reactor Safeguards  
Reliability and Probabalistic Risk Assessment  
Subcommittee

PROCESS USING ADAMS  
TEMPLATE: ACRS/ACNW-005

Docket Number: (not applicable)

Location: Rockville, Maryland

Date: Friday, February 22, 2002

Work Order No.: NRC-253

Pages 1-209

NEAL R. GROSS AND CO., INC.  
Court Reporters and Transcribers  
1323 Rhode Island Avenue, N.W.  
Washington, D.C. 20005  
(202) 234-4433

**ACRS Office Copy - Retain  
for the Life of the Committee**

TR04

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

+ + + + +

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
(ACRS)

+ + + + +

MEETING OF THE SUBCOMMITTEE ON RELIABILITY AND  
PROBABALISTIC RISK ASSESSMENT

+ + + + +

FRIDAY,

FEBRUARY 22, 2002

+ + + + +

ROCKVILLE, MARYLAND

The Subcommittee met at the Nuclear Regulatory  
Commission, Two White Flint North, T2B3, 11545  
Rockville Pike, at 8:30 a.m., George Apostolakis,  
Chairman, presiding.

COMMITTEE MEMBERS:

GEORGE APOSTOLAKIS, Chairman

THOMAS S. KRESS

F. PETER FORD

DANA A. POWERS

WILLIAM J. SHACK

STEPHEN L. ROSEN

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1     ACRS STAFF PRESENT:

2             MICHAEL T. MARKLEY

3

4     ALSO PRESENT:

5             ADRIAN HEYMER

6             BIFF BRADLEY

7             TOM HOOK

8             DOUG TRUE

9             BILL BURCHILL

10            GARETH PARRY

11            MIKE CHEOK

12            TIM REED

13            PARVIS MOIENI

14            BOB LUTZ

15            LOUIS CHU

16

17

18

19

20

21

22

23

24

25

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)

## A-G-E-N-D-A

**Introduction**

Chairman Apostolakis . . . . . 5

**Industry Presentation**

Mr. Heymer, NEI . . . . . 6

Mr. True . . . . . 10

**Response to ACRS questions on NEI 00-04 . . . . . 60****NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)



P-R-O-C-E-E-D-I-N-G-S

8:34 a.m.

CHAIRMAN APOSTOLAKIS: The meeting will now come to order. This is a meeting of the Advisory Committee on Reactor Safeguards, Subcommittee on Reliability and Probabalistic Risk Assessment.

I am George Apostolakis, Chairman of the Subcommittee.

Subcommittee members in attendance are Peter Ford, Tom Kress, Dana Powers, Steve Rosen and William Shack.

The purpose of this meeting is to continue the Subcommittee's discussion of risk-informed revisions to the special treatment requirements of 10 CFR Part 50. The Subcommittee will review the proposed industry guidance in NEI 00-04, Revision B, "Option 2 Implementation guideline." The Subcommittee will gather information, analyze relevant issues and facts, and formulate proposed positions and actions, as appropriate, for deliberation by the full Committee.

Mr. Michael T. Markley is the Cognizant ACRS Staff Engineer for this meeting.

The rules for participation in today's meeting have been announced as part of the notice of

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)

1 this meeting previously published in the *Federal*  
2 *Register* on January 30, 2002.

3 A transcript of this meeting is being kept  
4 and will be made available as stated in the *Federal*  
5 *Register* notice.

6 It is requested that speakers first  
7 identify themselves and speak with sufficient clarity  
8 and volume so that they can be readily heard.

9 We have received no written comments or  
10 requests for time to make oral statements from members  
11 of the public regarding today's meeting.

12 This Subcommittee last met on December 4,  
13 2001, to discuss 10 CFR 50.69 and NEI 00-04 Revision  
14 B. In a memorandum dated January 24, 2002, the ACRS  
15 staff forwarded a list of individual ACRS member  
16 questions on NEI 00-04 Revision B to the staff and NEI  
17 for use in preparing for this meeting. We would like  
18 to spend most of our time today addressing those  
19 questions and, of course, any other issues that our  
20 visitors would like to raise.

21 On February 11, 2002, the staff also  
22 provided a list of questions on NEI 00-04. Both lists  
23 of questions are publicly available and will be  
24 furnished upon request.

25 We will now proceed with the meeting and

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)

1 I call upon Mr. Adrian Heymer of NEI and his  
2 colleagues to begin.

3 MR. HEYMER: Thank you, George.

4 My name is Adrian Heymer, I'm the project  
5 manager with NEI responsible for risk-informed  
6 activities covering Option 2 and Option 3.

7 We've got here today at the table some  
8 utility people and Doug True, whose been helping us  
9 with the guideline, especially in the area of  
10 categorization.

11 On my left I've got Tom Hook from Dominion  
12 and Surrey is a pilot plant. They've just gone through  
13 the IDP. And he's here to give some insights into the  
14 categorization and the IDP process that went on at  
15 Surrey and what they learned from it; some of the  
16 strengths, some of the weaknesses.

17 And I think it's worthwhile saying that as  
18 we've gone through this process, this is the third  
19 pilot activity that was done a few weeks ago at  
20 Surrey. The first one we learned a lot; we tried to  
21 incorporate the lessons learned into the second. The  
22 second we learned a little bit more and refined the  
23 process. And so when we got to Surrey I think it was  
24 a reflection of just a general learning experience.  
25 And that's the whole idea of the pilot activity.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 I think it's true, as with all things,  
2 that we drafted a guideline and the staff said they  
3 thought it was of sufficient level to allow the pilots  
4 to proceed. And we proceeded down that path  
5 recognizing that we would learn things as we went  
6 through the pilot activities to strengthen; have to go  
7 back and strengthen the guidance.

8 Doug True is here on my right from ERIN  
9 Engineering, and he's been helping us with  
10 specifically on PRA issues and categorization as a  
11 general advisor on the Option 2 activities to NEI and  
12 the industry.

13 On my far right is Bill Burchill from  
14 Exelon. And Bill has been with the Option 2 activity  
15 and risk-informed regulation since really the start.  
16 He represents Exelon, who was a pilot plant at the  
17 Quad Cities that was done last year as the first one  
18 and that really identified that we had a little bit  
19 more work to do. And Bill will assist us in  
20 responding to some of the specific questions.

21 Also in the audience we have Parvis Moieni  
22 from Southern California Edison, Jason Brown and Bob  
23 Lutz from the Westinghouse Owners Group. They're here  
24 representing Wolf Creek whose the fourth pilot. And  
25 also the Westinghouse Owners Group who have been very

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 active in this Option 2 activity.

2 And we have a few other members of the  
3 industry from NEI in the audience.

4 What we would like to do today is to go  
5 through just an overview of what we're going to cover  
6 fundamentally. We're going to just go back and do a  
7 very brief overview of NEI 00-04, go through that in  
8 about 30 minutes and then get to the interactions on  
9 those specific questions.

10 And then also as we go through the  
11 process, either at the end or as we're going through  
12 the process, we'll invite the pilots to provide some  
13 insights into some of the pilot activities and what  
14 they learned both from the PRA perspective, form the  
15 PRA quality and from the categorization.

16 So, that's what we want to try.

17 The first couple of slides are really  
18 principles, and it was just to give a sort of a  
19 general introduction as regards what the principles of  
20 risk-informed regulation, and it's really focusing on  
21 the right stuff.

22 And we've got smart as years have gone by,  
23 and so it's the application of NRC requirements based  
24 on the safety significance of the equipment and the  
25 activities. I have taken into account what we've

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 learned through operating experience, the design and  
2 engineering techniques and insights from PRA and also  
3 taken advantage of advances in technology.

4 And the real thrust of this is that the  
5 real focus of the regulatory requirements should be on  
6 those matters that are safety significant, not  
7 necessarily at low safety-significant. And that was  
8 really the purpose of Option 2 as we see it, and I  
9 think it's really important if we're going to be  
10 successful in this enterprise and this activity to  
11 look at what really is Option 2. And it's the  
12 application of NRC's special treatment requirements  
13 such as QA, EQ, 50.55(a), the maintenance rule,  
14 Appendix B, which is QA based on the safety  
15 significance of the equipment. And it's fundamentally  
16 a two step process.

17 The first step, which we're really  
18 focusing on here and which the guideline will focus  
19 on, is the categorization. The second step is the  
20 application of treatment.

21 There are some ground rules that have been  
22 established as we go through this, and one of those  
23 ground rules is right up front, which was the design  
24 basis are not changed. And I think when the industry  
25 started off on Option 2 we had a view that perhaps we

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 were going to change the definition of safety related  
2 and we would have two categories.

3 As we started interactions with the staff  
4 it became clear, especially since we were going to  
5 maintain the design basis and this was going to be an  
6 optional activity, that in fact perhaps we should have  
7 a slightly different structure. And the NRC staff  
8 proposed the full box, the quadrant structure. We  
9 took a look at that, we assessed it and we felt that  
10 we could probably work with it. And that's we've been  
11 trying to do. But the real thrust of this discussion  
12 here is on the NEI 00-04, the categorization process  
13 and that's what we're here to talk about today.

14 I'll now hand over to Doug True, whose  
15 going to give a very brief overview. And we probably  
16 won't go through all these slides as a matter of time,  
17 but we will just give you a very rough overview of  
18 what NEI 00-04 talks to as regards to categorization.

19 MR. TRUE: Do they have this?

20 MR. HEYMER: Yes. You should have the  
21 handout.

22 CHAIRMAN APOSTOLAKIS: We don't. We have  
23 yours.

24 MR. HEYMER: No. It's the same thing --

25 CHAIRMAN APOSTOLAKIS: It's the same

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 thing?

2 MR. HEYMER: No.

3 CHAIRMAN APOSTOLAKIS: No, it can't be the  
4 same thing.

5 MR. HEYMER: There were two sets in the  
6 package I just gave you. One was the --

7 CHAIRMAN APOSTOLAKIS: Oh, there were?  
8 You guys got it? Yes, we didn't get it. All right.  
9 Let's go on.

10 MR. HEYMER: Well, it's early in the  
11 morning. I sort of lost a few marbles last night or  
12 something.

13 CHAIRMAN APOSTOLAKIS: Okay. Doug?

14 MR. TRUE: Okay. As Adrian said, we have  
15 a lot of material here. I'll just kind of slip  
16 through these quickly and kind of hit on a few high  
17 points in order to get through this quickly and get on  
18 to the questions.

19 I'm going to skip through to I think it's  
20 the fifth slide, safety-significant attributes. I  
21 just want to make a couple of quick points on that  
22 subject.

23 One of the things that we started with,  
24 actually, in the Option 2 effort within the task force  
25 was to look at well if we think about what PRAs have

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)



1 told us, we're going to find what are the differences  
2 and where are we going to find differences in what the  
3 design basis has told us about important equipment and  
4 what PRAs have told us. And we kind of keyed in on  
5 this notion of safety-significant attributes.

6 So for the equipment that were identified  
7 as safety-significant through whatever categorization  
8 process we used, we wanted to keep track of that, what  
9 attributes of those components made them safety-  
10 significant.

11 And that comes from the fact that the  
12 performance requirements for the design basis in some  
13 cases are more limiting than for PRA or for risk  
14 assessment perspective, and in other cases the  
15 accident performance is more limiting than the design  
16 basis. So we have this kind of mix and match we have  
17 to reconcile.

18 And as part of the categorization process  
19 we expect the categorization team and the IDP to  
20 address those attributes which make the SSCs safety-  
21 significant. And those things include the functions,  
22 the performance attributes, the pressure flows,  
23 temperatures, environment; that kind of thing, and any  
24 actuation requirements.

25 And just as kind of a point of reference,

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 we provided two hypothetical examples which are not a  
2 particular reach in this area.

3 First in the area of RISC-1s, those are  
4 the safety related, safety significant SSCs. For BWRs  
5 the ability to vent a containment and remove decay  
6 heat is often a safety-significant function. And so  
7 we realized that containment vent valves, which are  
8 part of the containment isolation system, might end up  
9 being safety-significant. And while their design  
10 basis function was to close to isolate the  
11 containment, there severe accident function or core  
12 damage in the containment failure function was to open  
13 and control -- open and close in order to control  
14 containment pressure and allow decay heat removal. So  
15 we were expecting the valves to do the opposite thing  
16 that the design basis expected them to do.

17 And here's some examples of the safety-  
18 significant attributes that might be tracked in this  
19 process include: What are the conditions we're  
20 expecting the valve to have to open under; what kind  
21 of capability does the PRA assume we need for being  
22 able to open that, whether it's from the control room  
23 or be able to do that locally using air bubbles or  
24 whatever. Different PRAs and different plants have  
25 different capabilities in those areas.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 But as we moved forward and we implement  
2 Option 2 and we made changes to the plant, we would  
3 want to keep track of those attributes and put that  
4 into our change control process so that we didn't lose  
5 track of the fact that those were now important  
6 functions for those components.

7 In the RISC-2 area, which is a non-safety  
8 related but safety-significant SSCs, an example might  
9 be a startup feedwater pump that was originally  
10 designed to help the plant go through power ascension  
11 and shutdown has no particular design basis from an  
12 accident analysis perspective, but in some plants it  
13 probably provides a risk significant function of  
14 making up to the steam generators as a backup to aux  
15 feedwater effectively in cases where all aux feedwater  
16 might be lost.

17 In that case, we certainly would want to  
18 keep track of the flow and head requirements, which  
19 probably are not a lot different than design basis.  
20 But in some plants also the ability to attach that  
21 startup feedwater pump to 1E Bus and power from a  
22 diesel generator so that it works in the event of a  
23 loss of offsite power is an attribute that we would  
24 want to keep track of and not lose over time as the  
25 plant changed.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 CHAIRMAN APOSTOLAKIS: What you are  
2 categorizing is a component, right? I mean, if I look  
3 at the matrix, I will see components in there not  
4 attributes or anything?

5 MR. TRUE: No. You categorize the  
6 component.

7 CHAIRMAN APOSTOLAKIS: Yes. So this  
8 discussion helps us do that, is that what you're  
9 saying?

10 MR. TRUE: I think all we're saying is  
11 that there's an adder -- when we go to the process of  
12 -- through the process of categorizing we say this  
13 startup feedwater pump is safety-significant, we want  
14 to not only know that it's safety-significant, we want  
15 to know why it's safety-significant so that we  
16 incorporate those attributes into the change control  
17 processes going forward in the plant and we don't lose  
18 track of that.

19 CHAIRMAN APOSTOLAKIS: Yes. Well, and  
20 that presumably --

21 MR. TRUE: And that the treatment is  
22 focused on those aspects.

23 CHAIRMAN APOSTOLAKIS: Presumably when you  
24 declare the safety-significant, you went through this  
25 process, right? You knew already. I mean, that's why

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 you said it was safety-significant because of all  
2 these things? And then you pass that along to whoever  
3 makes a decision?

4 MR. TRUE: Right. Right. But, for  
5 example, the startup feedwater pump, it is not safety-  
6 significant in being able to function post-seismic  
7 event. See, we can't paint all the components with  
8 the same brush because it's not like the safety  
9 related designation which automatically gets category  
10 1 seismic and 1E power and all those things.

11 In this case we're going to have a little  
12 bit more mixture of attributes that are important and  
13 we're going to have to keep track of those.

14 CHAIRMAN APOSTOLAKIS: So that would be  
15 more relevant when you decide what treatment to apply?

16 MR. TRUE: Yes. Yes.

17 CHAIRMAN APOSTOLAKIS: Which is very  
18 different from the current practice of safety related  
19 gets all --

20 MR. TRUE: Gets everything and everything  
21 else is treated in a different way.

22 CHAIRMAN APOSTOLAKIS: I believe South  
23 Texas had a separate category for that in the middle  
24 somewhere there where it was focused. But anyway,  
25 let's go on.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MR. TRUE: The four step process, I'm  
2 going to kind of skip through that. And just talk  
3 about a little bit the structure of the categorization  
4 process. Slide 8.

5 As you know from reading the document,  
6 we've tried to utilize the PRAs where they're  
7 available and use importance measures as a screening  
8 tool to identify the potentially safety-significant  
9 structure systems and components. We then utilized  
10 some sensitivity studies to test the robustness of  
11 those base importance measures.

12 One of the things we were looking for in  
13 the categorization process was one that was relatively  
14 robust and stable and we're not going to have SSCs  
15 jumping in and out of the categories over time. And  
16 so we've tried to use the sensitivity studies as one  
17 of the ways to make sure we are assuring that that's  
18 the case.

19 Where PRAs aren't available, we've tried  
20 to be more conservative in the way we've applied the  
21 categorization process knowing that if utilities  
22 wanted to go off and develop a PRA in an area where  
23 they don't have one and gain some additional benefit,  
24 they could do that. But if they had a seismic margins  
25 analysis, for example, instead of a seismic PRA we

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 wanted them to be able to use that as part of their  
2 categorization scheme.

3 We take all that risk information and  
4 supplement it with some defense-in-depth assessment.  
5 And then finally at the end we do a sensitivity study  
6 to look at the aggregate impact of a postulated change  
7 in all of the RISC SSCs simultaneously jumping to some  
8 higher unreliability to make sure that that change was  
9 small.

10 And, as I said, the objective was to  
11 develop a scheme that was comprehensive, didn't just  
12 focus for example on internal events and kind of hand  
13 away through the other hazards and operating modes,  
14 and robust to the importance measures, took into  
15 account the fact that there could be variations in  
16 them. And then long term stable so that we weren't  
17 having equipment jumping from one category to another  
18 over the life of the plant.

19 DR. ROSEN: Doug, you would acknowledge,  
20 would you not, that your next to last bullet while it  
21 is bounding, it's certainly unrealistic?

22 MR. TRUE: I think it is very unrealistic.  
23 That all of them would go to some upper level of  
24 value.

25 DR. ROSEN: All at one time -- suddenly?

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MR. TRUE: All of them.

2 DR. ROSEN: And all at one time?

3 MR. TRUE: All at one time. Without you  
4 noticing it.

5 DR. ROSEN: And without anything to do --  
6 I can't imagine anything that could do that to all the  
7 components.

8 MR. TRUE: In fact, we believe that likely  
9 there will be very little change in the performance --

10 DR. ROSEN: Well, that's totally  
11 unrealistic.

12 MR. TRUE: Yes.

13 DR. ROSEN: But the answer that comes out  
14 of that sensitivity study in the next to last bullet  
15 is really very unrealistic.

16 MR. TRUE: I believe so. But if we need  
17 it, or we use it because we realize that there are  
18 shortcomings in using individual importance measures.  
19 And if you're going to -- individual importance  
20 measures are going to make any decisions about  
21 individual components of getting insights about  
22 individual components, we're talking about a batch of  
23 components and the individual importance measures are  
24 not useful for that. So a sensitivity study is a way  
25 to address the fact that there could be synergisms

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com



1 that we want to look for in that aggregate of  
2 assessment helps us --

3 DR. ROSEN: But nobody should use the  
4 number that comes out of that and believe it as being  
5 anything that's physically real?

6 MR. TRUE: Correct.

7 DR. KRESS: Wouldn't it be better to treat  
8 that like a common-cause failure or you only change  
9 the failure frequency of one of them, but use some  
10 multiple Greek letter to get the probability of  
11 failure of the others in order to get an importance  
12 measure? What do you think, George? Rather than just  
13 say the whole group has a --

14 CHAIRMAN APOSTOLAKIS: To have a lower --  
15 yes.

16 DR. KRESS: Because they're not all going  
17 to fail at the same time.

18 CHAIRMAN APOSTOLAKIS: Sure.

19 MR. TRUE: Well, they're not all -- we're  
20 not saying when they all fail. We're saying their  
21 probability of failure all goes up by a factor.

22 DR. KRESS: When you do the RAW for the  
23 group, you assume that measure is all of them going.

24 MR. TRUE: Yes, the RAWs are done  
25 individually as a part of the screening process.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 DR. KRESS: Oh, you're not doing --

2 MR. TRUE: No. No.

3 CHAIRMAN APOSTOLAKIS: They just do  
4 probability.

5 DR. ROSEN: Just going to a Delta CDF for  
6 the group, but through the sensitivity study.

7 MR. TRUE: Through the sensitivity study  
8 of increasing the unreliability --

9 DR. KRESS: That's by increasing the  
10 factor of 10. But the RAW is simply for one  
11 component--

12 MR. TRUE: For individual events.

13 DR. KRESS: Yes, that's what I think you  
14 ought use, common-cause and get a different RAW than  
15 that.

16 CHAIRMAN APOSTOLAKIS: Yes, we'll come  
17 into that discussion.

18 DR. KRESS: Okay.

19 DR. POWERS: Can you give me some more  
20 insight of what a defense-in-depth assessment looks  
21 like?

22 MR. TRUE: Yes, if you'll hold on just a  
23 couple of slides, we'll get to that.

24 CHAIRMAN APOSTOLAKIS: Now, when you say  
25 your PRAs are not available, what does that mean?

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 That they are not available because nobody has ever  
2 done a PRA for this particular mode or this particular  
3 licensee happens not to have a PRA for something for  
4 which others have done a PRA?

5 MR. TRUE: The latter. Where a plant does  
6 not have a PRA currently.

7 CHAIRMAN APOSTOLAKIS: So there should be  
8 a clear demonstration then that the categorization  
9 process is conservative in that case, and we'll come  
10 back to that during the discussion I hope?

11 MR. TRUE: We can. I actually didn't plan  
12 on all those flow charts that go through every  
13 different way we look at things. We can --

14 CHAIRMAN APOSTOLAKIS: I mean, there was  
15 a question on fires which you presumably have  
16 addressed?

17 MR. TRUE: Yes. Yes.

18 CHAIRMAN APOSTOLAKIS: There was a  
19 question. So when we come to that, we'll probably  
20 raise a similar question.

21 MR. TRUE: Okay.

22 DR. SHACK: Well, since you're not  
23 covering that, let me just -- you know, as I read the  
24 seismic margins analysis, for example, it looks to me  
25 like you're protecting your one shutdown path, at

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 least that's the way I read this. You know, I look at  
2 what I need for that one shutdown path and I  
3 categorize to maintain that shutdown path. But in  
4 fact, I couldn't in fact be upping my risk because I'm  
5 not really paying attention to the other things that  
6 are neglected in the margins analysis that could in  
7 fact give me an assessment. So my change in risk  
8 could be larger than I think it is?

9 I'm not sure how in the margins analysis  
10 you assure that your categorization process is  
11 conservative.

12 CHAIRMAN APOSTOLAKIS: Or the final  
13 analysis.

14 MR. TRUE: Well, it's the same sort of  
15 thing. Anytime you have the margins analysis --

16 CHAIRMAN APOSTOLAKIS: That's right.

17 MR. TRUE: -- and you're protecting one or  
18 a limited set of shutdown paths --

19 CHAIRMAN APOSTOLAKIS: A screening.  
20 Whenever you have a screening process to demonstrate  
21 that something is not important, it's not clear to us  
22 how you handle it and whether the results are  
23 conservative.

24 MR. TRUE: Okay.

25 CHAIRMAN APOSTOLAKIS: So I don't know

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 whether you want to address it now or later.

2 MR. TRUE: We can come back.

3 CHAIRMAN APOSTOLAKIS: We'll come back to  
4 it. Okay. Great.

5 DR. FORD: Can I follow up on this  
6 question of the areas where there is not a PRA?

7 MR. TRUE: Yes.

8 DR. FORD: In reading through the 00-04  
9 document I was looking for references to time  
10 dependent degradation of passive components. And I  
11 couldn't find anything at all in that document which  
12 related specifically to that. And degradation of the  
13 containment, for instance, or some of the passive  
14 components like core shrouds or whatever.

15 If there was a component which was safety  
16 related and was put into RISC-3, how would that be  
17 determined when you don't have a time dependent PRA  
18 for those phenomena? Could it be done by an IDP  
19 process? And if so, who would be the experts on the  
20 panel to address this?

21 MR. TRUE: I think the categorization  
22 process in 00-04 isn't really designed to deal with  
23 passive loads of components. There's a separate --

24 DR. FORD: Passive components are  
25 mentioned in 00-04.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MR. TRUE: Yes, I think we hand it off to  
2 the ASME.

3 MR. HEYMER: Yes. The prime thrust of the  
4 categorization that we cover is dealing with active.  
5 When we get to passive there are ASME processes out  
6 there that look at classification of passive  
7 components. And what we say is that it's assumed to be  
8 where it is today, unless you've done one of those  
9 passive categorization schemes that is run through  
10 ASME. And then if you've done that, then you can  
11 start looking at things like the pressure boundary.  
12 But that's what you've got to do.

13 So we hand off to, we point to another  
14 group that's already done that work. And so we're  
15 relying on those.

16 DR. FORD: So time dependent degradation  
17 of passive components; pressure boundaries, core  
18 shrouds which are not pressure boundaries, but things  
19 of this nature which are safety related are not  
20 covered in this document?

21 MR. HEYMER: If they're not covered by the  
22 ASME process, they're not covered by this document.

23 DR. FORD: Okay.

24 MR. HEYMER: Tom?

25 MR. HOOK: Yes. I just wanted to make a

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 point that in the current draft of ASME code case that  
2 categorizes passive components for the Option 2 effort  
3 it makes the assumption that those passive components  
4 are failed for the purpose of the categorization.  
5 That the failure rate is 1.0 and only focuses on the  
6 consequence of failure.

7 So, items like core shrouds and  
8 containments all come up as high because of that  
9 process.

10 DR. FORD: So they'd be automatically in  
11 RISC-1 and RISC-2?

12 MR. HOOK: Right.

13 DR. FORD: Okay.

14 MR. TRUE: Okay. We use a variety of  
15 quite specific RISC information and deterministic  
16 information. I don't need to spend any time on that.

17 PRA quality, I had several questions that  
18 dealt with that which we'll get back to, but I thought  
19 it deserved a brief discussion.

20 The 00-04 allows for the use of NEI 00-02,  
21 which is the peer review process or the ASME standard  
22 for evaluating the quality of the internal events at-  
23 power PRA. We believe out of both of those documents,  
24 the peer review provides the greatest insight into the  
25 strengths and limitations of the PRA. And that the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 observations that come out of that peer review  
2 process, whether it's one driven by the ASME standard  
3 or from 00-02 have to be dispositioned as part of this  
4 process. And those are either dispositioned by  
5 incorporating -- making a change to the PRA model to  
6 address the observation, look for a way to handle that  
7 through sensitivity studies which are then passed on  
8 and looked at as part of the categorization process,  
9 or provide some justification that the assumption or  
10 the issue that's raised in the observation doesn't  
11 effect the categorization. I think that that third  
12 one is probably the least likely to be used, but there  
13 may be cases where depending upon the comment, that  
14 might be applicable.

15 Then it's up to the utility or the  
16 licensee to provide a characterization of the PRA  
17 quality. And that's submitted to the NRC staff at the  
18 time you enter into the Option 2 process and before  
19 categorization is done, along with an explanation of  
20 the scope and schedule of what's going to be done.

21 And that characterization, and as well as  
22 passed on to the integrated decision making panel so  
23 that they understand what they're dealing with in  
24 terms of the PRA quality.

25 And the things we want to look at are:

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)



1 How well does the PRA address the as-built as operated  
2 plans; what did the peer review say about the internal  
3 events PRA; how were those observations that were  
4 classified as significant in 00-02 parlance, that's A  
5 or B --

6 CHAIRMAN APOSTOLAKIS: But this list  
7 doesn't say anything about uncertainty. And it talks  
8 a lot about sensitivity.

9 Now, as far as I know, the standard  
10 computer codes that the industry is using to do their  
11 PRAs have capability of propagating uncertainty, the  
12 standard behind, you know the failure rate  
13 uncertainty. And I'm surprised that you resort to  
14 sensitivity studies all the time. Why? What's wrong  
15 with or is it so expensive to do? I mean, it would  
16 seem to me that it's kind of routine these days to do  
17 that.

18 MR. TRUE: Yes. I don't think -- I guess  
19 there are two things about that. Certainly there are  
20 tools available for the major PRA codes to allow you  
21 to do uncertainty calculations on the parametric  
22 uncertainties at least.

23 CHAIRMAN APOSTOLAKIS: Yes.

24 MR. TRUE: The sensitivity analyses that  
25 we're talking of tend to be more focused on the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 modeling and assumptions of the model.

2 CHAIRMAN APOSTOLAKIS: Well, that's not  
3 the impression I get when I read NEI 00-04, and we'll  
4 come to that. I mean, I would agree with you a 100  
5 percent that that's what should be done. But if you  
6 read the document, that's not what it says. But this  
7 is one of our questions.

8 MR. TRUE: Okay.

9 CHAIRMAN APOSTOLAKIS: So we'll come to  
10 that.

11 MR. TRUE: In particular related to the  
12 facts and observations in this slide where we mention  
13 sensitivity analyses, I believe it's relatively rare  
14 to have comments about the uncertainty distribution on  
15 individual perimeters that come out of the peer review  
16 and have those be an A or B significant in the overall  
17 result.

18 CHAIRMAN APOSTOLAKIS: Well, we'll see.  
19 We'll see.

20 MR. TRUE: So it's usually we're dealing  
21 with you didn't use this seal LOCA model or you made  
22 this assumption about room cooling or time for  
23 operator actions, or those kind of things.

24 CHAIRMAN APOSTOLAKIS: Well, for those I  
25 fully agree that the sensitivity analysis would be

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 very useful. But, again, I mean when I read the  
2 document that's not what it says. So we have to fix  
3 that.

4 MR. TRUE: Okay. Well then --

5 CHAIRMAN APOSTOLAKIS: Now, I have another  
6 question on this.

7 MR. TRUE: Okay.

8 CHAIRMAN APOSTOLAKIS: It seems to me, I'm  
9 a little bit concerned that if one has a PRA, we're  
10 going to spend a lot of time talking about its  
11 quality. If one does not have a PRA, then we wave our  
12 arms, we do screening analysis and we come up with  
13 some results that may be questioned for 10 minutes,  
14 and that's it. Is it really over kill here just  
15 because you happen to have the study? Then we talk  
16 about the quality, have you used the ASME standard,  
17 have you used the industry certification process. And  
18 then we go to the fire and seismic and say, well, I'll  
19 do some screening calculations and here is my  
20 categorization. And believe me, it's conservative.

21 I mean, just because -- in other words,  
22 are we penalizing people for doing PRAs because now  
23 they have to defend them forever? It should be the  
24 other way around. Your life should be much more  
25 difficult when you don't have the PRA.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 MR. TRUE: That's a wonderful question on  
2 excellence.

3 CHAIRMAN APOSTOLAKIS: Well, let's go on.  
4 It's just that I'm curious just because we have  
5 something, we scrutinize it to death and then in  
6 another area we say well we're going to do some  
7 conservative calculations and they will be good  
8 enough.

9 MR. TRUE: Yes.

10 DR. POWERS: If the calculations are  
11 demonstrably conservative --

12 CHAIRMAN APOSTOLAKIS: Are they in the  
13 other areas? I mean, I look --

14 DR. POWERS: They demonstrative to be  
15 conservative and the PRA is demonstrably realistic,  
16 then isn't that the appropriate split of labor?

17 CHAIRMAN APOSTOLAKIS: Yes. But you put  
18 to big "ifs" there. Yes, certainly.

19 MR. TRUE: Well, I think the second half,  
20 I mean the PRA is intended to be realistic. So that's  
21 the --

22 CHAIRMAN APOSTOLAKIS: I understand that.

23 MR. TRUE: I think it gets more attention,  
24 which is part --

25 CHAIRMAN APOSTOLAKIS: I think we should

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 make sure that the quality of the decision making  
2 process, you know, and its inputs is more or less  
3 uniform in the places where we have a PRA and in the  
4 places where we don't. And, again, I'm not convinced  
5 that that's the case. Okay, let's put it that way.  
6 I'm perfectly willing to be convinced, but I am not  
7 right now. And I think again as we discuss our  
8 questions later, these issues are going to come up.

9 MR. TRUE: Okay. One other thing about  
10 the PRA and the quality of the other analyses. It's  
11 still incumbent upon a licensee to demonstrate that  
12 they reflect the as-built/as-operated plant and that  
13 the things that carry over from the internal events  
14 PRA that may have been significant in that PRA, which  
15 is usually the basis for the other mode and hazard  
16 analyses, are properly addressed and identify any  
17 sensitivity studies necessary to address other areas  
18 of concern. And that's passed on to the IDP as part  
19 of their considerations.

20 CHAIRMAN APOSTOLAKIS: Why such an  
21 emphasis on the internal event PRA? I mean, you  
22 wouldn't want the fire PRA to reflect the as-built and  
23 as-operated?

24 MR. TRUE: Yes. No, that's what I was just  
25 saying. The last three bullets are the other PRAs.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 And we have basically the same standard for those that  
2 we have to reflect the as-built/as-operated plant.  
3 That the peer review comments that have been received  
4 on the internal events PRA, which is usually used as  
5 the input for fire PRA, at least for doing the  
6 conditional core damage probability calculations, have  
7 been addressed and don't effect the fire PRA, for  
8 example. And then look for any PRAs where there's a  
9 need for sensitivities to address issues in those PRAs  
10 also.

11 CHAIRMAN APOSTOLAKIS: Now, in your --

12 MR. TRUE: I think we have the same  
13 standard on both. But because and practically  
14 speaking the internal events PRA tends to be the  
15 center and the focal point or the kernel of all the  
16 other PRA analyses come from, we tend to put more  
17 words around the internal event study.

18 CHAIRMAN APOSTOLAKIS: Even though we know  
19 that the experience over the last 25 years with PRAs  
20 has told us that fires and earthquakes usually  
21 dominate the risk, right?

22 MR. TRUE: It depends upon the plant, but  
23 that certainly wasn't South Texas' experience, but --

24 CHAIRMAN APOSTOLAKIS: Well, it certainly  
25 does --

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MR. TRUE: -- other plants.

2 CHAIRMAN APOSTOLAKIS: -- but overall I  
3 think it's a true statement that they if not dominate,  
4 they are among the dominant contributors?

5 MR. TRUE: Yes, I would agree with that.  
6 Yes.

7 This was in case we wanted to talk about  
8 this.

9 Step 2, which is the actual categorization  
10 process and all of the figures that go along with  
11 that, we're looking at CDF and LERF. Importance  
12 measures are used as a screening tool. We look at  
13 both the initiator and the event mitigation. And  
14 we're looking for those attributes.

15 Back to the question about defense-in-  
16 depth, what we try to do there is step beyond the PRA  
17 itself and provide some additional information to the  
18 IDP on the defense-in-depth and the role that the SSC  
19 plays in providing defense-in-depth.

20 In particular for the RISC-3 SSCs, we have  
21 a process that we go through to looking at both core  
22 damage and early containment failure prevention and  
23 the role of SSC plays in defense-in-depth in that  
24 area.

25 CHAIRMAN APOSTOLAKIS: Again, I'm a little

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 confused here. It seems to me that if you have a  
2 robust PRA and you're using the importance measures  
3 from the PRA, the question of defense-in-depth should  
4 not arise because that's built into the PRA. That's  
5 why the Fussell-Vesely in RAW came out the way it did,  
6 because of the defense-in-depth.

7 Defense-in-depth should be an issue when  
8 you're now departing from the PRA, when you  
9 categorizing SSCs in areas where you don't have a good  
10 PRA or you don't have a PRA at all.

11 Why would I care? I mean, the fact that  
12 this pump is part of a one out of three system in the  
13 PRA is reflected on the importance measures. So on  
14 top of that I want to think about defense-in-depth  
15 again, unless I have left something out?

16 So I think these things should be made  
17 clear that, you know, when the panel is deliberating  
18 certain things are relevant to certain things and in  
19 other cases they're not relevant.

20 I mean diluting the input here it seems to  
21 me. That's why it all comes out the way it does,  
22 because there is some different -- like at South Texas  
23 they have higher redundancy than the average plant. So  
24 if I calculate Fussell-Vesely in RAW, I will see that  
25 there. Now in other instances where I don't have a

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 PRA, then I want to alert the panel to the fact that  
2 they have to worry about defense-in-depth.

3 This is simple enough?

4 MR. TRUE: Well, your question is simple  
5 enough. I think the answer may be simple enough also,  
6 and we kind of skipped through this in the guiding  
7 principles. That we started with 1.174 in the  
8 principles of risk-informed regulation in where we  
9 wanted to go. And some of the things in 1.174 invokes  
10 in the defense-in-depth area are there's reasonable  
11 balance, diversity or redundancy not introducing  
12 common-cause failures.

13 CHAIRMAN APOSTOLAKIS: Yes, I know.

14 MR. TRUE: Those kind of things. And  
15 that's what we were trying to address through the core  
16 damage.

17 CHAIRMAN APOSTOLAKIS: Yes, but I mean we  
18 should be going beyond 1.174 wherever we feel that we  
19 know enough now. That's already a four year old  
20 document, right?

21 MR. TRUE: Okay.

22 CHAIRMAN APOSTOLAKIS: What I'm saying is  
23 not necessarily inconsistent with what's in 1.174.  
24 It's just a further refinement, I think.

25 My point is this question is much more

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 important in the cases where the panel does not have  
2 a PRA they can rely on, or maybe not at all, then when  
3 they have a PRA. For the internal events that's very  
4 good and has gone through the reviews and all that.  
5 Because then the importance measures reflect that a  
6 degree of defense-in-depth that's in the plant.

7 MR. TRUE: Yes.

8 CHAIRMAN APOSTOLAKIS: And I believe that  
9 should be part of the training of the panel. There  
10 should be a training session where they would  
11 understand what the whole situation is.

12 Steve, do you have anything?

13 DR. ROSEN: No. I think you have it  
14 exactly right, George.

15 DR. KRESS: Well, I think with one  
16 problem, and that is if I look at redundancy and  
17 diversity of mitigation systems and bypass, isolation  
18 and early hydrogen burn and things having to do with  
19 long term containment integrity, those will be in the  
20 PRA. I don't know what defense-in-depth things will  
21 not be in the PRA that you have to alert the panel to.  
22 And that's what my problem is.

23 CHAIRMAN APOSTOLAKIS: Well, but --

24 DR. KRESS: There probably aren't any.

25 CHAIRMAN APOSTOLAKIS: Well, if there is

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 a PRA, yes, I'm with you. But there are many other  
2 situations where they're categorizing things without  
3 a PRA or using a screening approach.

4 DR. KRESS: Like fire or seismic?

5 CHAIRMAN APOSTOLAKIS: Yes. Yes. Then  
6 they have to worry about this.

7 DR. ROSEN: Or things that aren't modeled  
8 in the PRA.

9 DR. KRESS: Yes. But those won't be these  
10 things. They --

11 DR. ROSEN: They will typically be in  
12 RISC-4 anyway.

13 CHAIRMAN APOSTOLAKIS: Right. Right.  
14 There is a reason why they're not in the PRA.

15 DR. ROSEN: That's right. Because the  
16 analysts couldn't envision a sequence in which that  
17 was imperative --

18 CHAIRMAN APOSTOLAKIS: Well, it seems to  
19 be that point --

20 DR. ROSEN: But you have a point with fire  
21 and seismic, though.

22 CHAIRMAN APOSTOLAKIS: Yes.

23 MR. HOOK: Because those can be important  
24 and they're not a PRA.

25 CHAIRMAN APOSTOLAKIS: I mean clear cut

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 guidance like that I think would help a lot, not only  
2 with the categorization, but moving things along, you  
3 know. So next time, for example, we visit 1.174 we'll  
4 have the benefit of all this.

5 By the way, NRC staff is you ever feel the  
6 need or urge to jump in, do not hesitate.

7 Mike?

8 MR. CHEOK: This is Mike Cheok.

9 A quick comment of this defense-in-depth.  
10 I think you're right that if it's in the PRA, that  
11 should be a consideration in your defense-in-depth  
12 considerations. But remember that the importance  
13 measures now only deal with CDF and LERF and we need  
14 to pull in things like long term containment heat  
15 removal using the defense-in-depth arguments.

16 CHAIRMAN APOSTOLAKIS: Well, if you are  
17 changing the objectives of the categorization, then of  
18 course, you're absolutely right. But that's exactly  
19 what I would like to see in black and white; do this  
20 in that case, do that in the other case. So what  
21 you're doing now is you're going beyond what the  
22 importance measures reflect. And then, of course,  
23 you're right; you have to worry about it. You are in  
24 the category of cases where you don't have a good PRA  
25 result, right?

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 DR. KRESS: Or alternatively there's no  
2 reason why you couldn't have an importance measure for  
3 those things.

4 CHAIRMAN APOSTOLAKIS: For those things,  
5 yes. Sure.

6 MR. CHEOK: That's correct. But, you  
7 know, right now we have the CDF and LERF matrix as to  
8 one step we are looking into.

9 CHAIRMAN APOSTOLAKIS: That's right.

10 MR. CHEOK: Unless we expand those matrix,  
11 we have to deal with defense-in-depth.

12 CHAIRMAN APOSTOLAKIS: Well, that's my  
13 whole point, that we can say: (1) for CDF and LERF if  
14 the PRA's of good quality, then there's no other  
15 issues of defense-in-depth. Those are all built into  
16 it. Then (2) now if you want to worry about the late  
17 containment failure and so on, then of course the  
18 Fussell-Vesely in RAW do not reflect those, as they  
19 are calculated today.

20 DR. KRESS: But they could.

21 CHAIRMAN APOSTOLAKIS: Adrian? Oh, sure.

22 MR. HEYMER: As regard the input into the  
23 discussion, we can have it now or we can take it later  
24 on when we get into the questions. But it might be  
25 worthwhile hearing from some of the pilots.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 CHAIRMAN APOSTOLAKIS: Certainly. Any  
2 time. Yes.

3 MR. HEYMER: That have gone through this  
4 process, for them to just briefly describe how they  
5 addressed that in specific instances.

6 CHAIRMAN APOSTOLAKIS: Yes, we can pick up  
7 these things again when we talk about the question.

8 MR. HEYMER: Okay. Well, we'll wait until  
9 then.

10 MR. BURCHILL: This is Bill Burchill from  
11 Exelon.

12 You made a comment that I think I'd just  
13 like to make we understand your comment.

14 One of the fundamental principles in our  
15 approach as an industry to supporting this Option 2  
16 initiative is that we would be consistent with the  
17 current framework of risk-informed applications that  
18 are specified by the regulation. And, you know,  
19 whether 1.174 is going to change in the future, it  
20 currently provides the direction to evaluate from a  
21 number of different perspectives.

22 And I think you're absolutely correct that  
23 where we have a PRA, we think it provides sufficient  
24 information, but on the other hand what we've also  
25 done is responded to those guidance from the current

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 regulatory environment that says advise the IDP on  
2 whether there's an impact.

3 So when we look at defense-in-depth it  
4 doesn't necessarily mean that we're doing something  
5 separate from the PRA that would necessarily be in  
6 conflict with it, but having done the PRA and having  
7 done the categorization, we say well does that have  
8 any impact on defense-in-depth and then we advise the  
9 IDP whether or not that's the case.

10 CHAIRMAN APOSTOLAKIS: Yes. I didn't mean  
11 to imply that you should deviate from 1.174. For  
12 heaven's sake, no. But you can certainly refine  
13 certain things.

14 And my other point is that the panel  
15 typically will not consist of experts who understand  
16 the PRA and its subtle and then understand the plant,  
17 and understand all sorts of things.

18 DR. ROSEN: George, excuse me. I think it  
19 will. At least in the South Texas case and I assume  
20 that the staff would insist on similar capability in  
21 other cases of other licensees, the panel has a risk  
22 and reliability expert on it. Not every member is a  
23 risk and reliability expert.

24 CHAIRMAN APOSTOLAKIS: That's true.

25 DR. ROSEN: But there is one, and his job

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 is to keep the panel informed of any implications like  
2 the ones we're talking about.

3 CHAIRMAN APOSTOLAKIS: My point is that  
4 the more explicit the guidance to the panel, the  
5 better off all of us will be. Okay? And making sure  
6 that you discuss the defense-in-depth assessment  
7 appropriately, but in certain instances is not as  
8 important in others. That means that would be a  
9 useful thing rather than saying defense-in-depth is  
10 important, you have to look at it in a blanket sort of  
11 way.

12 MR. BURCHILL: Bill Burchill again.

13 Yes, I think you're absolutely correct.  
14 And I think if you have a full compliment, let me put  
15 that way, of PRA information that's applicable, then  
16 the defense-in-depth becomes a supplementary piece of  
17 information, perhaps confirmatory or perhaps just  
18 advisory. But as you point out as well, where you do  
19 not have the PRA information and perhaps are you only  
20 using screening techniques, the defense-in-depth  
21 probably becomes a more important part of the mix of  
22 information.

23 MR. CHEOK: George, real quickly I just  
24 want to read 2 sentences from 1.174. It says here  
25 that it -- I just lost the place.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 "It has been and continues to be an  
2 effective way to account for uncertainties. If  
3 comprehensive risk analysis is done, it can be used to  
4 help determine the appropriate extent of defense-in-  
5 depth to ensure protection of the public health and  
6 safety. When a comprehensive risk analysis is not  
7 done or cannot be done, traditional defense-in-depth  
8 considerations should be used or maintained to account  
9 for uncertainties."

10 That's what 1.174 says and I think it  
11 agrees with you just said and what Bill just said.

12 CHAIRMAN APOSTOLAKIS: We all agree.

13 DR. FORD: Could I just ask a question  
14 about the final bullet? By that do I understand  
15 physically what you're considering is long term  
16 degradation of concrete and the rebar?

17 MR. TRUE: No.

18 DR. FORD: No.

19 MR. TRUE: We're talking about the long  
20 term -- well, no unearlly failures of the containment  
21 under severe accident conditions. Failure to remove  
22 decay heat, long term over pressure over temperature  
23 conditions.

24 DR. FORD: Okay. Because I know that in  
25 the plant license renewal area the integrity and

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 degradation of the concrete of the rebar is under  
2 consideration, but that's not what you mean in here?

3 MR. TRUE: No. No.

4 DR. FORD: Okay.

5 MR. PARRY: Can I just add a comment, just  
6 to clarify that.

7 This is Gareth Parry from the staff.

8 What's under consideration here, things  
9 like the systems that are used to remove decay heat,  
10 like the RHR system, containment sprays, fan coolers  
11 but not the structures themselves. I think that's  
12 right.

13 MR. TRUE: Correct. Correct.

14 DR. FORD: What about integrity of the  
15 containment, the physical integrity? I mean, at  
16 Oyster Creek I know that there we had problems -- I  
17 think it was Oyster Creek. We had problems of  
18 degradation, however in that case some of the steel.  
19 Does that come into this out of all in the  
20 categorization of RISC-3 components?

21 MR. TRUE: I don't see a path that someone  
22 could conclude that the containment is RISC-3. The  
23 containment pressure boundary is RISC-3. So I think  
24 we believe that the treatment of the containment will  
25 continue as is and we're talking about changing the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 treatment.

2 DR. FORD: Okay. Not going to change  
3 that?

4 MR. TRUE: Same is true of the reactor  
5 coolant system --

6 CHAIRMAN APOSTOLAKIS: Are you saying that  
7 these categorization process as a generous statement  
8 does not apply to passive components? Is that what --  
9 I mean, Dr. Ford has asked two or three questions so  
10 far and I'm not sure what the answer is. You refer to  
11 the ASME case.

12 MR. HEYMER: Where the ASME code cases  
13 reflect, which is really focused on piping and vessels  
14 and such.

15 CHAIRMAN APOSTOLAKIS: Right.

16 MR. HEYMER: If the licensee wishes to  
17 involve that code case and use that, then he can  
18 incorporate the results from that passive  
19 categorization into what he's gotten by the pressure  
20 boundary. Otherwise, the pressure boundary would stay  
21 as it is today.

22 We do not see things like containment  
23 structures being included in that, and as such they  
24 would stay exactly as they are today. And I think one  
25 of the principles we have is that the component or the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 structure stays where it is today unless you can show  
2 that it's of low safety significance.

3 DR. ROSEN: But even in that case, Adrian,  
4 if the licensee wishes to use a code case, what you're  
5 doing is accepting or utilizing some flexibility to  
6 change the inspection intervals or testing intervals,  
7 but not to remove the components from scope?

8 MR. HEYMER: Well, in this case we would  
9 look beyond that. We would take it to the next step.  
10 So you --

11 DR. ROSEN: You've gone through the code  
12 case you're saying?

13 MR. HEYMER: Yes. So if it came down, it  
14 wouldn't just be increase in the interval necessarily  
15 of the inspection activity.

16 MR. CHEOK: I think the way the staff  
17 views this issue is that everything starts off as  
18 RISC-1 and it stays in RISC-1 unless you have  
19 justification to move it to RISC-3. So if you want to  
20 move a passive component from RISC-1 to RISC-3, you  
21 would have to use, for example, the ASME code cases to  
22 justify moving it to RISC-3.

23 DR. FORD: So if the staff came to you and  
24 said the containment vessel on the Seaborn Station and  
25 as an informed member of the public, I could say the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 rebar is going to corrode. The staff asked you prove  
2 to me that the containment has still got its original  
3 design integrity; that would be kicked into the  
4 current in the IDP process?

5 MR. HEYMER: Well, no. That to me is a  
6 completely different issue associated with the current  
7 design and the integrity of the containment as it is  
8 today and is not a risk-informed activity. This  
9 process doesn't go out and say is the equipment  
10 adequate today. We assume it is. What we're doing is  
11 going through a categorization process to look at the  
12 insides and say if it's 1 today, can we justify making  
13 it of low safety significance? It doesn't take into  
14 account well is the design with the design assumptions  
15 or the corrosion rates, etcetera, are they still valid  
16 today. To us that's a different question.

17 DR. FORD: Okay.

18 CHAIRMAN APOSTOLAKIS: Shall we go on to  
19 the questions now or you have more?

20 MR. PARRY: I mean, we've discussed the  
21 defense-in-depth. You've insisted that the PRA has  
22 everything we need in it for looking at core damage  
23 issues. And I look at the slide and it seems to have  
24 some sort of a balancing between mitigation and  
25 prevention in it, kind of what you look for in those

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 context.

2 What you also stipulated was that perhaps  
3 a defense-in-depth assessment is more required for  
4 some issue like fire. And when I look at the slide it  
5 does not have anything in it that's familiar to the  
6 issues of defense-in-depth when I think of fire.

7 Now, is that just translation or is there  
8 some understanding here that these words deal with the  
9 prevention of fire; the detection and suppression of  
10 fires and the prevention of damage caused by fires  
11 here hidden in these words?

12 MR. TRUE: No, there's nothing hidden in  
13 the words. I think fire is a difficult one when  
14 you're searching for defense-in-depth, because as a  
15 practical matter we have designed our plants to have  
16 a protected train in most cases for fires. So if you  
17 have a fire, a large fire, you'll be left with one,  
18 exactly one train of mitigation which by definition  
19 isn't really defense only. It's a level of defense-  
20 in-depth, but you're not going to get more levels of  
21 defense-in-depth than one in most plants for most  
22 situations.

23 MR. PARRY: In most plants.

24 MR. TRUE: Unless you're South Texas and  
25 you have three 3 trains and they're all separated and

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)

1 one of the last plants built in the country.

2 In most plants in the U.S. we have gone to  
3 a -- Appendix R has driven us to this single path.  
4 And because of the initiating event frequencies we see  
5 in fire PRAs, I don't see how a train that's used to  
6 mitigate a fire could ever have low safety  
7 significance because there's only one train.

8 And so I don't think we're going to find  
9 a lot of additional defense-in-depth in the fire area.  
10 It's just my experience from doing fire PRAs.

11 MR. BURCHILL: Bill Burchill from Exelon.

12 I guess I'd like to temper that just a  
13 little bit. If you talk about the Appendix R bounding  
14 fire, you know what we call an exposure fire, what  
15 you're saying is correct and the plant is designed  
16 specifically to provide a path for its protection.  
17 But in fact, the fires that will be more likely to  
18 occur in the plant at a higher frequency level are not  
19 bounding exposure fires or large control room fires,  
20 or something of that nature.

21 Most fires that have and probably will  
22 occur in a plant are of a much less extensive impact.  
23 And in those cases certainly the fires are protected  
24 through the use of the EOPs. You don't get your  
25 extreme safe shutdown procedure. You're working

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 through EOPs. And, in fact, you do look for defense-  
2 in-depth. You do look for any pathway that can control  
3 pressure, reestablish inventory if that's necessary.  
4 You know, obviously decay heat removal and so forth.

5 So, I think we have to be very careful not  
6 to let our thinking be dominated by the Appendix R  
7 design base approach. For that case what Doug is  
8 saying is certainly true. But for the more likely  
9 situation there are certainly are a number of ways  
10 that are available and, in fact, are actually invoked  
11 through the use of the EOPs.

12 CHAIRMAN APOSTOLAKIS: But I think the  
13 general -- I'm sorry.

14 MR. BURCHILL: And in fact, that's what a  
15 fire PRA represents. I mean, a fire PRA starts by  
16 going through what is the realistic response. We had  
17 this discussion, I think at an ANS meeting, Dr. Rosen.

18 In fact, the PRAs going to represent all  
19 those realistic paths.

20 CHAIRMAN APOSTOLAKIS: But I mean would  
21 the door, for example, that's supposed to be closed to  
22 prevent fires from spreading from one compartment to  
23 another, the smoke and so on, would that be part of  
24 the defense-in-depth philosophy? I mean, that you  
25 want these doors closed and so on because you are

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)



1 preventing the fire from spreading; and that's not  
2 going to be in the PRA I don't think.

3 MR. TRUE: Right. Right.

4 CHAIRMAN APOSTOLAKIS: You know, if there  
5 is a PRA. So is that kind of thinking in part of the  
6 guidance to the panel or they will think about it  
7 naturally because they're experienced people? I don't  
8 know how that works.

9 Now, the fire protection engineers, you  
10 know, when you speak about defense-in-depth, they will  
11 tell you we have measures to prevent fires from  
12 occurring. Then given that the fire exists, then we  
13 want to mitigate its consequences and so on.

14 MR. TRUE: I think what we said in the  
15 fire section was that we felt fire suppression systems  
16 were something that would be normally reflected in  
17 fire risk analyses, and we could use this process.  
18 But that if you were going to go --

19 CHAIRMAN APOSTOLAKIS: But what we're  
20 screaming about this is you don't have that benefit,  
21 right? It's screening analysis that is --

22 MR. TRUE: Well, we should talk about  
23 fire, because --

24 CHAIRMAN APOSTOLAKIS: We will. We will.

25 MR. TRUE: And fire barriers like the door

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 you mentioned in general it's rare that a fire PRA  
2 explicitly addresses those.

3 CHAIRMAN APOSTOLAKIS: Does not?

4 MR. TRUE: And so we said in order to do  
5 a reclassification -- like as Mike said, the premise  
6 is you stay where you are unless you have a case. And  
7 so you'd have a case that said I've looked at this  
8 barrier and even if it doesn't work, it doesn't  
9 increase the risk and therefore it could be moved  
10 down. But we don't see that as being a natural  
11 fallout from importance measures, that would have to  
12 be a focused look at barriers.

13 So we think the process could apply to  
14 barriers, but we don't think a practical matter it's  
15 going to be applied.

16 CHAIRMAN APOSTOLAKIS: Anyway, let's move  
17 on because we are spending too much time. Shall we  
18 jump into the questions.

19 MR. TRUE: Okay. I want to just jump to  
20 one last --

21 CHAIRMAN APOSTOLAKIS: One last, okay.

22 MR. TRUE: One last thing on applications.

23 CHAIRMAN APOSTOLAKIS: Good.

24 MR. TRUE: Just so you understand where we  
25 are.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 Three of the owners groups -- that was the  
2 last slide -- have pilot -- have undertaken pilot  
3 applications of the categorization process and  
4 guidance. And, in fact, in all cases developed  
5 additional guidance that they've used in that process.

6 And they've looked at both safety related  
7 and non-safety related, tried to get a balance of SSCs  
8 removing different boxes.

9 The NRC staff has been involved in  
10 observing the IDP deliberations on that. And we've  
11 had a case where we've had a spectrum of PRA  
12 information; fire approach is different, seismic  
13 approach is. And we believe, and we'll talk more  
14 about this when the pilots talk some more, we believe  
15 that through that that NEI 00-04 is a comprehensive  
16 and robust --

17 CHAIRMAN APOSTOLAKIS: Well, I wonder how  
18 you can draw that conclusion? What exactly does a  
19 pilot application tell us?

20 I mean, they take a document and they say  
21 okay it tells us to categorize certain things in a  
22 certain way. We do it and it works. We put them in  
23 category 3. I mean, where the pilot tell me that this  
24 was not appropriate or -- I mean, how can it question  
25 the document?

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)

1                   It could question the ease with which the  
2 document can be applied, but unless the panel that  
3 evolved it, the panel comes back and says gee, you  
4 know, everything you're telling us to do is nonsense,  
5 which I don't think is the case.

6                   So, I wonder --

7                   DR. ROSEN: That can't happen because the  
8 panel is the process in a lot of respect.

9                   CHAIRMAN APOSTOLAKIS: Well, I don't know  
10 how I can conclude it's comprehensive and robust.

11                  DR. ROSEN: Oh, I agree. I mean, I would  
12 be interested.

13                  CHAIRMAN APOSTOLAKIS: I just don't know  
14 that.

15                  MR. HEYMER: We started and we developed  
16 a draft guideline document. And some of the pilots  
17 provided input into that. And then we took that  
18 document and we took it into the field and we gave it  
19 to people and said now can you use this document.

20                  And so the real process is to test out the  
21 document. And they started to use it and they  
22 identified some problems.

23                  The IDP actually had some problems in the  
24 training process, and that's how we've gone through  
25 the lessons learned.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1           We're not saying that Rev. B as you see it  
2           today that was forwarded in June is the final  
3           document. We need to make some adjustments and in a  
4           number of areas. But the fact that the pilots took it  
5           and they could understand the document, and that they  
6           went through a categorization and identified  
7           weaknesses or areas where we needed to improve it, but  
8           they still went through it. And actually they came  
9           out at the end. And as we went through the pilot  
10          process, we've learned from the first and third look,  
11          and the second. And I think what we ended up with  
12          when you get to Surrey, admitting that we're going to  
13          have to refine it some, shows that we do have a  
14          reasonable and comprehensive process in place.

15                 It's an evolution. It's to test a  
16          document; did they understand the document, could they  
17          use the document.

18                 Bill, did you want to say anything?

19                 MR. TRUE: No. Tom.

20                 MR. HOOK: Having observed the Wolf Creek  
21          IDP and participated in the Surrey IDP, as Adrian  
22          indicated there were lessons learned in terms of some  
23          small word changes to the evaluation criteria in the  
24          NEI guide, specifically in section 5.2 in the IDP  
25          guidance on addressing defense-in-depth issues for

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 candidate RISC-3 components.

2           Where I believe the Surrey IDP felt much  
3 more comfortable with the new words and their  
4 appropriateness to address their concerns from the  
5 deterministic perspective from their areas of  
6 expertise with those words then the Wolf Creek did and  
7 probably the Quad Cities did. So I think there was an  
8 evolution in the specific words that brought the IDP  
9 to feel more comfortable with the categorization  
10 process. Not as much with the active, because I think  
11 the active didn't need as much revision, but the  
12 passive in terms of the draft ASME code case underwent  
13 significant revision between the Wolf Creek and the  
14 Surrey IDP having reflected the comments from the Wolf  
15 Creek IDP where basically it didn't work and they kind  
16 of gave up on the passive categorization at Wolf  
17 Creek. And Bob Lutz can speak to that more from the  
18 Westinghouse perspective.

19           In terms of your asking the question about  
20 well how does the IDP validate the process, I think  
21 the IDP validates the process when the members feel  
22 like the process works from their perspective, from  
23 their expertise and their view of is it acceptable to  
24 move this component for which I have some special  
25 knowledge of from RISC-1 to RISC-3 or RISC 2 to 4, and

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)

1 such.

2 And at Surrey I think the members felt  
3 like they understood the deterministic basis as well  
4 as the PRA basis for components being in their  
5 categories much better than in the earlier IDPs.

6 MR. BURCHILL: Bill Burchill from Exelon.

7 I just wanted to add to that sort of  
8 segueing off of your comment about I think you said  
9 the IDPs won't revolt. In fact, and I don't want to  
10 state this in too exotic terms, the IDPs in fact will  
11 revoke if they do not feel the process is correct and  
12 addressing the right issues.

13 The IDP panel members are not a randomly  
14 selected group, of course. They're specifically  
15 chosen for both their expertise and their experience.  
16 And to be quite frank about it, they're very  
17 protective of what they believe is the integrity of  
18 that plant and particularly those coming from  
19 operations, they're very protective. And so they do  
20 not take at just face value what they're presented.  
21 They challenge it. In every one of the cases of our  
22 pilots it's been quite an experience. In one case it  
23 was near revolt and they said your process needs to  
24 consider the following things, your process must be  
25 bringing me the correct information.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)

1                   So, I think that it's been a real learning  
2                   experience for each of us that's been involved with  
3                   it. We've, of course, previously had the similar  
4                   experience with maintenance rule expert panels, but  
5                   now we're talking about actually changing things in  
6                   the plant, particularly leading to treatment changes.  
7                   And we are very strongly challenged by these IDPs.

8                   DR. ROSEN:     That experience is not  
9                   inconsistent with mine on the South Texas panel.

10                  MR. TRUE:    I'd expect that.

11                  MR. CHEOK:   George, I guess the staff has  
12                  also been present at these three pilots. And one of  
13                  the main staff comments was that there needed to be  
14                  more structure in the NEI 00-04 process and in the IDP  
15                  documentation as to what was deliberated. And I think  
16                  I agree with Bill and everybody else who said that  
17                  there's a lot of deliberations that goes on to be in  
18                  these IDPs and that they actually go through extra  
19                  lengths to try to determine that something is low  
20                  safety-significant.

21                  What the staff's comment was that I think  
22                  we need to document this kind of process to ensure  
23                  that it does always happen in the future and that also  
24                  we need to document it in the present IDP  
25                  deliberations so that we can know what they talked

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)



1 about and what the basis for when you something in  
2 RISC-3.

3 So a lot of this process that's been  
4 talked about is not now in documentation that we can  
5 see, but we are pushing for more of this kind of  
6 documentation to be present.

7 CHAIRMAN APOSTOLAKIS: Okay. Shall we go  
8 to the questions?

9 MR. HEYMER: We provided a handout. We  
10 weren't going to put these up on the screen. We've  
11 got a handout. We were going to talk from these and  
12 so it would be an interactive process between the  
13 industry participants and the Subcommittee here and  
14 with the NRC joining in.

15 So rather than put just the question and  
16 that bullets up, the real purpose of the bullets is  
17 just a summary, but it would be more of a discussion  
18 session based on the questions as we go through them.

19 And I think some of them we've already got  
20 into in partial manner. And I think going through the  
21 exercise we've just done will help us.

22 Question 1: Why are there are four -- we  
23 read this as to be why there are four categories  
24 instead of three.

25 CHAIRMAN APOSTOLAKIS: That's what it

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 says.

2 MR. HEYMER: And, you know, when we  
3 started this off this morning the NRC staff, we came  
4 in with one proposal, the staff looked at it and said  
5 perhaps it would be more practical to come up with a  
6 quadrant approach and not have 50.49(b) as we did in  
7 Option B to Appendix J, but have a separate rule. So  
8 we took a look at the quadrants and we believed it  
9 could work.

10 Now, we've evolved a little from that, but  
11 I still think that a quadrant structure is correct.  
12 I will note that as we get into the treatment area we  
13 think that we're looking at three categories of  
14 treatment as regards Appendix B stroke safety related,  
15 augment quality and industrial balance of plant type  
16 activities. And that balance of plant activities is  
17 really a spectrum from items that you might work on as  
18 regards to water cooler way up into something that  
19 might be actually approaching the augment quality type  
20 of activities for something that has significant  
21 importance to the plant that may still be low safety-  
22 significant.

23 So I think what we're looking at here is  
24 not necessarily a hard line between RISC-3 and 4, but  
25 more of a perforated line between 3 and 4. But the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 categorization is still there because we're not  
2 changing the design basis. We're still keeping the  
3 nomenclature of safety related, and that means  
4 something in the regulatory space. So I do think the  
5 quadrant structure is practical. It does move  
6 forward, but we are looking at -- I guess if we went  
7 through Option 3 and we're successful in everything in  
8 Option 3 that we're trying to go to, then perhaps we  
9 would just end up with 2 categories. But we see that  
10 the categorization is 4 with 3 degrees of treatment  
11 and with the third section of treatment being  
12 industrial balance of plant treatment being a very  
13 much a graded process depending upon where you are as  
14 regards to the importance.

15 But if the staff want to jump in there to  
16 mention the quadrant process.

17 MR. REED: I don't disagree with anything  
18 he said.

19 CHAIRMAN APOSTOLAKIS: Sorry?

20 MR. REED: I don't disagree with anything.

21 This is Tim Reed from the NRC staff. I  
22 agree with his characterization.

23 CHAIRMAN APOSTOLAKIS: So Option 3 might  
24 combine the two of them, but not Option 2?

25 MR. HEYMER: Right.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 DR. ROSEN: That's just because of the way  
2 we structured Option 2.

3 MR. HEYMER: That's correct.

4 DR. ROSEN: It has nothing to do -- I  
5 mean, if you didn't have that, you would say that box  
6 3 is -- we probably wouldn't have put the components  
7 that end up in box 3 in box 3, would not have made  
8 them safety related in the beginning if we had this  
9 process.

10 After we designed the plant or as we were  
11 designing the plant we did the PRA and IDP as part of  
12 an integrated design process for the plant that would  
13 have ultimately emptied box 3 into box 4.

14 MR. HEYMER: Right.

15 DR. ROSEN: And would have said okay,  
16 these things are not risk significant, therefore we're  
17 going to be treat them as nonsafety related.

18 MR. HEYMER: I think if you'll look at a  
19 new plant, I mean I think you would probably look to  
20 two categories, possibly three, but certainly I think  
21 you would look at two. Because the fewer number of  
22 programs you have the better it is from a long term  
23 perspective.

24 But, yes, I mean if we were starting off  
25 from scratch we probably wouldn't have the box 3

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 category.

2 DR. ROSEN: Well, the fact of the matter  
3 is we're starting off from scratch. Because there are  
4 some new plants being thought of by such companies as  
5 Exelon and Dominion. So I think that -- if it's  
6 revelation to anybody, that revelation might be  
7 important in what those entities are doing.

8 CHAIRMAN APOSTOLAKIS: Anything else on  
9 this question?

10 MR. BURCHILL: I was just going to  
11 comment.

12 From a utility perspective it's actually  
13 important to us to have the boxes 3 and 4 because  
14 there are continuing regulatory requirements before  
15 Option 3 may change them that apply to those RISC-3  
16 components. And it's very important for the plant to  
17 maintain cognizance of that and assure that they're  
18 meeting those requirements.

19 So it really becomes a matter of  
20 bookkeeping even if treatment really is the same  
21 between the two categories.

22 DR. KRESS: That has to do with  
23 functionality requirements?

24 MR. BURCHILL: Yes, in some cases.

25 DR. KRESS: Yes. Personally, I don't see

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 any downside to having 4 boxes. So, you know, it just  
2 provides additional information as far as I'm  
3 concerned.

4 MR. BURCHILL: Yes. And again, it's  
5 almost as simple as mundane bookkeeping; the plant  
6 being able to keep track of those components that they  
7 have to maintain a continuing regulatory compliance.

8 DR. ROSEN: Those components which were  
9 born safety related?

10 MR. BURCHILL: Correct.

11 DR. ROSEN: Which we now understand  
12 probably shouldn't have been.

13 MR. BURCHILL: Absolutely.

14 DR. ROSEN: But we will continue to  
15 maintain their functionality.

16 MR. BURCHILL: Correct.

17 DR. SHACK: Well, I always assumed that  
18 the staff have some other -- you know, when we say  
19 they're not safety-significant, they're not safety-  
20 significant in terms of CDF and LERF. And it comes  
21 back to these questions that Tom and Mario keep  
22 bringing up about sort of frequency consequences and  
23 some of the other things. And I look at this attempt  
24 to maintain functionality in RISC-3 as trying to keep  
25 a handle on those kinds of concerns without bringing

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 in a new metric.

2 And so I always assumed that the RISC-3  
3 and the emphasis on the functionality there was really  
4 part of a defense-in-depth frequency consequence kind  
5 of consideration that wasn't explicitly brought in.  
6 And if you said that CDF and LERF were your only  
7 considerations, then I think you would end up with a  
8 two bin system. But if you brought in explicitly other  
9 kinds of measures, you would end up with in fact  
10 something like the 4 quadrant box.

11 And that sort of one my questions that  
12 came in here, as I looked through this, is suppose you  
13 made the scope the same as the maintenance rule and  
14 you brought in Part 100 considerations; the component  
15 is used to meet those requirements and make that an  
16 explicit part of the consideration. Would you  
17 simplify some of these arguments over whether the  
18 component has to be functional or not? And, you know,  
19 you just automatically boost it up. Would it change  
20 the scope all that dramatically?

21 MR. HEYMER: Tom?

22 MR. HOOK: For the passive component  
23 categorization and the current draft ASME code case,  
24 Part 100 is a consideration, just to address that  
25 specific issue for pressure boundary components.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MR. HEYMER: Okay. Moving on. Question  
2 2. Bill Burchill will start the response from the  
3 industry perspective on this. Bill?

4 MR. BURCHILL: Yes. Actually I'm going to  
5 respond to the next four questions which were  
6 generally categorized in your letter as the use of CDF  
7 and LERF as the sole criteria.

8 The first question asks whether there's a  
9 logical inconsistency between the safety criteria used  
10 in current licensing activity, specifically the  
11 concept of frequency versus consequence and the  
12 criteria used in Option 2.

13 And we took this quite literally in trying  
14 to respond to it. We think that Option 2 is  
15 consistent with other risk-informed applications which  
16 we've previously talked about and in that sense  
17 addresses more than just CDF and LERF. It does address  
18 defense-in-depth considerations, preservation of  
19 safety margin considerations and so forth.

20 But more to the question of the  
21 consistency, I think sort of what I would say on  
22 philosophic plane if you look at our current licensing  
23 structure beginning with, I guess, Reg. Guide 1.70  
24 Rev. 2 back in the mid-'70s, we articulated that there  
25 was a clear distinction between those high frequency

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 events, relatively high frequency, anticipated  
2 operational occurrence events and the limits that we  
3 would place on them, you know, which are things like  
4 DNBR and critical power ratio. And then the next step  
5 down the curve would be those moderate frequency  
6 events where we would then impose -- actually it turns  
7 out it's similar limits to the AOOs. And then the  
8 very low frequency events, normally referred to as  
9 design basis events where we go to things like  
10 Appendix K and more severe limits.

11 And our thinking is that in fact what  
12 we're doing here is actually continuing the logical  
13 extension of that curve that core damage and large  
14 early release, neither one of which are associated  
15 with any of those first three categories because they  
16 disallow that as an end consequence, but now you  
17 consider an end consequence that's more severe than  
18 the most severe design basis accident consequence but  
19 generally of a much lower frequency. You know, some  
20 orders of magnitude in cases, but some coming close.

21 So if you think of the curve of the  
22 frequency versus consequence as generally sort of the  
23 Farmer line that was articulated almost 30 years ago,  
24 that this is just a logical extension of that whole  
25 concept. And as such, in fact, adds an enhancement to

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 our inquiry about the safety of the plant. You know,  
2 it says I've got these three that are under design  
3 base, they have a graduated set of criteria consistent  
4 with the challenge frequency and we're now looking at  
5 yet another point on that curve. And we're saying  
6 for these events which have a much more extreme end  
7 point, you know, generally we would expect to see them  
8 in a much lower frequency.

9 CHAIRMAN APOSTOLAKIS: I'm not sure I  
10 follow this argument. Couldn't there be a system or  
11 a component that would prevent the minor release but  
12 when it comes to serious severe releases, the system  
13 is really irrelevant? Would that system come out as  
14 being risk significant is CDF is my criterion? I  
15 think the thrust of the question is that there may be  
16 some SSCs that are really preventing minor releases,  
17 Farmer called them "of nuisance value," and these may  
18 not be captured. They may not be declared the  
19 significant if you look at the severe stuff. That's  
20 really the thrust of this.

21 I mean, there's no question that by going  
22 to CDF and LERF you're going beyond design basis and  
23 everything you told us is valid. But are we missing  
24 some stuff that, you know, may be preventing minor  
25 releases that may create an uproar or whatever by

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)

1 focusing on the severe accidents beyond design basis?

2 MR. BURCHILL: I understand. I think  
3 there's two parts to the answer. One is that under  
4 Option 2 specifically we are maintaining the  
5 functionality of those pieces of equipment.

6 Well, let me start with things that simply  
7 stay in RISC-1. Things that stay in RISC-1 we're not  
8 changing anything. So what we're really only talking  
9 about is the subset that would be reclassified because  
10 of safety-significant into RISC-3. And in those cases  
11 we're compelled to maintain the functionality for all  
12 of their design basis responses, which would be for  
13 these less severe events.

14 Now, we're going to have a later question  
15 that deliberates, of course, whether or not there's an  
16 actual impact on that functionality or its reliability  
17 with respect to treatment. The evidence generally to  
18 date is, I guess, at best inconclusive on that, but it  
19 doesn't indicate a strong change in the negative  
20 direction. And, in fact, you know probably at best  
21 neutral.

22 So what we believe is that being compelled  
23 to maintain that functionality that we're supporting  
24 the response to those less severe events and that  
25 we're in fact not degrading that.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 DR. KRESS: That presumes that the  
2 original classification of those as safety-significant  
3 captured their significance with respect to these  
4 smaller releases.

5 CHAIRMAN APOSTOLAKIS: Is it possible that  
6 some of them were not RISC-1?

7 MR. BURCHILL: Well --

8 DR. KRESS: And it's possible that they  
9 didn't capture all of those because the process by  
10 which they were -- the criteria used to put them in  
11 that category might not have captured all of them.

12 CHAIRMAN APOSTOLAKIS: I mean the old --

13 DR. KRESS: We got a new way to do it now,  
14 but --

15 CHAIRMAN APOSTOLAKIS: I understand. But  
16 were they safety related in the old scheme?

17 DR. KRESS: Oh, yes. That's the reason  
18 they're in that category.

19 CHAIRMAN APOSTOLAKIS: They were safety  
20 related. Yes. All right.

21 MR. BURCHILL: Yes. Right. I mean if  
22 they're safety related --

23 DR. KRESS: They were safety related. Now  
24 that presumes the old process for determining they  
25 were safety related caught all these frequency

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 consequence event components; that might be at the low  
2 frequency nuisance level. I'm not sure they did. The  
3 proof of the pudding in that is if you had a PRA that  
4 looked at all those things and actually calculated a  
5 frequency consequence and did a RAW with respect to  
6 components on these lower frequency consequence  
7 events. Had a RAW on the F-V.

8 And to me that would be a proof of the  
9 pudding, and I'm not sure it's captured this way  
10 because it has a presumption in it that they were  
11 captured originally.

12 DR. ROSEN: Let me ask a question designed  
13 to get very tangible about this. For example, what  
14 did the PRA independent panel at Surrey do with things  
15 in the waste gas processing system?

16 MR. HOOK: They worked in the scope of the  
17 pilot where the Surrey IDP --

18 MR. BURCHILL: Well, they were at Quad,  
19 the standby gas treatment system was one of the  
20 systems chosen. And, in fact, through the measures  
21 that were presented to the panel from the process of  
22 their significance determination, it was recommended  
23 that the system be reclassified into RISC-3. And the  
24 IDP did not accept that. The IDP in fact -- you know,  
25 I said about revolt. They rejected that information

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 and said we will not reclassify this.

2 DR. ROSEN: Here the IDP is standing for  
3 defense-in-depth.

4 MR. BURCHILL: Yes.

5 DR. ROSEN: And just using their intuition  
6 in saying --

7 MR. BURCHILL: Right.

8 DR. ROSEN: -- there isn't that much to be  
9 gained from doing this and potentially something to be  
10 lost, and we'd just rather not do it, so don't.

11 MR. BURCHILL: Precisely.

12 DR. ROSEN: And that's a familiar pattern  
13 from experience with IDPs. Just because the process  
14 allows it doesn't mean that the expert panel has to go  
15 along. And so I'm glad to hear that response.

16 DR. KRESS: Let me rephrase my concern.  
17 We have a category here called nonsafety related but  
18 safety-significant. You have a category because you  
19 did a PRA that said hey, we someone got this component  
20 overlooked in the old process and that we really  
21 should have been safety in there.

22 Now, what I was saying is if -- but that  
23 was with respect to CDF or LERF. Now, if you extended  
24 that concept to some low level frequency concept, I  
25 was saying is it's possible we missed those, we might

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)

1 have missed some other things. And the only way we  
2 find it out is do the PRA. That was the nature of my  
3 comment.

4 CHAIRMAN APOSTOLAKIS: So you're really  
5 changing the argument. Billy was saying --

6 DR. KRESS: Just turn it around.

7 CHAIRMAN APOSTOLAKIS: -- that to go from  
8 1 to 3 you have a functionality requirements and so  
9 on.

10 DR. KRESS: Yes, exactly.

11 CHAIRMAN APOSTOLAKIS: But Tom is really  
12 saying how about from 4 to 2.

13 MR. BURCHILL: That's an interesting  
14 point. In fact, I want to address both the 1 to 3 and  
15 the 4 to 2.

16 CHAIRMAN APOSTOLAKIS: Okay.

17 MR. BURCHILL: Because you could have, for  
18 example, a component. In fact, the example Doug put  
19 on his slide about the containment valves. You could  
20 have -- you know, the vent valves. That's normally  
21 under design base intended to close. Okay. And what  
22 we've got is a situation that for the PRA we want it  
23 to open. We want it to vent.

24 So whether or not that would be a  
25 candidate for reclassification from 1 to 3, I'm not

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 sure. But we certainly would now identify a new  
2 functionality, you know, because of this inquiry that  
3 would have a set of attributes associated with it  
4 which in fact may change the treatment of that  
5 component; if nothing else to cause us to monitor its  
6 condition and capability for this new attribute.

7 So I think -- I guess I don't see  
8 something that degrades anything that's presently in  
9 place. I think actually what we're presented is an  
10 opportunity to identify new functionalities and  
11 attributes that we really want to spend some time on,  
12 you know, that we want to pay some attention to.

13 DR. KRESS: Yes. I don't think it degrades  
14 anything presently in place either. I think there's  
15 a potential for missing things that the current  
16 process missed in the first place.

17 MR. BURCHILL: Well, actually now I  
18 understand completely what you're saying.

19 DR. KRESS: Yes.

20 MR. BURCHILL: Yes. And we're going to  
21 have to think about that. I don't think any of us  
22 would stand here today and say we will guarantee this  
23 process, we'll pick up those things that we might have  
24 forgotten before. I don't think there's any -- we  
25 would not -- yes, understand.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 DR. KRESS: Yes. And that is the basis of  
2 my comment.

3 DR. ROSEN: But there is guidance at NEI  
4 00-04 that says if something like that shows up --

5 MR. BURCHILL: Yes.

6 DR. ROSEN: -- that becomes an opportunity  
7 for the plant to exercise its 50.59 process.

8 MR. BURCHILL: Yes.

9 DR. ROSEN: And to make it safety related  
10 to the extent possible and to recognize an error. I  
11 mean, that's what the corrective action systems do  
12 everyday.

13 DR. KRESS: Yes, but my point was that I  
14 don't see in the process how you find those thing.

15 DR. ROSEN: Well, he's right. It's not the  
16 process that does it, although there's a lot of -- the  
17 process puts a lot of light and scrutiny on  
18 components. And in that process you're naturally  
19 going to find a cockroach if there is one.

20 DR. KRESS: It may very well, and I'm not  
21 sure of that. It's not explicit.

22 DR. ROSEN: You're right.

23 CHAIRMAN APOSTOLAKIS: Okay.

24 MR. BURCHILL: Okay. The third question  
25 had to do with somewhat of a variation I think of this

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 concept of the frequency versus consequence. And it  
2 addresses explicitly the provision of layers of  
3 protection which are part of the defense-in-depth.  
4 And that these pieces are generally classified as  
5 important to safety.

6 The implication of the question is that  
7 we're going to change something that's going to either  
8 change that level of defense-in-depth or eliminate it.  
9 And our answer to that is that compliance with Part  
10 100, you know, as the example in the question is is  
11 not impacted by Option 2. In other words, we're still  
12 compelled of course to comply with that regulation.

13 Neither are there layers of protection  
14 explicitly impacted by Option 2. We don't anticipate  
15 in fact that equipment is going to be removed from the  
16 plant. The only thing that we understand would be  
17 changed would be the treatment requirements, but we  
18 must maintain functionality.

19 So there's not an expectation that we're  
20 actually changing these levels.

21 DR. KRESS: There could be a potential for  
22 changing the balance between CDF and LERF? You might  
23 change CDF some and not LERF or vice versa? And  
24 wouldn't that be a change to the defense-in-depth?

25 MR. TRUE: It's possible that CDF

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1       theoretically could change more than LERF, but we are  
2       controlling that amount of change to be a very small  
3       change.

4               MR. BURCHILL: In both cases.

5               MR. TRUE: In both cases. So, yes, as a  
6       matter of --

7               DR. KRESS: You're saying you're keeping  
8       the balance within an appropriate range by keeping it  
9       small?

10              MR. TRUE: In some appropriate range.

11              MR. BURCHILL: The reason I was a little  
12       stumped on your question is I really wasn't thinking  
13       of CDF and LERF as separate perimeters being an  
14       illustration of defense-in-depth.

15              CHAIRMAN APOSTOLAKIS: But they are.

16              MR. BURCHILL: Yes, it's interesting.

17              CHAIRMAN APOSTOLAKIS: At the high level.

18              MR. BURCHILL: Yes. Yes.

19              DR. SHACK: So the argument in maintaining  
20       functionality is not the same; although you have the  
21       functionality if it works, the reliability could  
22       potentially be degraded?

23              MR. BURCHILL: Yes.

24              DR. KRESS: That's why a RAW tells you.

25              CHAIRMAN APOSTOLAKIS: Well, that's what

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 the whole issue is here, right?

2 MR. BURCHILL: Okay.

3 DR. SHACK: To come back and say that  
4 you're maintaining functionality just doesn't really  
5 address the question in a sense either. We're  
6 changing the requirements. Now whether they have a  
7 significant impact is a different -- that's a  
8 different question.

9 MR. BURCHILL: But that in fact --

10 DR. SHACK: Which, of course, is the  
11 relevant question.

12 CHAIRMAN APOSTOLAKIS: Was not even a  
13 question.

14 MR. BURCHILL: Yes, it was a comment.

15 CHAIRMAN APOSTOLAKIS: Just an argument  
16 supporting the other question.

17 DR. KRESS: Yes, you're right.

18 CHAIRMAN APOSTOLAKIS: Which were number  
19 2 and number 5, I believe. 2 and 5 have question  
20 marks at the end. Three and 4 really are preludes to  
21 the questions.

22 Anyway --

23 MR. BURCHILL: Let me just use the  
24 opportunity with question 4, however, even though it's  
25 not posed as question --

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 CHAIRMAN APOSTOLAKIS: Yes. Yes.

2 MR. BURCHILL: -- to clarify that we are  
3 not addressing within this Option 2 arena the spent  
4 fuel pool and the fuel handling systems. It says rad  
5 waste systems. In fact, we are doing some of that,  
6 but it's principally the spent fuel pool and fuel  
7 handling are not explicitly under the scope of this.

8 We've talked about this functionality item  
9 and defense-in-depth, so unless there's a question on  
10 4, we'll go on to 5.

11 MR. PARRY: Well, yes. You conclude the  
12 response to 4 by saying there's no conclusive evidence  
13 that a "'category-one quality requirements' actually  
14 provide improved SSC performance." I mean, I think  
15 that's true. I guess I would ask is there conclusive  
16 evidence that they don't provide improved SSC  
17 performance?

18 MR. BURCHILL: Well, I mentioned  
19 previously that I think our position is clearly there  
20 is not conclusive evidence. However, probably the  
21 most extensive body of evidence that we're aware  
22 that's actually attempted to provide this comparison  
23 was submitted on the South Texas docket in their  
24 exemption request. And I'm failing right now to  
25 remember the exact number of components, but it was in

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 the 20,000 range, I think. I may have that figure  
2 incorrect. But it was a large number that were looked  
3 at with comparison between those that had been  
4 maintained under a safety related regime and those  
5 that had been maintained under a commercial practices  
6 regime. And that document pretty clearly shows  
7 there's no statistical bias one way or the other.

8 Now, there's been argument about whether  
9 the conditions that were imposed were sufficient to  
10 test the case and so forth. But at least the evidence  
11 we're aware does not indicate a degradation in a  
12 systemic bias way.

13 Okay. Number 5 is a difficult one. It  
14 says: How does the ensure of SSCs that are deemed  
15 risk significant not essential for addressing acts of  
16 terrorism and sabotage? How does that get addressed?

17 We're looking at the potential for  
18 radiological release under the LERF consideration.  
19 But we do not under this program explicitly address  
20 acts of comission or sabotage or terrorism. We  
21 consider those are specifically addressed in a  
22 structured way under the security programs and we  
23 don't see that anything that we are doing here would  
24 actually change that. There's no linkage across to  
25 how the security program addresses preparation for

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealgross.com](http://www.nealgross.com)

1       that type of an impact on the plant.

2               The programs, as I say, are not within the  
3       scope of Option 2. The one place which you may be  
4       aware that the PRA does get applied, we do assist  
5       occasionally in the security program in identifying  
6       what are called target sets of equipment. You know,  
7       those that would present the plant with disabling  
8       effect and therefore might be the focus of a sabotage  
9       or terrorism activity. But there's nothing about what  
10      we're doing under Option 2 that would change that  
11      activity or dilute the information that's being  
12      presented in support of the security program.

13              To be frank with you, I think what we  
14      could come up with as an answer on this one, because  
15      it's not considered under this, Tom, did you have a --

16              MR. HOOK: Yes. I just wanted to make one  
17      point. That in the target sets for plants there are  
18      nonsafety related components in the target set. So  
19      it's not a presumption that something's credited for  
20      sabotage and terrorism is a safety related component.  
21      So that dispels the concern about moving something  
22      from RISC-1 to RISC-3 as having an impact in terms of  
23      the expectation of its quality requirements for  
24      mitigating terrorism and sabotage events.

25              MR. BURCHILL: Right.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 CHAIRMAN APOSTOLAKIS: Well, maybe this is  
2 a good time to take a short break.

3 So we will recess until 10:15.

4 (Whereupon, at 10:10 a.m. a recess until  
5 10:2 a.m.)

6 CHAIRMAN APOSTOLAKIS: So we are now on  
7 question 6. So whose going to respond to that?

8 MR. HEYMER: We discussed as we went  
9 through sort of an overview of NEI 00-04 the PRA  
10 quality and we had some discussion there. And we  
11 thought that it would be worthwhile as we're in this  
12 question and we've covered some of these issues, that  
13 we would ask the pilot plants to speak to how they've  
14 dealt with this issue as they've gone through Option  
15 2. And so, Tom?

16 MR. BURCHILL: Yes. Actually I think it's  
17 a little bit broader.

18 This is Bill Burchill with Exelon.

19 A little broader than just pilot plants.  
20 I'm going to really try to speak to this from a  
21 broader utility perspective.

22 There's a lot of focus in the PRA quality  
23 area that's been placed on the peer review process and  
24 the certification of PRAs as the measure of quality or  
25 perhaps the ASME standard or other standards that

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 under development as the majors to be applied. And I  
2 want to step back from that a little bit and talk  
3 about really how do you get quality in a PRA. Those  
4 two tools are certainly measures that are applied when  
5 a PRA exists and somebody wants to come in and  
6 evaluate it or the utility itself wants to evaluate  
7 it. But there's a much bigger picture on what  
8 produces PRA quality, and I'm going to try to speak to  
9 that and then Tom Hook is going to provide some other  
10 specific examples.

11 I think in today's environment where we  
12 are using PRA extensively for risk-informed  
13 application and daily, in fact, hourly perhaps in A4  
14 support under the maintenance rule, that the first  
15 thing that one has to have to ensure quality is a well  
16 structured PRA program.

17 And what I mean by that is PRA, we've  
18 joked about this over the past few years. PRA has  
19 come out of the closet. You know, it's now a -- you  
20 know, we don't even call it PRA in at least Exelon  
21 anymore. We call it risk management. And it's a  
22 function that is right along side design engineering,  
23 system engineering, the maintenance function,  
24 operations function. It's a recognized function and  
25 it's governed by processes and procedures just as

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)

1 other functions in the operation of the plant.

2 So a well structured program, which I  
3 think one will find in all utilities today, is the  
4 first starting point.

5 That process has to have internal process  
6 controls. Certainly as recently as even four or five  
7 years ago if you went to a utility and looked at the  
8 degree to which the way one goes about doing the  
9 preparation of a PRA or its documentation, you might  
10 find a less satisfactory condition than you would  
11 like. Today I would tell you that when you go out to  
12 utilities they either already have in place or are  
13 rapidly developing very highly structured procedures  
14 and guidelines for everything they do, and  
15 particularly those areas that are already in  
16 continuing use like the maintenance rule A4, those are  
17 all highly structured; the interface between the PRA  
18 function or the risk management function and the  
19 operations group and the work planning and work  
20 control or work management group is very well defined.

21 I think the third hallmark is you have to  
22 have a highly component PRA team. You cannot do what  
23 we're doing today with PRAs with amateurs. The people  
24 that are on the PRA team on the risk management group,  
25 they have to demonstrate their capability. And I know

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 that in Exelon and I believe this is becoming the  
2 practice, these people are certified just like other  
3 engineering disciplines. We have, in fact, seven  
4 different certification guides that each one of our  
5 risk management engineers must demonstrate their  
6 competence. You know, it's like a qual. process. So  
7 I think that leads to PRA quality.

8 The fourth is what I will call the  
9 documentation area. The improvements that have been  
10 made, certainly post IDP and very strongly driven by  
11 the certification process have forced utilities to  
12 really seriously think about the degree and extent and  
13 quality and traceability and retrievability of the  
14 documentation that goes along with their PRA. And I'm  
15 not talking just about what's written in a paper, but  
16 you know what decisions were made in developing of  
17 entries, fault trees, you know, approaches to human  
18 reliability analysis, whatever. Those are documented,  
19 those are retrievable.

20 You mentioned earlier, Dr. Apostolakis,  
21 that several of the PRA codes can provide the  
22 uncertainty analysis. Well, likewise they can provide  
23 documentation. There's automated tools for ensuring  
24 that those thought processes that are used to develop  
25 a PRA are captured.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)

1           We all I believe have a process of  
2           requiring ourselves to do periodic PRA updates. We  
3           have varying cycles on that, but the ASME standard, as  
4           you know, also compels that a periodic determination  
5           of the adequacy of the PRA to meet the representation  
6           of the as-built/as-operated plant is required.

7           And we also do unscheduled updates. If we  
8           have any modification in our plants, every  
9           modification in fact is evaluated for risk impact from  
10          two perspectives. One is whether or not the  
11          modification itself changes the risk of the plant and  
12          if so, that we recognize what the impact is. But also  
13          whether as a result of that modification the PRA  
14          itself must be changed so that for its other  
15          applications, you know, for example again A4, that  
16          that PRA adequately represents the plant.

17          So, we will have unscheduled updates to  
18          represent some specific either design change or  
19          procedure change. We will also then periodically go  
20          back and check the whole PRA and literally go in and  
21          check everyone of the 11 elements.

22          Now, as far as the risk management  
23          engineer himself and how does he assure that the tool  
24          that he's using or that he's improving is adequate,  
25          one technique is something I'll just call

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1       reasonableness checks. I mean, there's a wild wealth  
2       of information today about PRAs. I mean, we're not  
3       functioning with one or two studies. You know, every  
4       utility has, and we're talking specifically full power  
5       internal events but we could be talking the other risk  
6       sources where those exist at different utilities as  
7       far as their quantification tools.

8               There's a lot of peer checking that can  
9       take place by just the individual risk management  
10      engineer. There's a lot of documentation of how other  
11      plants of similar design, similar vintage, similar  
12      equipment, how they have been assessed with respect to  
13      their risk profile. And so the first point in a  
14      reasonableness check would be, obviously, to go out  
15      and see how does the result you've generated compare  
16      with what others have found.

17             We do a series of acceptance reviews that  
18      can range from a second risk management engineer  
19      sometimes who, depending upon the nature of the  
20      development, is totally independent from the  
21      development process or to even bring in an outside  
22      party and review our PRAs. This is even before we  
23      would go to a certification team.

24             I don't want to represent to you that we  
25      do that in each and every change, but depending upon

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)

1 the magnitude of the change if we had a significant  
2 update to a PRA, it's more than likely we would bring  
3 in another party to look at our work and see whether  
4 or not that was adequate.

5 Another point is, and this is certainly  
6 true at all utilities today, we all have significant  
7 management oversight of the application of our risk  
8 management tools. Again, PRA has come out of the  
9 closet. We are no longer a little study group off to  
10 the side where, you know, it's a study, it's nice, we  
11 look at it and it produces pretty pictures with pie  
12 charts and we put it on the shelf and don't pay too  
13 much attention to it anymore. It is now used  
14 everyday. It influences work planning. It influences  
15 the operation of the plant and management pays  
16 attention to those things. Management wants to know  
17 that those things that are influencing that plant's  
18 operation are sufficient.

19 Now we'll come finally at the end of my  
20 list to the PRA peer review and certification process,  
21 and the use of standards.

22 I think what you can see that I'm trying  
23 to develop is that those things when they're applied  
24 will only be successful in showing that the PRA is  
25 adequate if all these other attributes have been met.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 In Exelon we have ten sites, literally 17  
2 PRAs for 17 operating unit, and we've had them all  
3 through certification. I can tell you it's a fairly  
4 grueling experience. And I can't imagine that those  
5 would have been successful in not only measuring the  
6 PRA, but in developing a favorable impression of their  
7 capabilities if we hadn't done all of these preceding  
8 activities that I've described.

9 What shall I say? I'm not trying to just  
10 be rah-rah about it. This is a very serious business.  
11 It's an integral part of the plant's operation today,  
12 and it's taken quite seriously and, therefore, it is  
13 now integrated into the main fabric of the overall  
14 engineering operation.

15 I can tell you personally that my MBO --  
16 we don't call it that -- for the past 2 years,  
17 actually 4, but particularly for the past 2 has had a  
18 very strong point in it about bringing the risk  
19 management activity into the mainstream of the  
20 engineering department and the overall nuclear  
21 organizations activities.

22 I'm going to turn it over then to Tom Hook  
23 who can give some more specific examples.

24 MR. HOOK: I just wanted to talk about  
25 Surrey and North Anna and Dominion's PRA quality

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 attributes that we think makes the PRA suitable for  
2 use in an Option 2 type application.

3 Now, first of all, a plant that  
4 participates in license changes through Reg. Guide  
5 1.174 already has to address the quality attributes in  
6 the Reg. Guide in terms of the design meeting the --  
7 of the models being consistent with the plant design,  
8 the quality of the PRA staff, the peer review having  
9 been performed. So most plants having submitted Reg.  
10 Guide 1.174 license changes already meet the quality  
11 attributes of that reg. guide. And Dominion has a  
12 living PRA program to ensure that it can continue to  
13 support Reg. Guide 1.174 type submittals at anytime.

14 The second attribute that Bill touched on  
15 that I think is very important for ensuring quality  
16 for my experience having worked in expert panels for  
17 the maintenance rule of two different utilities, is  
18 that there is a questioning attitude during the  
19 categorization process that occurs for the maintenance  
20 role. And many of the modeling problems that occur or  
21 inconsistencies with the plant design are uncovered  
22 during the maintenance rule review process, and that  
23 was very helpful at North Anna and Surrey in upgrading  
24 the quality of the PRA model.

25 Surrey and North Anna also were involved

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 in the risk-informed ISI and performed full scope  
2 class 1, 2, 3 ISI expert panel process and looked at  
3 a large scope of components independently in another  
4 expert panel and obtained a significant amount of  
5 comments and feedback, and PRA quality improvements as  
6 a result of the exchange.

7 Then through the NEI certification process  
8 PRA review there were additional comments that come  
9 back from outside observers through --

10 CHAIRMAN APOSTOLAKIS: These comments,  
11 Tom, I mean, you're using a failure rate, for example,  
12 is that a distribution that you are using typically or  
13 a point value and is anyone questioning whether that  
14 value's reasonable? I mean, how does that work?

15 MR. HOOK: Those types of questions  
16 typically do not come up unless there's -- it's point  
17 estimates. in general. And only -- the expert panel  
18 focuses more on the dependencies in the model and the  
19 accident sequence analysis than on failure rates  
20 unless the failure rates look totally inconsistent  
21 with expectations.

22 CHAIRMAN APOSTOLAKIS: But, I mean, I  
23 don't even know how these expectations are formulated  
24 when you talk about 10 to the minus 3, 4, 5. I mean,  
25 it's not something that we have some intuition about

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 that the failure rate should be this. I mean, we are  
2 looking at all these studies for a number years and  
3 then we say, well, gee, I expect it to be in the 10 to  
4 the minus 4 region.

5 But I'm really curious about that. I  
6 mean, we keep talking about failure rates and point  
7 estimates and so on. And I don't know where they come  
8 from and whether anybody questions them, or you know,  
9 why not use a distribution and is there a population  
10 of distributions out there that are reasonabler. And  
11 it's not just the failure rates. I mean, human error  
12 rates. And then the dependencies between human  
13 actions and so on. There are so many places where a  
14 factor of 2 here, a factor of 1 or a half there, you  
15 know, pretty soon we're talking about serious factors.  
16 And I don't know that anyone really looks at these  
17 things in a critical way.

18 Now, for some reason I'm under the  
19 impression the independent panel will not do this,  
20 even though they have a PRA expert on them. And it  
21 bothers me. I don't understand. I mean, and then we  
22 propagate those point estimates, we don't know what  
23 we're getting out of it. I'm pretty sure these things  
24 work fairly well, most of the time. What I'm  
25 complaining about is that I haven't seen a systematic

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)

1 analysis or study that shows that they do actually  
2 work.

3 I don't know doubt that what you're  
4 proposing most of the time will give reasonable  
5 results. But in terms of building and maintaining  
6 public confidence, it seems to me that somebody ought  
7 to look at this thing and say yes it doesn't matter;  
8 that if you use the standard point estimates that  
9 people use, you are going to get reasonable Fussell-  
10 Veselys and RAWs and, you know, that in combination  
11 with the expert panel questions will lead to  
12 reasonable results. But I haven't seen that, and I  
13 don't know.

14 I mean, somebody says, yes, I'm going to  
15 use 5 10 to the minus 3 and another guy says no, I'll  
16 use 10 to the minus 4. What's the basis for that and  
17 what do I get out if a complex system like a PRA? You  
18 know, we know from the theory that inputs that are  
19 points estimates, so you don't know what you get out.  
20 If they are mean values, that is you know.

21 And then we declare them as being mean  
22 values without any basis, in my view. Why should the  
23 number be a mean value just because we say so? And  
24 that bothers me.

25 Again, I don't think it's something that

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 will really turn everything you are doing upside down.  
2 No. I know it won't. What really drives these things  
3 is model uncertainty. But why don't we take care of  
4 the stuff we know how to take care of so we don't have  
5 this feeling that what we're doing is okay? I mean  
6 the reactor safety study 30 years ago did do that.

7 MR. BURCHILL: I was just going to clarify  
8 that I agree with you. I don't think that the IDP is  
9 going to delve into this. It's not their mission nor,  
10 frankly, would they have the time or expertise other  
11 than their particular member from the risk management  
12 group. Certification teams do.

13 Certification teams are renowned for being  
14 quite challenging on the data sources that you use;  
15 whether or not they are recognized in peer review data  
16 sources, are they up to date, do they account for --  
17 and I'm talking about generic sources now -- and then  
18 I believe that it's fair to say that they also  
19 challenge if you do not have plant specific data  
20 considered, if you've not upstated your data source,  
21 why have you not. And they will challenge has there  
22 been any known trend. The first thing they'll  
23 challenge is you do you know the trend in behavior of  
24 your components with respect to their reliability.  
25 and then they'll challenge whether or not if there has

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1       been anything that would indicate deviation from your  
2       prior, so to speak. Have you taken it into account?

3               CHAIRMAN APOSTOLAKIS: But, Bill, that my  
4       concern. Do people do this on a routine basis? I  
5       mean, when we pick up a PRA and somebody has used it  
6       in Option 2, they have done a categorization and they  
7       use point values, what assurance do we have that these  
8       point values are plant specific and that they are  
9       indeed mean values? Do we have an assurance there?  
10      I mean, are they under any obligation to show us how  
11      they did that?

12             I remember some of the IDP, you know, some  
13      were very good. They used the standard methods to  
14      update and so on, as you know. But others, I remember  
15      one said oh for events for which we felt we didn't  
16      have significant plant specific information, we used  
17      generic sources only. For other the others we just  
18      used the plant specific data. And you scratch your  
19      head and say, first of all, how did they decide that  
20      they didn't have significant plant specific  
21      information. And then why this arbitrariness? I  
22      mean, we know how to handle these things.

23             And I think if we did that in this  
24      document, then a lot of the concerns about the  
25      sensitivity analysis would go away. And, in fact,

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 what you told us earlier, Doug, is the way to do it.  
2 Do a sensitivity analysis on major model  
3 uncertainties, not playing with a point decimal  
4 lambda. Who cares?

5 You're spending money on the pilot  
6 studies. I mean, would it be really an extraordinary  
7 expense to add a short study of several months showing  
8 to us that these things are handled well or they're  
9 relevant, or it doesn't matter? I don't understand  
10 that.

11 MR. TRUE: To me it's somewhat of a semi-  
12 infinite problem.

13 CHAIRMAN APOSTOLAKIS: In it not infinite,  
14 no.

15 MR. TRUE: Because the situation that  
16 exists in most plant specific PRAs is that a large of  
17 portion of data is taken from generic sources and the  
18 mean value from that generic source is used as a point  
19 estimate in the calculation.

20 And then for dominate by some definition  
21 or important by some definition, important components  
22 plant specific data is collected and then used to  
23 update that generic information to reflect more plant  
24 specific evidence.

25 The peer review process will look at all

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 pieces of that and say is the generic source you  
2 started with a reasonable generic source --

3 CHAIRMAN APOSTOLAKIS: Well, if they did  
4 what you just described. I'm not sure they always do  
5 that. Do they really take the mean value of the  
6 generic distribution as a point value?

7 MR. TRUE: I think the peer review team  
8 would have a hard time if you didn't do that. I think  
9 you would get criticized for that in your peer review.

10 There may be --

11 CHAIRMAN APOSTOLAKIS: And the issue may  
12 not be so much the hardware, how about the human error  
13 rate?

14 MR. TRUE: Well, the human errors are,  
15 obviously, one of the most difficult portions of the  
16 PRA to even compute and assign a probability to, much  
17 less have confidence that we have a true mean value of  
18 that parameter. In most cases --

19 CHAIRMAN APOSTOLAKIS: Well, let me let  
20 you know where I'm coming from. The Fussell-Vesely in  
21 RAW are uncertain, aren't they? I mean, if the  
22 Lambda--

23 MR. TRUE: Yes.

24 CHAIRMAN APOSTOLAKIS: Is there a simple  
25 analysis someplace, some study that shows that the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 categorization is not effected by these uncertainties  
2 the way we're doing it now or was it a figure in the  
3 old paper by Cheek and Parry and Sherry that showed  
4 the some evidence that indeed for a lot of the  
5 components it doesn't matter unless the uncertainty is  
6 very, very large. But wouldn't the more systematic  
7 study show? I mean, there is a paper in the  
8 conference in '96 in PSA where a couple guys from  
9 Maryland did a similar thing.

10 You know, document that it doesn't matter,  
11 that the uncertainty's not something I should worry  
12 about rather than saying use point estimates and do  
13 it, and then the expert panel really will take care of  
14 it.

15 I think it probably doesn't matter,  
16 actually. But I would like to see that it doesn't.

17 MR. TRUE: I think one of the problems --

18 CHAIRMAN APOSTOLAKIS: Just once.

19 MR. TRUE: I think such a study might have  
20 some value and give us some more confidence. But the  
21 importance measures are really screening tools to try  
22 and bring in the components and --

23 CHAIRMAN APOSTOLAKIS: Yes, but screening  
24 tools are supposed to be conservative. How do you  
25 know they are?

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 MR. TRUE: Well, how do we know that 2 and  
2 .005 are the right thresholds?

3 CHAIRMAN APOSTOLAKIS: Well, that was  
4 another question that would be raised. Yes, don't  
5 assume we know.

6 DR. ROSEN: You can't go much lower than  
7 those numbers. I mean in terms of setting thresholds.  
8 Those are almost where we are before we started this  
9 exercise. I've characterized them as extraordinarily  
10 timid. You know, how low can you go. You could go to  
11 a one.

12 CHAIRMAN APOSTOLAKIS: 1.8.

13 DR. ROSEN: Yes, you could go to 1.8, you  
14 could go to 1.0. But we're talking about individual  
15 components that have a RAW of 2, this is --

16 CHAIRMAN APOSTOLAKIS: I just don't  
17 understand this reluctance to actually demonstrate  
18 once and for all that what we're doing makes sense  
19 instead of having to take it as an article of faith.  
20 That's all I'm saying. I need one cross mark. We're  
21 not talking about a million dollar study here. It's  
22 some experience guys like you can do it very quickly.

23 MR. TRUE: I think that the --

24 CHAIRMAN APOSTOLAKIS: How about that?

25 MR. TRUE: I'd be happy to do a million

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 dollar study. No.

2 CHAIRMAN APOSTOLAKIS: And then we play  
3 with the sensitivities and, say, take all the failure  
4 rates, put them in the 95th percentile. Hey, come on,  
5 now. Come on. This is not a sensitivity study worth  
6 its name. A sensitivity study should look at model  
7 uncertainties and say, you now, we have some  
8 uncertainty there, we really don't know how to handle  
9 it. But, look, if we do this and this and that and  
10 play some sensitivity games, we get this warm feeling  
11 that, yes, we are not off.

12 MR. TRUE: We'll get to the sensitivity  
13 studies in another question. Yeah. In some year we  
14 will.

15 I think we may learn something from such  
16 a study, but as Steve said, these thresholds are  
17 relatively tight already to begin with. And they're  
18 going to be screening in a very large fraction of the  
19 components that are modeled in the PRA as safety-  
20 significant. It's not like we've set bounds very far  
21 out and we're worried about already missing things.

22 And then on top of that when we do the  
23 sensitivity studies we'll talk about in a little  
24 while, we're even bringing more components over those  
25 tight thresholds into the screening process. And I

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 think if anything, we are probably being conservative  
2 in bringing in all the different --

3 CHAIRMAN APOSTOLAKIS: But you say we're  
4 probably being conservative. I don't know that.

5 MR. TRUE: Well, I don't know how to prove  
6 that we are --

7 CHAIRMAN APOSTOLAKIS: Well, you could.

8 MR. TRUE: -- or that we are being  
9 realistic or conservative in this.

10 DR. KRESS: It has to be done on a plant  
11 specific basis.

12 MR. TRUE: Because it's really specifics  
13 of the plants and more so to the modeling assumptions  
14 and things that go into the model than the parameter  
15 estimates.

16 CHAIRMAN APOSTOLAKIS: That's why one does  
17 studies like that, to show that the process is  
18 conservative or at least reasonable results. The fact  
19 that it may be difficult to prove it 100 percent of  
20 the time doesn't mean that you shouldn't try.

21 MR. TRUE: I guess I don't know if I did  
22 a study like that what the acceptance criteria would  
23 be for the result. Is it that nothing changes? Is it  
24 that --

25 CHAIRMAN APOSTOLAKIS: I don't know, for

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 example, if I actually propagate the uncertainties to  
2 Fussell-Vesely how much probability will be above the  
3 .005 or not. I don't know that. I suspect most of  
4 the probability will be above for the components you  
5 are declaring as RISC-1. I don't know how much. You  
6 know, I haven't done it myself. I don't know. And  
7 RAW, the same thing. I mean these things are  
8 uncertain.

9 DR. KRESS: But the problem is a RAW of 2  
10 means something for one plant in terms of its effect  
11 on CDF and something entirely different for another  
12 plant.

13 CHAIRMAN APOSTOLAKIS: That's another  
14 problem, yes.

15 DR. KRESS: And --

16 MR. TRUE: Relative importance measure  
17 are--

18 CHAIRMAN APOSTOLAKIS: Yes, they're  
19 relative.

20 MR. TRUE: They're around the base value.  
21 And so a plant with a low CDF and a RAW of 2 has a  
22 much smaller absolute impact on risk than a plat with  
23 a higher CDF would have.

24 DR. KRESS: Yes, and I find that to be a  
25 problem. You know, that's penalizing the good plants.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MR. TRUE: Well, I think that it reflects  
2 a desire to stay within the basic framework you have--

3 DR. KRESS: You know, it's just like 1.174  
4 in a sense, but that's penalizing the good plants in  
5 my mind, and it's treating them unfairly. You know,  
6 I think -- I'm saying that the thresholds ought to be  
7 plant specific. They ought to have something to do  
8 with their effect on CDF. You ought to incorporate  
9 the uncertainties because you need to have some -- the  
10 uncertainties will be different for different plants  
11 and you need to have a consistency in the confidence  
12 level that you want to meet these thresholds.

13 And, you know, it's just not coherent to  
14 say we'll use 2, and that's it for an example.

15 CHAIRMAN APOSTOLAKIS: For example --

16 DR. ROSEN: You're requesting a revision  
17 to 1.174.

18 DR. KRESS: Well, I've been suggesting  
19 that for a long time.

20 CHAIRMAN APOSTOLAKIS: Well, let me -- if  
21 you do a study like the one I mentioned, one of the  
22 things that you may want to investigate is defining a  
23 new RAW, RAW STAR, which is the ratio of the numerator  
24 as we do it now, you know, increasing -- actually it's  
25 a denominator -- increasing the unavailability to 1

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 and calculating the new CDF, but the reference value  
2 now will be perhaps 10 to the minus 4. The goal, now  
3 the base CDF. And see what happens. Then you are  
4 moving more to a more absolute measure.

5 DR. KRESS: Yes, that would incorporate my  
6 problem then. Yes.

7 CHAIRMAN APOSTOLAKIS: See, studies --  
8 when I say studies, I don't mean just propagate  
9 uncertainty. I mean if you start investigating the  
10 whole analytical basis of the methodology, and then  
11 you could come up with questions like that. Would  
12 that be reasonable? I'm not saying it will be, but  
13 here is a possibility that would answer this question.

14 DR. KRESS: That would answer my question.

15 CHAIRMAN APOSTOLAKIS: Why use relative  
16 values for all the plants when, in fact, again we have  
17 a paper from distinguished members of the staff here  
18 that say that you should not be using these things, as  
19 I recall.

20 MR. PARRY: Can I chip in here, since  
21 we've been referred to? This is Gareth Parry again.

22 CHAIRMAN APOSTOLAKIS: Oh, you heard  
23 distinguished member and you felt --

24 MR. PARRY: No, I heard mention of a  
25 paper.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 Remember that these -- and what's Doug or  
2 Bill said -- that these criteria for RAW for Fussell-  
3 Vesely are in fact only screens.

4 DR. KRESS: Yes.

5 MR. PARRY: The ultimate test, and you'll  
6 see it in NEI 00-04, is the absolute value of delta  
7 CDF and delta LERF.

8 Now, yes, you could change the RAW and  
9 Fussell-Vesely thresholds on a plant specific basis,  
10 and actually if you read Appendix A of Reg. Guide  
11 1.174 you'll see we suggest it. But in a way, does it  
12 matter that much if in the end you're going to do this  
13 final test on delta CDF and delta LERF? It's a step  
14 to the final categorization --

15 DR. KRESS: That just confirms that the  
16 choices you made didn't do it.

17 MR. PARRY: Yes.

18 DR. KRESS: But you might have been able  
19 to put a lot more things in different categories.

20 MR. PARRY: Oh, you might have been able  
21 to put a lot more, yes.

22 CHAIRMAN APOSTOLAKIS: But the thing that  
23 bothers me, Gareth, is that we are saying or we're  
24 asking ourselves does it matter that much too many  
25 times. Where do you draw the line? When does it

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 begin to matter?

2 It doesn't matter that we don't have a  
3 structure IDP process whereas SDP did. It doesn't  
4 matter that perhaps the factor by which we increase  
5 the failure rates is 2 to 5 rather than 10, as SDP  
6 did. It doesn't matter that we don't do an  
7 uncertainty analysis. Nothing seems to matter.

8 MR. PARRY: Actually --

9 CHAIRMAN APOSTOLAKIS: I don't know when  
10 we'll have to worry about the things mattering  
11 anymore.

12 MR. PARRY: Right. I don't think that's  
13 true. And I think when we get to --

14 CHAIRMAN APOSTOLAKIS: Oh, come on.

15 MR. PARRY: And when we get to discussing  
16 these issues later on, I think you'll see that they do  
17 matter.

18 CHAIRMAN APOSTOLAKIS: Every single one  
19 that I mentioned is true, isn't it? They're proposing  
20 2 to 5 now, not 10.

21 MR. HEYMER: I really --

22 MR. PARRY: Well, they're proposing that.

23 MR. HEYMER: -- struggle with the word we  
24 do not have a structured IDP process.

25 CHAIRMAN APOSTOLAKIS: Well, I don't see

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 it in the document.

2 MR. HEYMER: And we recognize that, among  
3 other things that the pilot plants identified, is we  
4 must give it more structure.

5 CHAIRMAN APOSTOLAKIS: Oh, okay. Well, if  
6 you're talking about something that has been improved  
7 and changed, that's a different story.

8 DR. ROSEN: Well, that comes to one of the  
9 base questions. You guys are going to have to come  
10 back, is that right?

11 MR. HEYMER: Yes. This is not the final  
12 product. We've got to --

13 DR. ROSEN: You agree it's not your final  
14 product.

15 MR. HEYMER: Right.

16 DR. ROSEN: It's a work in progress.

17 MR. HEYMER: It's a work in progress. It  
18 was put out there for the pilots to take and test and  
19 we recognize that in some areas, like in the IDP  
20 guidance, it needs to be strengthened. And we're  
21 going to do that. We've got some comments from the  
22 staff to incorporate. We've got error insights from  
23 the IDP and the process. And then we've got the  
24 staff's comments to incorporate. And then we'll be  
25 forwarding that back for sort of Rev. C.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 DR. ROSEN: Well, maybe you ought to also  
2 look at what the staff is planning to do with the  
3 regulations in 50.69. Because there's no Appendix T  
4 anymore and yet B refers to an Appendix T.

5 MR. HEYMER: Right. Well, Rev. B was  
6 written in May last year when Appendix T was  
7 breathing. And now it's now. So, I mean, you know  
8 there's certain things that we need to adjust.

9 We are at an interim stage.

10 CHAIRMAN APOSTOLAKIS: Right. But I get  
11 the impression that both the staff and you feel that  
12 a lot of things don't matter, but I feel they do. Or  
13 at least I'm asking -- no, I'll take that back.

14 What I'm saying is just demonstrate that  
15 they don't matter. Please take the time to  
16 demonstrate they don't matter.

17 MR. HEYMER: Or have a basis for the w to  
18 5 as opposed to --

19 CHAIRMAN APOSTOLAKIS: Yes.

20 DR. ROSEN: And to be fair, George, I  
21 think we have to give the staff it's chance to tell us  
22 what they think about this document. We haven't done  
23 that yet.

24 CHAIRMAN APOSTOLAKIS: No, they are  
25 supposed to jump in whenever they disagree with the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 industry is saying.

2 DR. ROSEN: Oh, they are? Okay.

3 CHAIRMAN APOSTOLAKIS: That's what they  
4 told me, right?

5 MR. REED: We haven't got to the specific  
6 item yet.

7 CHAIRMAN APOSTOLAKIS: Yes. They're not  
8 going to have a separate presentation. Just jumping  
9 in. Silence means concurrence.

10 DR. ROSEN: No. I think what Tim Reed  
11 said was, Tim said they hadn't gotten to the specific  
12 issues yet.

13 MR. REED: Well, some of the specific  
14 issues are concerned with the IDP, we're not to that  
15 yet. We're not to the particular question yet, and  
16 then we'll jump in.

17 MR. MOIENI: George, this is one of the  
18 reasons --

19 CHAIRMAN APOSTOLAKIS: You have to speak  
20 to the microphone.

21 MR. MOIENI: Oh, sorry.

22 CHAIRMAN APOSTOLAKIS: That way you have  
23 volume and identify yourself.

24 MR. MOIENI: I don't know how to change  
25 the volume. I don't know yet.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 CHAIRMAN APOSTOLAKIS: You don't know who  
2 you are?

3 MR. MOIENI: This is Parvis Moieni.

4 CHAIRMAN APOSTOLAKIS: Okay.

5 MR. MOIENI: I think I have a response to  
6 at least the criteria, where we draw the line.  
7 Because we did the risk-informed IST a couple of years  
8 ago, the criteria for Fussell-Vesely was .005 or  
9 1.005. And when we did the exercise and identified  
10 the low safety significance, pumps and valves, to  
11 basically increase the interval. While testing  
12 interval we realized with that line we could not meet  
13 the criteria in 1.174 on the delta CDF and LERF. So,  
14 one of the options was not to do anything or basically  
15 to stay with whatever we did in terms of having low  
16 safety significance, or go back and revisit the  
17 screening.

18 So to make a long story short, we reduced  
19 it to .001 in order to meet the criteria for the delta  
20 CDF and later LERF. So even though the code case in  
21 ASME said .005, we used .001.

22 So this is a response to your question  
23 that we really, even back then, we didn't know that  
24 this came from the Bible and said this, this is .005.  
25 So we had to change it and redo the categorization,

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 redo the Fussell-Vesely and RAWs and some of the low  
2 safety significance went back to --

3 CHAIRMAN APOSTOLAKIS: Well, that's the  
4 kind of thing that I would like to see, that's a  
5 sensitivity analysis that I would like to see in the  
6 study that I'm proposing. You know, how sensitive are  
7 these things?

8 And now when you tell me you reduce it by  
9 a factor of 5, right?

10 MR. MOIENI: Yes.

11 CHAIRMAN APOSTOLAKIS: From .4. That  
12 brings up again the issue of uncertainty in the  
13 importance measures. Does that go completely outside  
14 the distribution of the Fussell-Vesely. I don't know.  
15 I've never seen any study like that.

16 I'm sure you guys are doing things when  
17 things don't work out the way they're written in the  
18 documents. But why would it be, you know, so  
19 difficult to do a study that looks at all these things  
20 as says, look, there are certain conclusions that we  
21 can draw and certain approximations that are valid  
22 most of the time, and let's go ahead and use them.

23 I mean, when the reactor has proposed  
24 approximations like the prompt jump on approximation  
25 and all that stuff, they actually documented that they

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 were approximations. Why can't we do the same thing  
2 in PRA? And I'm sure in other sciences like material  
3 sciences they do similar things.

4 DR. KRESS: No, that's exact.

5 CHAIRMAN APOSTOLAKIS: Anyway, I think you  
6 got the thrust of the comment here.

7 DR. ROSEN: Could I ask a question on a  
8 slightly different subject here, and that is that  
9 there is something in 00-04 that leads me to the  
10 conclusion that if the independent panel decided that  
11 they wanted something to be in not safety-significant,  
12 that they couldn't just do it, put it in not safety-  
13 significant no matter what the PRA said?

14 It seems the independent panel can  
15 override the PRA results. There's no specific  
16 expressed prohibition against that that I see.

17 MR. TRUE: It can only move it up. It  
18 can't -- the IDP cannot move down.

19 DR. ROSEN: Can you point to where that  
20 says that in here?

21 DR. SHACK: It doesn't say that.

22 DR. ROSEN: No.

23 DR. SHACK: It says it can move it down.

24 CHAIRMAN APOSTOLAKIS: Yeah, in fact, that  
25 was one of my questions. I saw it somewhere. I don't

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 remember where now. But I remember SDP said that --

2 DR. SHACK: Right. SDP --

3 CHAIRMAN APOSTOLAKIS: -- the panel can  
4 never bring it down. But in your documents I think  
5 they can do it.

6 MR. TRUE: I think they can only do that  
7 if there --

8 CHAIRMAN APOSTOLAKIS: Now, where did I  
9 see that.

10 MR. TRUE: -- is a set of circumstances.

11 DR. SHACK: Yes, they have to justify it,  
12 but they can do it.

13 MR. TRUE: This flow chart is intended to  
14 reflect --

15 CHAIRMAN APOSTOLAKIS: Ah. On page 6 of  
16 the letter to Mr. Pietrangelo by the staff, question  
17 7 says there is a need to provide guidance about what  
18 authority the IDP has for making a determination that  
19 an SSC is low safety-significant when the PRA  
20 indicates the SSC is safety-significant. So I'm sure  
21 the staff had some basis for writing this.

22 MR. TRUE: What this flow chart shows --

23 DR. ROSEN: Perhaps could be focused a  
24 little bit.

25 DR. SHACK: It's on page 29 it's the "if"

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 statement.

2 CHAIRMAN APOSTOLAKIS: Okay.

3 DR. SHACK: If the IDP determines that  
4 this in many cases special treatment will have low or  
5 no impact on such SSCs, which meet the criteria, if  
6 the IDP terms this is the case, it may decide to  
7 classify the SSC as low safety-significant.

8 MR. TRUE: Sorry. What page is that?

9 DR. SHACK: It's page 29. It's the second  
10 paragraph from the bottom.

11 MR. TRUE: 29 and 30 are not --

12 DR. SHACK: I think what's it's saying is  
13 that if it's meeting only because you've done such a  
14 conservative analysis that you've thrown it way up,  
15 they can then sort of argue it back down.

16 MR. TRUE: Well, this particular paragraph  
17 has to do with SSCs that strictly got in on the basis  
18 of high Fussell-Vesely and high failure probabilities.

19 DR. SHACK: Right.

20 MR. TRUE: Because what happens is, the  
21 thing we were concerned about with that particular  
22 paragraph was that often times you will have a base  
23 CDF and there'll be a particular type of scenario that  
24 is relatively important. And the PRA analyst will add  
25 a recovery action of some kind which may invoke the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 use of a system, import kind of a screening value on  
2 that HEP and thereby bringing in the SSC as important.

3 An example might be refilling the RWST for  
4 a steam generator tube rupture or lining fire water  
5 for injection of certain cases.

6 It's given a conservative high HEP or high  
7 failure probability, but it happens to address more  
8 than the half of percent of the total CDF. And it  
9 brings the sequence down in the process by -- that  
10 recovery, it brings the sequence down in the mix still  
11 above a half percent of the contribution. But it's  
12 really kind of a screening approach to how important  
13 that thing is. And we didn't think it was fair to  
14 make those things get the same level of significance  
15 if they were already treated conservatively with their  
16 failure probability as something else that's being  
17 modeled in a way and structured in the model.

18 Really only focused on that particular set  
19 of high failure probability and recovery action type  
20 things. It was something that was raised actually as  
21 part of the BWR pilot not because it applied directly  
22 to the systems they looked at, but because they  
23 identified this could be a problem in future  
24 applications.

25 So, that statement only applies to that

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 narrow set of circumstances.

2 Now, if we go to the flow chart that we  
3 used for the IDP, basically what we asked the IDP to  
4 do is to make sure that we've got the right functions  
5 both to -- and core damage included. This kind of  
6 talks to the way Tom was referring to in the IDP,  
7 understanding how we've reflected the SSC. Then we go  
8 over all the information on the basis for  
9 categorization; the importance measures, the defense-  
10 in-depth assessment, different hazards, how we  
11 addressed all of those. And then their decision is is  
12 the SSC reflected appropriately? That's really the  
13 decision they get to make.

14 And if they think it's --

15 DR. KRESS: Well, does that mean to say is  
16 the SSE categorized appropriately?

17 MR. TRUE: No. Is the SSC is reflected  
18 appropriately in the inputs to the categorization  
19 process? Have we got --

20 DR. KRESS: Oh, you got all the things  
21 that bear on that SSC?

22 MR. TRUE: Yes. Right.

23 DR. KRESS: Okay.

24 MR. TRUE: And if the view it reflected  
25 appropriately, then basically if it's identified as

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 risk significant, it stays risk significant and all  
2 they're doing is confirming that we got the right  
3 attributes and that they understand the attributes.

4 If it's found to be low safety  
5 significant, then they're asked to look at the risk  
6 information in more detail. They asked to look at --  
7 and the basis behind why the thing was found to be low  
8 safety-significant. They'll look at defense-in-depth  
9 and safety margins. And then they're asked to make a  
10 judgment about should it really stay RISC-3, but  
11 they're given the flexibility to say no, I don't think  
12 it should be RISC-3, it should go back up to RISC-1.

13 DR. SHACK: My problem with your viewgraph  
14 is it doesn't seem to me to reflect the South Texas  
15 experiences where the IDP actually classified most of  
16 the components, you know.

17 This sort of focuses on what they're doing  
18 when they get the PRA input and the PRA has sort of  
19 done some preliminary classification. There seems to  
20 be very little guidance for how they're to deal with  
21 the components that aren't in the PRA in this current  
22 version compared to the much more structured process  
23 I thought we got from STP, where they immediately  
24 realized that they were going to be doing a lot of the  
25 categorization for things that weren't explicitly in

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealgross.com](http://www.nealgross.com)

1 the PRA. And this flow chart really, you know, you're  
2 thinking about things that are in the PRA when you're  
3 looking at this chart, I think.

4 MR. BURCHILL: I think the upper part of  
5 that chart is not at all restricted to PRA  
6 information. That is, in fact, all information that  
7 is gathered for the whole population of SSCs that are  
8 being considered.

9 MR. TRUE: In fact, we think that the five  
10 questions that STP asked are embodied in the flow  
11 charts and things that we use in the categorization  
12 process.

13 DR. SHACK: Then why not put them  
14 explicitly in is sort of my question?

15 MR. TRUE: Well, I think they are. We're  
16 going to get -- we'll get to that.

17 CHAIRMAN APOSTOLAKIS: Now let me see  
18 where we are here, because --

19 DR. ROSEN: Well, let him answer the  
20 question; why not put it in explicitly?

21 MR. TRUE: I think it is. These are the  
22 five questions. And the first question has to do with  
23 is it an initiating event. In the flow chart for  
24 consideration of events related to internal events, we  
25 have a question that says can the failure of this

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 component cause an initiating event. Okay. What we  
2 call a --

3 DR. ROSEN: Where?

4 MR. TRUE: -- a complicated initiating  
5 event.

6 CHAIRMAN APOSTOLAKIS: I didn't see it in  
7 there.

8 MR. BURCHILL: I think it's 244. 244  
9 page 27 on the right side of that flow chart.  
10 Actually, it's at the top of the flow chart, the  
11 diamond to the left and it's on the right side of the  
12 flow chart relative to the complicated initiating  
13 events.

14 MR. TRUE: Now, we did qualify it a little  
15 bit more than South Texas did and not say all  
16 initiating events. But we asked if it wa a  
17 complicated initiating events and those which had an  
18 importance greater .005.

19 DR. ROSEN: How did they know that up  
20 front when they're at that stage?

21 MR. TRUE: The categorizers that are  
22 providing information to the IDP will know that.

23 DR. ROSEN: Know that? The categorizers  
24 will know that at that stage?

25 DR. SHACK: But see, that again means

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 we're dealing with components that are in the PRA.

2 CHAIRMAN APOSTOLAKIS: The PRA, yes.

3 MR. TRUE: Well, if it's not in the PRA --  
4 well, it's either explicitly or implicitly in the PRA.  
5 Implicitly includes the fact that the component's  
6 failure could have effect on something modeled in the  
7 PRA.

8 I mean, balance plant piece of equipment  
9 that could cause a loss of turbine trip, we only have  
10 an event that's a turbine trip event. That doesn't  
11 have all the possible components. But those  
12 components are implicitly in the PRA because they're  
13 part of the turbine trip initiating event.

14 If a component has a function that's  
15 totally independent of -- could create a challenge to  
16 the plant or mitigating it, then it's not going to be  
17 in the PRA and asking that question will it cause an  
18 initiating event because it has nothing to do with it.

19 DR. SHACK: Well, I just have the feeling  
20 that phrasing the question this way versus the South  
21 Texas way gives a very different focus on what the  
22 panel's looking at.

23 CHAIRMAN APOSTOLAKIS: Yes. But you said  
24 I thought earlier, Adrian, that Rev. C will provide  
25 some more structure, is that true?

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MR. HEYMER: Well, Rev. C will pick up  
2 some of the comments and the comment that Dr. Shack  
3 mentioned about well if it's not modeled in the PRA,  
4 is there guidance. And one of the feedback, we  
5 certainly I think -- we had -- and correct me if I'm  
6 wrong, Jason, from the Wolf Creek and I think from the  
7 Quad Cities was specifically in that area that we need  
8 to add something a little bit more explicit in the  
9 guideline, what to do with components that aren't  
10 modeled in the PRA as regards to guidance for --

11 CHAIRMAN APOSTOLAKIS: So you wouldn't do  
12 something like --

13 MR. TRUE: There will be some more.  
14 Particularly if they have this notion of implicit --

15 DR. ROSEN: And you're telling me that  
16 there's protection against the IDP overriding the PRA  
17 results and built into the structure. But I would be  
18 more comfortable if in the wording of this thing it  
19 made that absolutely clear and even referred to the  
20 diagrams to say how that result is obtained by  
21 correctly flowing through the diagram in the process.

22 MR. TRUE: Okay. I think that's a fair  
23 comment.

24 MR. BURCHILL: I don't think Tom finished.

25 MR. HOOK: I just had a couple more points

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 on PRA quality.

2 CHAIRMAN APOSTOLAKIS: Let me say that I  
3 think I'm going to lose at least one member at 12:00.  
4 We have really addressed several of these questions in  
5 the last 15 minutes. Maybe we can address the  
6 questions that we have touched yet, like the fire. I  
7 mean, we touched it earlier, but there were specific  
8 questions how conservative it is and so on. And  
9 anything else where you gentlemen disagree with what  
10 the thrust of the question was? Because otherwise I  
11 don't see how we can wrap this up in a reasonable  
12 amount of time.

13 And the other thing is since you are  
14 revising this, I wonder does the staff want us to  
15 write a letter this time? Would you like to see a  
16 letter from us? So we have to decide that ourselves  
17 without input from an expert panel.

18 MR. REED: We're going to have to give  
19 that some thought.

20 CHAIRMAN APOSTOLAKIS: Sorry?

21 MR. REED: We're going to have to give  
22 that some thought.

23 CHAIRMAN APOSTOLAKIS: Give it some  
24 thought, yes.

25 So, if it's okay with you, I'd like to

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 destroy your presentation and jump to things that --  
2 I mean -- you can handle it.

3 MR. REED: Okay.

4 CHAIRMAN APOSTOLAKIS: Okay. So now,  
5 Doug?

6 MR. TRUE: Yes.

7 CHAIRMAN APOSTOLAKIS: Shall we go to --  
8 I mean, I think we disagree on the sensitivity  
9 analysis and uncertain. I mean, all I'm saying is I'd  
10 like to see a study that confirms that what you're  
11 proposing is indeed reasonable, you know, instead of  
12 doing these sensitivities and arguing that fifth and  
13 95th percentile -- I mean, gee wiz.

14 MR. TRUE: Maybe I should put this a  
15 little bit more directly. In my mind the purpose of  
16 the sensitivity studies and the raising and lowering  
17 of values across the board is a way to exercise the  
18 model to see if there are opportunities because of  
19 changes in evidence or information that SSCs are going  
20 to break one of those thresholds.

21 CHAIRMAN APOSTOLAKIS: But it seems to me  
22 that what you said earlier this morning is really  
23 where the proper role of sensitivity studies is. If  
24 there is a model uncertainty, I would be happy to see  
25 those things. But see them on failure rates, I mean

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 when we can propagate that uncertainly in a travail  
2 manner, I mean I don't know that that makes any sense.

3 MR. TRUE: Right. Maybe we should --

4 MR. HEYMER: And Bob -- Bob Lutz from  
5 Westinghouse. In the AP600 didn't we look at  
6 uncertainty and sensitivity and if we go to what  
7 follows question nine?

8 MR. LUTZ: This is Bob Lutz from  
9 Westinghouse.

10 I had prepared with the help of one of my  
11 colleagues back at Westinghouse sort of a summary of  
12 what went on on the AP600 new plant application a  
13 couple of years ago where we did do a full uncertainty  
14 analysis in that submittal as part of the  
15 documentation for the design certification. And we  
16 also did a number of sensitivity analyses. And I  
17 tried to summarize on one slide.

18 We did the uncertainty analysis to try to  
19 look at the CDF and LERF and make sure that we did not  
20 have a large variation in CDF and LERF between the  
21 mean and the 5th and the 95th percentile values. And  
22 what we found is obviously specific to the AP600  
23 design, but what we found is that between the mean and  
24 the 95th and the mean and the 5th percentile values,  
25 that we didn't see more than about a factor of 3

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)

1 variation in the overall core damage frequency or LERF  
2 numbers.

3 We also did a number of sensitivity  
4 analyses, much more than what is being proposed here  
5 in the Option 2 framework that's in NEI 00-04. And,  
6 again, this is all documented back in the licensing  
7 analyses. But we didn't see any SSCs coming from a  
8 negligible contribution to LERF or CDF becoming a  
9 dominant contributor when we did these sensitivity  
10 studies.

11 In other words, nothing that had a RAW  
12 value or an F-V value close to 1.0 changed to a  
13 significant RAW or F-V value when we did the  
14 sensitivity analyses. Now, that's what's documented  
15 and it's -- within what we did, we didn't document it  
16 in any of the licensing analyses, but within our how  
17 house back when we were going through this.

18 We also looked at RAWs and F-Vs at the 5th  
19 percentile and 95th percentile level. And, again,  
20 found the same thing; that nothing that had an RAW  
21 value, for example, near 1.0. In the mean case when  
22 we went and looked at the 5th or the 95th percentile  
23 case, nothing jumped up. So we had some confidence on  
24 that application that nothing that was in the grass or  
25 down in the background using the mean value would jump

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)

1 up when we did sensitivity or uncertainty analyses.

2 And that's I think probably one of the  
3 extensive comparisons that we do have to date of  
4 sensitivities and full uncertainty analysis. I  
5 brought this along just for what it's worth.

6 And, again, the plant design's a little  
7 bit different, but it does show that in this one case  
8 that there was no significant differences.

9 CHAIRMAN APOSTOLAKIS: Well, that's good  
10 to know. But that was not in the report, and that's  
11 part of what I have in mind as -- there is this paper  
12 in the proceedings of the PSA conference '96, which  
13 you are probably familiar with already.

14 MR. TRUE: Quad City meeting?

15 CHAIRMAN APOSTOLAKIS: Yes.  
16 "Consideration of Probabilistic Uncertainty and Risk  
17 Based Importance Ranking." And the distributions here  
18 are Fussell-Vesely and RAW, and all that. I mean,  
19 something along these lines would be helpful, you  
20 know. This was done by graduate students. So maybe  
21 you want to know which one it is, or you want a copy  
22 now? We can give you a copy.

23 MR. TRUE: A copy would be great.

24 CHAIRMAN APOSTOLAKIS: Okay. We'll make  
25 copies and hand them out.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MR. TRUE: Probably just the authors'  
2 names and I can pull it out of the proceedings.

3 CHAIRMAN APOSTOLAKIS: Modares and  
4 Agerwal.

5 MR. TRUE: I can't find that.

6 CHAIRMAN APOSTOLAKIS: It's PSA '96, page  
7 230.

8 MR. TRUE: Even better.

9 CHAIRMAN APOSTOLAKIS: Volume 1.

10 MR. TRUE: Okay.

11 CHAIRMAN APOSTOLAKIS: And other things.

12 I mean, as I say, that paper by the distinguished  
13 members from the NRC staff in reliability engineering,  
14 which you probably have, would probably be a good one  
15 to look at. You have that? "Use of Importance  
16 Measures in Risk-Informed Regulatory Applications"?

17 MR. TRUE: Yes. Yes.

18 CHAIRMAN APOSTOLAKIS: You have it and you  
19 promptly ignored it, right?

20 MR. TRUE: I didn't think any of us  
21 ignored it.

22 DR. SHACK: I mean the one that shows the  
23 point estimates are very close to the mean.

24 CHAIRMAN APOSTOLAKIS: Yes. And also  
25 talks about the advisability of using the thresholds

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 as they are. Yes.

2 DR. ROSEN: So now where are we, George?  
3 To the NRC staff?

4 CHAIRMAN APOSTOLAKIS: Well, let's talk  
5 about external events, because that's really something  
6 that I think bothers us. And we had a question or a  
7 couple of questions, at least, on --

8 MR. TRUE: I have to say I didn't get the  
9 same impression from reading the questions as I've  
10 gotten here today. So, take me to the question that  
11 you think --

12 CHAIRMAN APOSTOLAKIS: Well, question 16  
13 and 17.

14 MR. TRUE: Okay. Sixteen, I missed --  
15 understood what you were asking about. I thought you  
16 were asking in 16 about places where we had PRAs  
17 available, how do we handle them quantitatively. And  
18 the answer was we looked at them individually and then  
19 we compute these integral importance measures using  
20 this equation. That's just basically weighting it  
21 based on the CDF contribution of each hazard.

22 And then the sensitivity study we've  
23 talked about looks at that.

24 So there must have been something more to  
25 this question than I read from it.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)

1 CHAIRMAN APOSTOLAKIS: Well, go on to 17.

2 MR. TRUE: Okay. So then 17 question is  
3 focused on fire versus fire PRA.

4 CHAIRMAN APOSTOLAKIS: So let's look at  
5 these two figures now. 3.1-2. You don't have a  
6 transparency, do you?

7 MR. TRUE: Yes, we do.

8 CHAIRMAN APOSTOLAKIS: Oh, great. Let's  
9 put it up because that's important.

10 MR. TRUE: 3.1-1 and 3.1-2. Okay.

11 CHAIRMAN APOSTOLAKIS: Okay. Good.

12 MR. TRUE: This figure is effectively the  
13 same as the internal events figure with the exception  
14 that I loped off the initiating event question because  
15 individual components aren't really contributors to  
16 initiating events in the same way the fires as they  
17 are for other internal events.

18 So basically the questions are is the RAW  
19 greater than 2 or Fussell-Vesely greater than .05. If  
20 it is, can it have been safety significant --

21 CHAIRMAN APOSTOLAKIS: Now let me  
22 understand this. When you say calculate draw in  
23 Fussell-Vesely for components addressed in 5 PRAs --

24 MR. TRUE: Yes.

25 CHAIRMAN APOSTOLAKIS: -- are you doing it

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 now with respect to the contribution to core damage  
2 frequency from the fire --

3 MR. TRUE: From the fire.

4 CHAIRMAN APOSTOLAKIS: Not for the whole  
5 thing?

6 MR. TRUE: From the fire and then at the  
7 end we come back and take that important measure --

8 CHAIRMAN APOSTOLAKIS: And you weight?

9 MR. TRUE: And weight it and compute  
10 overall.

11 CHAIRMAN APOSTOLAKIS: Now, again, I mean  
12 that -- it sounds reasonable, but why is that  
13 something we want to do? I mean, the whole idea of  
14 the importance measures is to look at the whole PRA as  
15 one entity and say this is the ranking. Right now we  
16 are breaking it up and say no we're going to do a  
17 separate one for fires, earthquakes, internal events  
18 and then somehow put them together.

19 MR. TRUE: Right.

20 CHAIRMAN APOSTOLAKIS: I mean that's more  
21 defense-in-depth it seems to me. So it's okay, but --

22 MR. TRUE: It's more defense-in-depth,  
23 it's more conservative because we're breaking it apart  
24 and looking at individual pieces. But at the end we  
25 bring it back together and when we pass the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 information to the IDP, we give them both contexts.  
2 And basically what we said is if something is  
3 important from an internal events perspective when  
4 it's isolated by itself, it's important.

5 In my opinion we have a lot of confidence,  
6 a lot of experience with importance measures and  
7 internal events PRA. If we found that the importance  
8 was high for another hazard source, then we give the  
9 IDP that value plus the aggregate, which is the -- or  
10 integral, which is the combination importance measure.  
11 And if that fire or fire, for example, was a small  
12 contributor to the total CDF, then we allow it to be  
13 kind of diluted. But if it's a large contributor,  
14 it's still going to be a significant importance  
15 measure at the end, and we think that it deserves that  
16 weight.

17 But if we combine them altogether and you  
18 have a plant, for example, like Quad Cities that has  
19 low internal events CDF and moderate fire CDF, then  
20 nothing relating to internal events is ever important  
21 because it's always swapped out by fire. And the only  
22 things that are important are the fire mitigation  
23 systems. And we didn't think that that was  
24 appropriate because the basis on which you do fire PRA  
25 is totally different than the basis on which we do the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 internal events. And the uncertainties are different,  
2 the input assumptions are different, and they're just  
3 different beasts we felt deserved being separated  
4 apart.

5 Within internal events we made an  
6 allowance for the fact that if you were dominated by  
7 some unique hazard like internal flooding, we said you  
8 should pull that out and look at everything absent  
9 that so that you don't swamp out the plant responses  
10 and the defense-in-depth that's integrated in your  
11 ability to respond to traditional initiating events by  
12 this big lump that's a particular vulnerability to an  
13 internal flooding or some unique hazard.

14 MR. BURCHILL: Let me add to that. As you  
15 know, Quad Cities is one of my major challenges 4  
16 years ago when I came to ComEd. And the fire PRA,  
17 which is a overstatement, of course, that existed at  
18 the time showed a hideously high core damage  
19 frequency. And when we examined it, even casually, we  
20 found that it was extremely poorly structured.

21 CHAIRMAN APOSTOLAKIS: But now let me come  
22 back to what you and Doug were saying earlier this  
23 morning about all these reviews and these engineers  
24 who are reviewing the risk management programs and so  
25 on, and that these -- we have high quality. How come

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 in that case --

2 MR. BURCHILL: It was a terrible product-

3 -

4 CHAIRMAN APOSTOLAKIS: You mean the  
5 process was terrible as terrible?

6 MR. BURCHILL: The process that developed  
7 it was a terrible process.

8 CHAIRMAN APOSTOLAKIS: So it was not what  
9 you described here?

10 MR. BURCHILL: It is not what I described  
11 this morning. It was not put in place since I've been  
12 there.

13 DR. ROSEN: When did you say that was?

14 MR. TRUE: It was the IPEEE?

15 MR. BURCHILL: The IPEEE for Quad Cities  
16 was developed in '96/'95. '95/'96 time frame. One of  
17 my first challenges when I arrived on the scene in  
18 January of '98 was to go look at this beast and find  
19 out what was it telling us. And, you know, as I say,  
20 even a casual examination showed me that it was very  
21 poor. And I will in no way even try to rationalize  
22 for you how it got prepared in the way that it was.

23 Now, when we went about to totally redoing  
24 that fire PRA, we did exert the types of controls that  
25 I described to you. But nevertheless, even with that

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 there were certain things that we did and did not do.

2 The major thing, of course, because fire  
3 is a highly spatially dependent hazard, is you have to  
4 know a great deal about all of your cable routings in  
5 order to know exactly what gets impacted by a  
6 particular spatially defined fire. And you have to  
7 know then what you can take credit for. You have to  
8 know both what the fire will impact so the fire  
9 modeling comes into effect, and you have to know where  
10 those cables are that are important to other pieces of  
11 equipment's operation, which aren't even in that  
12 spatial area. I mean, that's the whole challenge with  
13 fire PRA.

14 So we spent -- you know, I don't want to  
15 put this in numerical terms. But we spent a lot of  
16 money to go chase cables. But we only spent a certain  
17 amount of money. I mean, I won't say to you that I  
18 know where every individual cable chase in that plant.  
19 So in certain cases where we had a fire in a  
20 compartment, you know, if we knew where the critical  
21 pieces of equipment were that had cables through or  
22 where the cables were for critical pieces through that  
23 compartment, then we could explicitly model it.

24 If we didn't, then we just -- if we knew  
25 it entered that compartment but we didn't know

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 precisely where it ran -- and frankly, it was  
2 impractical to go track that down, we just assumed  
3 that we lost that piece of equipment. I mean, this is  
4 standard practice.

5 So, the fire PRA in my opinion at least  
6 suffers in comparison to the internal events PRA from  
7 two considerations. One is that the ignition  
8 frequencies for the first are nowhere nearly as  
9 sufficiently defined as our internal events initiating  
10 event frequencies. And in cases of absence of  
11 knowledge, we believe that we biased them in a high  
12 direction; in other words, a conservative direction.

13 DR. ROSEN: But not all plants had that  
14 problem of lack of knowledge of the configuration?

15 MR. BURCHILL: No, I understand that.

16 DR. ROSEN: Some plants knew precisely  
17 where the cables are.

18 MR. BURCHILL: Some plants do. Some.

19 And then the second part is that point;  
20 that the adequacy of your fire PRA to show a CDF  
21 that's comparable to your internal events absolutely  
22 depends on your intimate knowledge of those cable  
23 routings.

24 So it's two things. It's the ignition  
25 frequencies themselves and then the adequacy of the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 cable routing knowledge so that you can do the fire  
2 modeling.

3 Now, absent that I would submit to you  
4 that if you have a -- and you'll challenge me on this  
5 -- but a reasonable representation of the plant,  
6 although still somewhat conservative, you can still  
7 gain a great deal of information about what pieces of  
8 equipment are really important for mitigating the  
9 fire. And so now on relative basis I can look in my  
10 fire PRA and I can say, you know, what are the  
11 importance measures associated with equipment. And  
12 that will tell me how important the equipment is on a  
13 relative basis for responding to fire. But I wouldn't  
14 pretend it to be directly comparable to the same  
15 importance majors coming out of the internal events  
16 PRA. You see what I'm saying?

17 And that's, I think, another reason for  
18 separating this. Because you can gain information out  
19 that fire PRA that's helpful to understand the  
20 importance of equipment. And as Doug said, it could  
21 go either way. You could either lose that information  
22 or it could swamp the internal events if you lumped  
23 them altogether, because they're not on the same  
24 playing field. And I would submit there's very few  
25 PRAs in which they are on the same playing field.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 CHAIRMAN APOSTOLAKIS: Which essentially  
2 comes down to how uncertain you are about the fire PRA  
3 results really. And it's one way of --

4 MR. BURCHILL: And how you dealt with  
5 that.

6 CHAIRMAN APOSTOLAKIS: It's one way of  
7 handling.

8 So let's answer the question that was  
9 raised.

10 MR. CHEOK: Actually, let me supplement  
11 what Bill and Doug just said.

12 By separating the initiators we can gain  
13 insights we cannot gain whereby lumping them. In  
14 essence this kind of maybe relates to question 5 on  
15 sabotage.

16 What happens when we have an event that  
17 maybe could make a fire event more important, by  
18 having this separate pieces of importance measures,  
19 you can now deal with question 5 a little better  
20 maybe.

21 CHAIRMAN APOSTOLAKIS: Well, the only  
22 thing that worries me is that -- I mean, this is  
23 reasonable. I don't recall in 1.174 having anything  
24 like this unless you tell me to go read Appendix X.

25 MR. CHEOK: I think if you read Appendix

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 A --

2 CHAIRMAN APOSTOLAKIS: Oh, God.

3 MR. CHEOK: We do say that you need to  
4 treat the importance measures cumulatively and  
5 separately because each will give you a different  
6 insights.

7 CHAIRMAN APOSTOLAKIS: Could you point me  
8 to the page. I'd like to see that. And also it's not  
9 just a matter of importance measures. I mean, I think  
10 in general when you do risk-informed applications,  
11 shall we start doing this in a consistent systematic  
12 way and say now you have to separate fires from  
13 internal events and do certain things? Let's not what  
14 the basic approach says, right? I don't think -- I  
15 mean, if you look at the figures in 1.174 --

16 MR. TRUE: It's total.

17 CHAIRMAN APOSTOLAKIS: It's total. It  
18 doesn't say, you know, consider things separately. It  
19 may be buried in Appendix A, something --

20 MR. CHEOK: But remember we are saying  
21 that importance measures are not your decision making  
22 tool. You see a delta change that is, the importance  
23 measures are things that you bring into the IDP for  
24 them to deliberate on.

25 CHAIRMAN APOSTOLAKIS: Right. Right.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)



1 MR. CHEOK: These are insights you bring  
2 in to the IDP. And I think we mentioned it this  
3 morning in terms of defense-in-depth. You know, a RAW  
4 value basically tells you SSCs that are in single,  
5 double or maybe triple event cut sets, so you're  
6 talking about things that are maybe sensitive to  
7 defense-in-depth in terms of levels of protection.

8 Fussell-Vesely would tell you whether an  
9 SSC appears in many different cut sets which tells you  
10 that, you know, it's there to mitigate a lot of  
11 different functions.

12 CHAIRMAN APOSTOLAKIS: My point was that  
13 if you look at the basic diagrams that are in the main  
14 body of 1.174, there is no distinction between parts  
15 of PRA that are done poorly or very conservatively  
16 versus other parts that are not done that way. There  
17 is one global delta CDF that you have to consider.  
18 And now what I'm saying is that, you know, this sounds  
19 reasonable to me. Maybe that idea of treating certain  
20 things differently from others should be studied more  
21 carefully and maybe change the basic approach.  
22 Because I don't know what delta CDF means. Now if we  
23 do it for fires or for something else in light of what  
24 Bill just told us.

25 Anyway, that's an idea. Let's go back to

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 the question here. Where is the corresponding, you  
2 know, that diamond you have there are all greater than  
3 2?

4 MR. TRUE: Right.

5 CHAIRMAN APOSTOLAKIS: If I go to the next  
6 figure --

7 MR. TRUE: Okay. Let's go and we have one  
8 there, too. Okay. What we did here is -- well, let  
9 me back up.

10 In our five analysis we start with a fire  
11 scenario and you look for factors which can allow you  
12 to screen that fire scenario out. And screening it  
13 out means that its frequency gets below one times  $10^{-6}$ .  
14

15 So you say I'm going to have a fire in this area, it  
16 causes this much damage, what are the things that are  
17 left and what are the systems that could suppress or  
18 terminate that scenario. And once you've gotten that  
19 scenario below  $10^{-6}$  you stop. You don't continue to  
20 recover it to try and refine into a true CDF. You  
21 just screen it below  $10^{-6}$  and say I don't have to  
22 worry about it anymore. It's not a vulnerability in  
23 my plant. That's what fire was really intended for is  
24 to identify vulnerabilities.

25 And so when you're all done you end up

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 with screened scenarios and unscreened scenarios.  
2 Unscreened scenarios are those that you could never  
3 get below  $10^{-6}$  even though you incorporated all the  
4 success paths and information that you had available.

5 And so what we said was that for a  
6 component that participates in an unscreened scenario,  
7 it's used to mitigate -- an unscreened scenario, so  
8 it's part of a scenario, it's built into my 6, it's  
9 automatically safety-significant. I don't care if  
10 it's --

11 CHAIRMAN APOSTOLAKIS: It's a candidate?

12 MR. TRUE: It's a candidate. Well, it's  
13 safety-significant and then whether it's safety  
14 related or not makes it a candidate of RISC-1 and  
15 RISC-2, and that's passed on to the IDP to make the  
16 final decision about.

17 DR. ROSEN: And even the IDP and all its  
18 glory can't change that?

19 MR. BURCHILL: That's right.

20 MR. TRUE: Right.

21 CHAIRMAN APOSTOLAKIS: So let me  
22 understand --

23 MR. BURCHILL: And it can't ever get to  
24 RISC-3?

25 CHAIRMAN APOSTOLAKIS: It can never get to

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 RISC-3?

2 MR. TRUE: Right.

3 MR. BURCHILL: Right.

4 MR. TRUE: Okay. So then we're left with  
5 what about all those ones that you squeezed below the  
6  $10^{-6}$ ? There could be a bunch of them and the risk  
7 could actually be large. And so what we said there  
8 was that if it doesn't participate in one of those  
9 scenarios, then we're going to make it low. So what  
10 we're saying is it didn't really have anything to do  
11 with fire risk. But if it does participate and it was  
12 part of the reason you were able to screen it below,  
13 then we ask if you didn't credit that, would you bring  
14 that scenario back above the threshold and make it an  
15 unscreened scenario.

16 So it's sort of like a risk achievement  
17 kind of a look at it to say if I don't credit that as  
18 a I come out of this box and move back into this other  
19 box over here, where we said everything was important,  
20 so we're taking all the things that participated in  
21 the unscreened and all of those that helped to screen  
22 out scenarios and putting those back in. So those  
23 come back down and, again, are RISC-1 or 2.

24 MR. PARRY: Can you walk me through  
25 George's door?

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MR. TRUE: The barrier, I think what I  
2 said about barriers was that you would have to have a  
3 fire PRA -- I think what the guidance is you have to  
4 have a fire PRA that was focused on looking at that  
5 barrier which would take you back to the other figure  
6 and we wouldn't be using this figure. And I think you  
7 would use the same process and basically say --

8 MR. PARRY: Most people don't have a fire  
9 PRA that looks on barriers.

10 MR. TRUE: Right.

11 MR. PARRY: Okay. So what do they do with  
12 barriers?

13 MR. TRUE: They are not allowed to -- they  
14 don't have a compelling case to move it from safety  
15 related, a/k/a RISC-1 to RISC-3. So it remains RISC-  
16 1. Or it remains under whatever program it's in. It  
17 may actually be in an augmented program, in which case  
18 it starts in RISC-2 and stays in RISC-2.

19 MR. PARRY: So we've got what? A thousand  
20 fire barrier penetration seals that are always going  
21 to be in a high risk category, RSC category?

22 MR. TRUE: Safety-significant category?

23 MR. PARRY: Yes.

24 MR. TRUE: Yes. Without having done an  
25 analysis to show that they are, they remain in the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 safety-significant category.

2 MR. CHEOK: Unless you can show that they  
3 are not important in screening out of the sequences in  
4 your fire screening analyses. In other words, if you  
5 had used the barrier to justify fire independence, you  
6 have to maintain the current programs unless you can  
7 show that even if you remove the programs, the  
8 screening does not matter.

9 I think the staff also has one more  
10 question with respect to this figure, and it's a  
11 little more subtle than just the typical barriers when  
12 you do screening. When you go to the PRA leg of this  
13 figure a lot of people would define fire damage  
14 states. And when you define fire damages states, you  
15 take credit for things like fire suppression systems,  
16 sprinklers, response from the fire department,  
17 wherever.

18 MR. TRUE: Right.

19 MR. CHEOK: And that gets to be put into  
20 your split fractions in your fire damage stated  
21 entries.

22 MR. TRUE: Right.

23 MR. CHEOK: That things don't normally get  
24 propagated to the final cut sets because in your final  
25 cut sets you come in with a single event where you say

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 it's damaged stage 3 -- where you have, you know, a  
2 large fire that is suppressed in 3 minutes. So in  
3 essence when you have -- when you take credit for  
4 suppression systems, that seldom gets propagated to  
5 the importance measures, and the staff has a question  
6 for NEI on that.

7 MR. TRUE: I'm not familiar with your  
8 question, because I frankly haven't taken the time to  
9 go through all your questions on top of these 23. But  
10 what I'll say about that is that I believe we can use  
11 the same -- I agree with you that it's uncommon to see  
12 those show up in traditional importance measures, but  
13 I believe that we can use the same basic importance  
14 measure concepts, RAW 2, Fussell-Vesely and .05 for  
15 those systems. It just would take a separate  
16 calculation to look at what the benefit you're getting  
17 out of those systems is.

18 MR. CHEOK: I think this is something we  
19 need to discuss more. Because we define a lot of our  
20 runs over our fire property runs by using certain  
21 parameters like suppression systems and I'm not sure  
22 if that actually gets propagated all the way to the--  
23 or can get easily propagated to the importance  
24 measures. But that's something we need to discuss  
25 more.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MR. TRUE: Okay. It's probably a place  
2 like where we need more -- maybe we could use more  
3 guidance than the guidance document.

4 CHAIRMAN APOSTOLAKIS: And all this  
5 assumes, of course, that whoever did the 5 kept track  
6 of the screen scenarios, right? If they have not,  
7 they cannot apply this. Do they keep that  
8 information?

9 MR. TRUE: Yes. Yes. Yes, as part of the  
10 5 processes.

11 CHAIRMAN APOSTOLAKIS: How about if you do  
12 the HCLPF in -- what do they call that, in seismic?

13 MR. TRUE: Okay.

14 CHAIRMAN APOSTOLAKIS: It's the same idea?

15 MR. TRUE: It's the same basic concept in  
16 that what we're saying is that the seismic margins  
17 approach was intended to make sure we didn't have any  
18 vulnerabilities to seismic risk. And in that process  
19 you were required to have two safe shutdown paths that  
20 you had -- 1 is the PRA one which looks like every  
21 other PRA one.

22 Basically what we said there was that if  
23 you have identified that component as being part of  
24 your safe shutdown paths in your safe shutdown  
25 analysis for seismic margins, it is -- if it supports

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 the safe shutdown path, then it is safety-significant.

2 If it's not something that's important to  
3 one of your safe shutdown paths, then it's not and it  
4 goes to a --

5 CHAIRMAN APOSTOLAKIS: And if you do all  
6 this, you cannot really develop the integral -- what  
7 you call the integral form of importance measures  
8 because you don't have a CDF, right?

9 MR. TRUE: Right. And you -- that  
10 aggregate calculation and the sensitivity study at the  
11 end will vary by a factor of 2 to 5. Obviously  
12 doesn't get factored back in here.

13 CHAIRMAN APOSTOLAKIS: So how does that  
14 work now?

15 MR. TRUE: But the --

16 CHAIRMAN APOSTOLAKIS: In other words what  
17 you just said is, if I understand correctly, that we  
18 cannot really calculate delta CDF?

19 MR. TRUE: For the seismic contribution.

20 CHAIRMAN APOSTOLAKIS: Oh. So we don't  
21 know whether we meet 1.174, do we? Especially given  
22 the fact that these things are among the significant  
23 contributors a lot of the time.

24 MR. TRUE: But all of these -- what we're  
25 -- all of these that are credited are going to remain

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 treated. So it's the ones that aren't on the success  
2 path that are possibly be moved to RISC-3 or 4. If  
3 they make it through all the other screens and those  
4 aren't what we need in order to assure that our  
5 seismic risk is low.

6 So the ones that were included to make  
7 sure our seismic risks are low, stay safety-  
8 significant.

9 CHAIRMAN APOSTOLAKIS: Right.

10 MR. TRUE: So it's the ones that are not  
11 part of that that are kind of marginal helpers in the  
12 seismic risk area, you may want to look at it.

13 CHAIRMAN APOSTOLAKIS: Yes.

14 MR. TRUE: Those are the ones that  
15 potentially might change by a factor of 2 to 5.

16 CHAIRMAN APOSTOLAKIS: Right. And that we  
17 don't know the impact.

18 MR. TRUE: And those are the random  
19 failure rates anyway of the components that we're  
20 changing by a factor of 2 to 5. So, yes, we're  
21 missing a small slice of the delta CDF, but we felt  
22 like because we were taking everything on that path,  
23 that --

24 CHAIRMAN APOSTOLAKIS: That's an  
25 interesting point you just made. In these analyses,

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 for example, in the seismic analysis we had the  
2 ragility curves, right? When you do you 2 to 5  
3 calculation, you don't touch those, do you? Because  
4 they're not --

5 MR. TRUE: We were going to change just  
6 the random unreliability --

7 CHAIRMAN APOSTOLAKIS: Only the random?  
8 Oh. Okay. Interesting.

9 Okay. Anything else on the questions?

10 MR. TRUE: We had a lot of discussion  
11 about this, is it conservative, is it not  
12 conservative?

13 CHAIRMAN APOSTOLAKIS: No. I think the  
14 way you describe it is conservative, that's my  
15 impression. The way you describe it here.

16 MR. TRUE:

17 DR. SHACK: Well, we tried. It was  
18 actually our intent. Good.

19 DR. SHACK: Well, I'm not sure in this  
20 one, though, if you had a relatively large seismic  
21 contribution, that you could be sure that the delta  
22 CDF with the other paths were small. You know, it  
23 becomes -- it's one of these thing where the -- yes,  
24 you've gotten the largest one and you've made it  
25 manageable, but it's not clear to me that the delta

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 CDF associated with the others is necessarily small.  
2 It's just -- it's not dominate.

3 You know, in the 5 at least you've got a  
4  $10^{-6}$ . You know, a have a quantitative criterion for  
5 what you've screened out.

6 MR. TRUE: Yes.

7 DR. SHACK: In this one all you know is  
8 that, you know, it's less than the two that you've  
9 picked.

10 MR. TRUE: Yes. I think that my  
11 impression, and I'm not the seismic expert for sure.  
12 My impression is that if you're able to meet the  
13 HCLPFs in the seismic margins approach, that you can  
14 have reasonable confidence that your total CDF from  
15 seismic is going to be on the order of  $10^{-5}$ . And so -  
16 - and that's for the things that are treated.

17 Now, you may be actually above  $10^{-5}$  if  
18 your HCLPFs didn't meet the earthquake, but we've  
19 already got all those components that didn't meet the  
20 HCLPF because they're a part of our safe shutdown path  
21 for making it safety-significant.

22 So we're talking about some change to a  
23 fraction of the  $10^{-5}$  kind of a value, which gave me  
24 some confidence that we're still kind of in that same  
25 ball park.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 DR. SHACK: Yes. But if delta CDF is --  
2 I mean, you know, it's a small contribution to the  
3 total CDF, but when you're looking at the deltas that  
4 you're interested in, is not -- you know, we're not  
5 looking at 10 to the 4th anymore. You know, if you're  
6 going to demonstrate that the delta CDF is small --

7 MR. TRUE: It's between  $10^{-6}$  -- or less  
8 than  $10^{-5}$  and, hopefully, less than  $10^{-6}$ . Yes. But  
9 it's not all that --

10 CHAIRMAN APOSTOLAKIS: Shall we move on?  
11 Now, in the common-cause failure area --

12 MR. TRUE: Yes.

13 CHAIRMAN APOSTOLAKIS: -- on question 20,  
14 which -- and 21 is blank. Oh. Okay.

15 MR. TRUE: We didn't understand that.

16 CHAIRMAN APOSTOLAKIS: Why should -- no,  
17 I thought your --

18 MR. TRUE: We didn't understand 21.

19 CHAIRMAN APOSTOLAKIS: Well, it's related  
20 to the comment I'm about to make.

21 MR. TRUE: Okay.

22 CHAIRMAN APOSTOLAKIS: I think the  
23 implication in 20 or what you're doing in here is that  
24 the common-cause failure term is a separate event  
25 because in RAW and Fussell-Vesely can be calculated.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 In other words, I have a PRA, I have --

2 MR. TRUE: What you said is statement of  
3 the facts, right?

4 CHAIRMAN APOSTOLAKIS: Yes.

5 MR. TRUE: That's true.

6 CHAIRMAN APOSTOLAKIS: And the thrust of  
7 these questions is that it really isn't, but if this  
8 component A fails, it effects -- that fact effects a  
9 number of terms. I mean, when I calculate RAW and I  
10 set that component down, it should effect a term that  
11 has only random failures, it should effect the term  
12 has common-cause failures, because that component is  
13 down now.

14 MR. TRUE: Okay. Yes, but the --

15 CHAIRMAN APOSTOLAKIS: So we're not going  
16 to take the common-cause failure term as a separate  
17 entity, as if it were a separate component in other  
18 words?

19 MR. TRUE: Okay.

20 CHAIRMAN APOSTOLAKIS: So -- yes, go  
21 ahead.

22 MR. TRUE: Let's take it one at a time.

23 Fussell-Vesely is effectively setting the  
24 failure rate to zero, right?

25 CHAIRMAN APOSTOLAKIS: Yes.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MR. TRUE: So that takes the common-cause  
2 term to zero. So Fussell-Vesely I think we --  
3 hopefully we can agree that the approach of  
4 considering all of those together addresses that.

5 CHAIRMAN APOSTOLAKIS: Considering what?

6 MR. TRUE: We take the sum of all t he  
7 Fussell-Veselys and assign that to be the Fussell-  
8 Vesely importance of the component.

9 CHAIRMAN APOSTOLAKIS: And that's bounding  
10 or what is it?

11 MR. TRUE: Well, I believe it's bounding.

12 MR. PARRY: It is, because they're  
13 independent failure modes of the component.

14 CHAIRMAN APOSTOLAKIS: Mutually exclusive.  
15 They're mutually exclusive.

16 MR. PARRY: That's right. But -- that's  
17 right.

18 MR. TRUE: Yes.

19 MR. PARRY: So the cut sets are mutually  
20 exclusive. So --

21 MR. TRUE: Unless by some chance you had--

22 MR. PARRY: Well, there may some --

23 MR. TRUE: -- the same component had to  
24 work one way and then work a different way.

25 MR. PARRY: But then it would be in a

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)

1 different phase.

2 CHAIRMAN APOSTOLAKIS: So in essence what  
3 you're --

4 MR. PARRY: And you would get a different  
5 sequence.

6 I think it's true that it's the right way  
7 to do it.

8 MR. TRUE: Yes. It's the right to do it.  
9 It's certainly not --

10 CHAIRMAN APOSTOLAKIS: But you are talking  
11 about the Fussell-Vesely of a single component now  
12 that has 3 failure modes, right?

13 MR. TRUE: Right.

14 CHAIRMAN APOSTOLAKIS: You are not  
15 addressing the question of how to handle the common-  
16 cause term also?

17 MR. TRUE: I'm trying to do that.

18 CHAIRMAN APOSTOLAKIS: Okay.

19 MR. TRUE: So there's a figure -- the  
20 answer to question 22, what we probably should work  
21 from and then we'll get -- and you had a question  
22 about that table. Get the table out of the report and  
23 corrected an alignment problem that we had in the  
24 report, which I apologize for.

25 So basically what we did was we said okay,

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 in a PRA a component has various failure modes.  
2 Independent failure modes and common-cause failure  
3 modes. What we want to do in the area of Fussell-  
4 Vesely is we're going to compute a component in  
5 Fussell-Vesely importance, and for doing that we're  
6 going to take the sum of the individual component  
7 failure mode Fussell-Vesely importances. So these  
8 Fussell-Vesely importances sum to this .00952 value.

9 CHAIRMAN APOSTOLAKIS: So this is the sum  
10 of all these four numbers.

11 MR. TRUE: The sum of those numbers, yes.  
12 Because the decimal points align, it's not obvious  
13 that that's the case, but that's what it is.

14 DR. ROSEN: We'll trust you.

15 CHAIRMAN APOSTOLAKIS: Well, but wait a  
16 minute now. Let me -- the failure to open versus  
17 failure to remain --

18 MR. BURCHILL: Right. It's not physically  
19 possible that those both occur unless they're time  
20 dependent failure situations in a scenario. But at  
21 least we have -- that's why we think it's conservative  
22 because we've actually added what may be in fact  
23 mutually exclusive failure modes.

24 MR. TRUE: You can't fail or remain open--  
25 shouldn't be able to fail or remain open and fail to

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 remain closed in the same -- at the same time.

2 DR. ROSEN: Well, if you get caught in the  
3 middle.

4 MR. TRUE: Well, you could, yes. Although  
5 that usually would be categorized as one failure or  
6 the other.

7 CHAIRMAN APOSTOLAKIS: But the common-  
8 cause failure again represents now what kind of  
9 failure? To open or to remain closed?

10 MR. TRUE: To open. To open. We don't  
11 usually have a common-cause term for failed to remain  
12 closed.

13 DR. ROSEN: Closed.

14 CHAIRMAN APOSTOLAKIS: And you have a --  
15 oh, there was a number there. So the .004 is --

16 MR. TRUE: Is it's importance. That  
17 actually happens to be the most important of the  
18 Fussell-Vesely importances.

19 CHAIRMAN APOSTOLAKIS: So this Fussell-  
20 Vesely now is calculated by assuming -- by treating  
21 the common cause term as an independent separate term,  
22 is that what that means?

23 If I go to the PRA and I set that common-  
24 cause term equal to what, zero?

25 MR. TRUE: This term? Yes.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 CHAIRMAN APOSTOLAKIS: Then it will get  
2 .004?

3 MR. TRUE: It will reduce the total by  
4 .004

5 CHAIRMAN APOSTOLAKIS: Okay. And as if  
6 nothing else happened?

7 MR. TRUE: Yes. There's a basic event in  
8 the model that says common-cause failure of these two  
9 valves.

10 CHAIRMAN APOSTOLAKIS: Right.

11 MR. TRUE: And I computed that with an  
12 alpha factor model or a beta factor model, or whatever  
13 model. But I have a basic event that says common-  
14 cause failure, this .004 reflects the Fussell-Vesely  
15 importance of that basic event.

16 CHAIRMAN APOSTOLAKIS: Although in  
17 reality, I mean if you use the alpha factor or the  
18 beta -- I mean the multiple Greek letter method, 1 and  
19 4 really have the failure rate of valve A times beta  
20 and gamma?

21 MR. TRUE: Right. Right. Right. I agree.

22 CHAIRMAN APOSTOLAKIS: So they're really  
23 not independent basic events. I mean, you know,  
24 lambda appears in both?

25 MR. TRUE: Right. But if we're going to

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 zero, I think they all go to zero at the same time.

2 CHAIRMAN APOSTOLAKIS: They all go to zero  
3 at the same time. But that's not how you calculated  
4 the Fussell-Vesely. You set one versus equal to zero  
5 and then the other. You don't put them down at the  
6 same time.

7 MR. PARRY: George, maybe -- excuse me.  
8 The way you calculate them, they're not independent.  
9 But they represent independent failure modes of that  
10 component because the valve A fails to open is what's  
11 classified as the independent failure to open. Event  
12 4 is that subset of those failure causes of valve A  
13 that would also fail all the others.

14 CHAIRMAN APOSTOLAKIS: Right.

15 MR. PARRY: So they are, in fact,  
16 independent events from the point of view of physics.  
17 It's just that when you calculate it by taking the  
18 lambda for 1 and multiplying by a few betas or alphas.

19 CHAIRMAN APOSTOLAKIS: But if you do that,  
20 I mean the importance of lambda is different. It also  
21 effects two terms.

22 MR. PARRY: Well, that's -- yes, but  
23 that's why they're adding them. They're not looking  
24 at the --

25 CHAIRMAN APOSTOLAKIS: Can they

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 demonstrate that if you add them, you get the correct  
2 result --

3 MR. PARRY: They're not looking at the  
4 importance of lambda. They're looking at the  
5 importance of the component.

6 CHAIRMAN APOSTOLAKIS: Right. And that's  
7 not something that's obvious to me. He just says that  
8 we are doing it this way without any justification. I  
9 have to sit down and figure it out myself if it's  
10 correct, and I don't like that.

11 MR. TRUE: You don't like that you had to  
12 figure it out?

13 CHAIRMAN APOSTOLAKIS: Yes. Because then  
14 I have to do the same for RAW. I have to understand  
15 every line you have here. And, you know, why should  
16 the user have to do this? Can you just explain why  
17 these things are reasonable? Somewhere.

18 MR. TRUE: Okay.

19 CHAIRMAN APOSTOLAKIS: Okay.

20 MR. TRUE: We can explain that, why  
21 they're reasonable.

22 CHAIRMAN APOSTOLAKIS: Good.

23 MR. TRUE: The next one may be somewhat  
24 more contentious because I don't think the staff  
25 agrees with this completely.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MR. PARRY: You are right.

2 MR. TRUE: Okay. We've resolved the fact  
3 of how we calculate the component importance for  
4 Fussell-Vesely, right? That's clear what we're doing?

5 CHAIRMAN APOSTOLAKIS: Well, I understand  
6 what you're doing. It's just that it's not clear to me  
7 that it's reasonable what you're doing. But I  
8 understand what you're doing. Now let's go to RAW.

9 MR. TRUE: Okay. Let's go to RAW.

10 CHAIRMAN APOSTOLAKIS: But you said you  
11 can supply proof that it's reasonable. So, you know,  
12 I'll wait to see it.

13 MR. TRUE: Okay. For RAW in the PRA we  
14 have in the same individual basic events, and we can  
15 compute a RAW for each of those individual basic  
16 events. And we in our categorization process have  
17 said that we will not include the common-cause -- the  
18 RAW of the common-cause term as part of our  
19 computation of the total component importance from a  
20 RAW perspective and unless -- unless the conditional  
21 probability of the additional components failing  
22 that's used in alpha factor method is less than .005.  
23 And the reason for that is that if it's greater than  
24 .005, which in most cases it is -- it's usually around  
25 -- between .01 and .1, then the Fussell-Vesely is

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 going to be bounding anyway. Because the only way to  
2 get a RAW of 2 with a Fussell-Vesely lower than .005  
3 is if the failure rate or the event that you're  
4 setting to true has a value that's smaller than .005.

5 CHAIRMAN APOSTOLAKIS: Doug, and you  
6 expect the reader to figure that out? Why don't you  
7 supply some arguments that this is --

8 MR. TRUE: There's a footnote that  
9 describes it.

10 CHAIRMAN APOSTOLAKIS: There's a footnote  
11 which I never understood.

12 MR. TRUE: Okay.

13 MR. PARRY: I have got to say I don't  
14 really understand the footnote either. Because I  
15 think it refers to the conditional common-cause  
16 failure probability, which is the product of the  
17 alphas.

18 MR. TRUE: Right. It does.

19 MR. PARRY: Yes. Whereas, in fact by  
20 using the same argument that you used to sum the  
21 Fussell-Veselys you can turn it around and say that  
22 you also have to consider each of these basic events  
23 when you're considering RAW. Because remember what  
24 these separate events are is they're separate failure  
25 modes, if you like, of the component. Therefore, why

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)

1 would the common-cause failure -- the common-cause  
2 failure mode is a very strange one in that it also  
3 impacts other components. But it still fails  
4 component A, and therefore it's equivalent. So I  
5 think you should consider it.

6 CHAIRMAN APOSTOLAKIS: Isn't the problem  
7 stemming from the fact that item 4 is treated as a  
8 separate entity from 1 and 2? I mean, if you say the  
9 common-cause failure -- forget failure rates.

10 The term is QA times data.

11 MR. PARRY: Yes.

12 CHAIRMAN APOSTOLAKIS: Then I'll go  
13 everywhere in my PRA, I'm looking for the RAW of A.  
14 And wherever I have Q of A I'll set it equal to one.

15 MR. PARRY: You could do that --

16 CHAIRMAN APOSTOLAKIS: Clearly, I could.  
17 I mean, that's what I must do.

18 MR. PARRY: No, no, no, no.

19 CHAIRMAN APOSTOLAKIS: There's a  
20 difference between must and could.

21 MR. PARRY: No, not necessarily.

22 CHAIRMAN APOSTOLAKIS: Not necessarily.

23 MR. PARRY: Right. Because what you're  
24 assuming is that the impact of whatever change you're  
25 doing is only effecting the random failure

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 probability. It could equally effect the coupling  
2 factor between the components A, B and C.

3 CHAIRMAN APOSTOLAKIS: It could. It  
4 could.

5 MR. PARRY: And by doing what you suggest,  
6 but you're only focusing on --

7 CHAIRMAN APOSTOLAKIS: But it's a step in  
8 the right direction.

9 MR. PARRY: It's a step in the right  
10 direction.

11 CHAIRMAN APOSTOLAKIS: Because the  
12 component is down.

13 MR. PARRY: It's a step in the right  
14 direction.

15 CHAIRMAN APOSTOLAKIS: Yes.

16 MR. PARRY: But there is no right answer  
17 to this because RAW is itself a very --

18 CHAIRMAN APOSTOLAKIS: Oh, but there is a  
19 wrong answer.

20 MR. PARRY: Yes, and I think this is the  
21 wrong answer.

22 DR. ROSEN: This is the wrong answer and  
23 a --

24 MR. PARRY: But there's no right answer in  
25 the sense that RAW is such a strange extreme

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)

1 importance measure.

2 CHAIRMAN APOSTOLAKIS: I want to know what  
3 happens to the CDF if this component is down. Now, in  
4 the community's wisdom the common-cause failure is  
5 represented by 2 times beta times gamma, times delta.  
6 Well, if I have accepted, then I have to go and set Q  
7 equal to zero, to 1 there. Now, whether beta, gamma,  
8 delta will also go up is another question. But I  
9 think I would go back to the comment that, you know,  
10 how much can they go up. Because they're already  
11 pretty high. It's the Q that really brings everything  
12 down by -- I mean, beta is 10 percent, gamma is close  
13 to one. I mean, how much are you going to change it.  
14 Change it a little bit if you want, but it's the Q  
15 really that brings everything down.

16 MR. PARRY: Well, the --

17 CHAIRMAN APOSTOLAKIS: And it seems to me  
18 that's the way it should be done.

19 MR. PARRY: It depends what you're  
20 thinking you're doing, I think. It's --

21 MR. TRUE: Let me take a brief stab at  
22 defending what we did.

23 CHAIRMAN APOSTOLAKIS: I think you should.  
24 And I think that comes back to my request for a study  
25 that documents all these things.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MR. TRUE: Okay. I think that several  
2 things -- I think we can agree on several things.

3 Common-cause RAW is an extreme term. It's  
4 saying that all the components in that group fail 100  
5 percent of the time for 100 percent of the year and --

6 DR. ROSEN: Now calculate CDF on that  
7 basis.

8 CHAIRMAN APOSTOLAKIS: Wait a minute.

9 MR. TRUE: And calculate CDF.

10 CHAIRMAN APOSTOLAKIS: Where does it say  
11 that? It doesn't say that.

12 MR. PARRY: Where does it say that?

13 CHAIRMAN APOSTOLAKIS: The way you  
14 calculate its importance says that, and that's what  
15 I'm objecting to.

16 MR. TRUE: No. It's the RAW term for  
17 common-cause event in a PRA --

18 CHAIRMAN APOSTOLAKIS: And that's what I'm  
19 saying.

20 MR. TRUE: You set it to one --

21 CHAIRMAN APOSTOLAKIS: You could never  
22 calculate the RAW of the common-cause event, that's my  
23 point. Because it doesn't make sense. It's not a  
24 basic event.

25 MR. TRUE: Okay.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 CHAIRMAN APOSTOLAKIS: We call it basic  
2 event, but isn't.

3 MR. PARRY: But it is a basic event.

4 MR. TRUE: So you agree with me, you're  
5 running -- you agree. You're agreeing that's --

6 CHAIRMAN APOSTOLAKIS: I -- what I'm  
7 saying is that --

8 MR. TRUE: You happen to agree with that.

9 CHAIRMAN APOSTOLAKIS: What I'm saying is  
10 that, yes, the codes do treat it as a separate basic  
11 event, but in fact it is a coupled event with the  
12 other things. And if you look at the multiple Greek  
13 letter method, for example, then it's obvious that Q  
14 is everywhere. And you are really calculating the RAW  
15 of A. So you're setting A equal to -- I mean, QA  
16 equal to one for failure of the unavailability going  
17 to one and then you should go to all the terms in the  
18 PRA that have that QA and set it equal to one.

19 MR. PARRY: That's an artifact of the way  
20 you calculate --

21 CHAIRMAN APOSTOLAKIS: A what?

22 MR. PARRY: That's an artifact of the way  
23 you're calculating the common-cause failure --

24 CHAIRMAN APOSTOLAKIS: But that's what  
25 you're doing. I mean, you can't do it this way here

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 and later on say no I'm not going to do that anymore.

2 MR. PARRY: You got to go back to what the  
3 definition of the events is. And the event -- the  
4 first event is the random failure of component A. The  
5 fourth event is the failure of component A in  
6 conjunction with other components. But it's still a  
7 failure mode of component A. That's the way those  
8 events are defined in NUREG 47 and its subsequent  
9 progeny. But it's an artifact of the way that we  
10 calculate the probabilities of those events that you  
11 calculate anyway to use lambda.

12 CHAIRMAN APOSTOLAKIS: I'm surprised you  
13 have to pay for the multiple Greek letter model.

14 And the other thing that really I think is  
15 upsetting right now is that we are doing this analysis  
16 here in real time, talking to each other, and the  
17 question is why hasn't the Office of Research  
18 investigated these things and settled them once and  
19 for all? Is it so difficult? Why? Would it take a  
20 million dollar study to do these things? No. Why do  
21 I have to come here and at 12:00 listen to Gareth tell  
22 me that it's an artifact and it doesn't matter, and  
23 this and that, and then Doug give something else?

24 I mean, if we are to have --

25 MR. PARRY: I didn't have the math,

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 George.

2 CHAIRMAN APOSTOLAKIS: I know you didn't,  
3 but I want to put words in your mouth.

4 If we -- I mean one of the goals of the  
5 agency is to have -- to build and maintain public  
6 confidence, right? I don't think we're doing that by  
7 doing things like that and arguing the last moment,  
8 yes, it makes sense, it doesn't make sense. It seems  
9 to me we should have a piece of work somewhere that  
10 documents that these things make sense, they are  
11 conservative or they're not conservative, and this,  
12 and this and that.

13 MR. PARRY: Well, actually, we do have a  
14 comment into NEI on this particular point. So that  
15 does --

16 CHAIRMAN APOSTOLAKIS: Well, this  
17 committee has issued reports that are more than 2  
18 years old commenting on the problems with importance  
19 measures. I'm not sure anybody read them. The study  
20 should have been done already to settle the issue of  
21 importance measures and how you calculate them.

22 MR. CHEOK: George, there's no one from  
23 the Office of Research here, but I guess I'll speak  
24 for them a little bit.

25 They do have a limited study on importance

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 measures, and Louis Chu here from BNL is helping them  
2 do it.

3 And I think in terms of common-cause  
4 failures, I believe that the results show that there  
5 were four additional SSCs that would become important  
6 if you had included the RAW common-cause failure.

7 CHAIRMAN APOSTOLAKIS: So we should wait  
8 then until we see the study from Brookhaven before we  
9 say anything about this?

10 Are you addressing these questions, Dr.  
11 Chu? Come up here to the microphone.

12 DR. CHU: Okay. This is Louis Chu,  
13 Brookhaven Lab.

14 I think -- I work on some calculation  
15 using the Sequoyah SPAR model.

16 In terms of calculating the RAW  
17 considering the CCF, we -- I did I think exactly the  
18 way George described it. That is, in the SPAR model  
19 you calculate a common-cause failure probability in  
20 terms of the alpha factors times the Q value. So  
21 there's an expression for it.

22 And it happens that the SPAR model has the  
23 capability of, you know, you fail the component it  
24 will recalculate this common-cause failure  
25 probability. As a result, I believe this is the right

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 way, the accurate way of accounting for common-cause  
2 failure when you calculate a RAW value.

3 CHAIRMAN APOSTOLAKIS: So you're saying  
4 not to consider the term as a separate entity and  
5 calculate its RAW, but calculate the RAW of Q, which  
6 appears in two different places?

7 DR. CHU: Yes. We -- we --

8 CHAIRMAN APOSTOLAKIS: For the component?  
9 Even though Gareth says it's an artifact, which I  
10 agree. Because--

11 MR. PARRY: And, actually, we disagree  
12 with Louis -- at least I disagree with Louis' point of  
13 view, too.

14 CHAIRMAN APOSTOLAKIS: Well, thank you  
15 very much. I mean, that proves my point. We don't  
16 have a definitive study that tells us how these  
17 things--

18 MR. PARRY: I don't think the study is  
19 going to help you. But we know we can do it several  
20 ways, but you've got to get back to thinking what are  
21 you trying to do with evaluating the importance  
22 measure. And if you're trying to get the absolute  
23 importance of component A, then you have to look at  
24 all its failure modes. That's --

25 MR. TRUE: But it is only a portion of the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 common-cause --

2 MR. PARRY: Well, yes, but it doesn't  
3 matter. If that common-cause fails A, it's a  
4 different failure mode of A.

5 MR. TRUE: Then -- then --

6 CHAIRMAN APOSTOLAKIS: But it does fail A.

7 MR. PARRY: Yes.

8 MR. TRUE: Then I think we need to  
9 reconsider the use of the criteria 2 for that kind of  
10 a failure mode. Because it's something that's totally  
11 different. We're taking a whole group of equipment  
12 and failing it and saying that exists for 100 percent  
13 of the year at least --

14 MR. PARRY: It's only different in degree,  
15 Doug.

16 MR. TRUE: -- for a component that's  
17 certainly out of service --

18 MR. PARRY: It's only different in degree.  
19 You're doing that with all the individual failure  
20 modes. So what's the difference there? That's also  
21 an extreme measure of the importance.

22 CHAIRMAN APOSTOLAKIS: Well, we cannot  
23 resolve --

24 MR. PARRY: No, no. Things don't happen  
25 for the whole year, which is what you're saying the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 common-cause failure is.

2 CHAIRMAN APOSTOLAKIS: Obviously we cannot  
3 resolve that issue now.

4 MR. PARRY: Right.

5 CHAIRMAN APOSTOLAKIS: And I don't know  
6 how we can resolve it if you guys insist that nobody  
7 should look into it and document it someplace. But a  
8 study will not help me; I really don't understand  
9 that. I really don't.

10 I mean, I would like to see something that  
11 documents what Louis just said, what Gareth claims and  
12 so on and draw some conclusions. Why is this issue  
13 different from anything else that we study and say,  
14 you know, this is this way and this is not that way.  
15 I don't understand that we have to do it in real time  
16 here arguing that it doesn't mean this, and then Doug  
17 says we should reconsider the threshold. Well, gee,  
18 you know -- so I'm not sure we can reach a conclusion  
19 right now.

20 MR. PARRY: No, but I think you heard that  
21 from Mike and from Louis that there is a -- there is  
22 someone looking into this.

23 CHAIRMAN APOSTOLAKIS: Okay. So --

24 MR. PARRY: So I think at the end of that  
25 we will come up with some position.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 DR. SHACK: And it makes a difference of  
2 4 components?

3 CHAIRMAN APOSTOLAKIS: Yes.

4 MR. PARRY: In a particular example.

5 DR. KRESS: That hardly seems worth, does  
6 it?

7 DR. SHACK: Four 4 components?

8 DR. ROSEN: What do you mean by 4  
9 components? Four components in the whole analysis or  
10 -- what does is this reference to 4 components?

11 MR. CHEOK: I think this is four  
12 additional components in one plant model.

13 MR. TRUE: But is there only two common-  
14 cause groups? Is that all that it brings in?

15 MR. CHEOK: I don't know the details.

16 CHAIRMAN APOSTOLAKIS: I don't know, guys.  
17 We are wasting our time now.

18 And the other thing is that I hope this  
19 study will not just say we did it for Sequoyah and  
20 this is what we found. I mean, there may be some  
21 logic behind all this and go back to the definitions;  
22 what does RAW mean, is it meaningful to really claim  
23 that when a component is down, everything goes down?  
24 You know, that kind of thing. It is not just that we  
25 provide is numerically for this plant and we got these

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 numbers. I mean, that's useful insight, too, but it  
2 seems to me the definitions here -- and I think that's  
3 where Gareth was going -- you know, what does it mean  
4 that I have a common-cause failure of 2 valves?  
5 Right? What does it mean that one valve fails as a  
6 subset? You know, that kind of argument would go a  
7 long way to convincing me, at least, that we know what  
8 we're doing.

9 MR. TRUE: Okay.

10 CHAIRMAN APOSTOLAKIS: Okay?

11 MR. TRUE: Okay.

12 CHAIRMAN APOSTOLAKIS: All right. Now, I  
13 don't have any more questions.

14 DR. ROSEN: Is it lunchtime or are we  
15 done?

16 CHAIRMAN APOSTOLAKIS: I don't have  
17 anymore questions or comments unless my colleagues  
18 around the table -- Peter? Steve?

19 DR. ROSEN: Are we going to hear the NRC  
20 staff?

21 CHAIRMAN APOSTOLAKIS: Well, the NRC  
22 spoke.

23 DR. SHACK: The ultimate pièce de  
24 resistance of all this is how we calculate delta CDF.

25 CHAIRMAN APOSTOLAKIS: The two to 5.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 DR. SHACK: The 2 to 5.

2 CHAIRMAN APOSTOLAKIS: Yes, the 2 to 5.

3 DR. SHACK: You know, it's like question  
4 15

5 MR. TRUE: Right. That's about the only--

6 CHAIRMAN APOSTOLAKIS: Let's discuss that  
7 one for a few minutes.

8 MR. TRUE: Okay. I guess the issue here--  
9 it's actually 14 and 15 are related to this.

10 It is true that South Texas, they do a  
11 calculation where the value's increased all the way to  
12 a factor of 10. They also did lower values. We don't  
13 know if they actually did 5, but I know they did 2 and  
14 some other intermediate value.

15 I think that the core of the issues here  
16 is that 10 is just as arbitrary as 5. Twenty is just  
17 as arbitrary as 10.

18 CHAIRMAN APOSTOLAKIS: But you didn't pick  
19 20.

20 MR. TRUE: Right.

21 CHAIRMAN APOSTOLAKIS: Is that by chance.

22 MR. TRUE: We believe that the evidence  
23 that we have seen -- well, we haven't seen evidence  
24 that it will change by a factor of 10. That the  
25 evidence that was presented by South Texas in their

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1       submittal actually said it probably isn't going to  
2       change a lot. And there is some --

3               CHAIRMAN APOSTOLAKIS: What is it that's  
4       changing? The mean value of the distribution?

5               MR. TRUE: The mean value. Yes. The mean.

6               CHAIRMAN APOSTOLAKIS: The mean value?

7               MR. TRUE: Yes.

8               CHAIRMAN APOSTOLAKIS: Not the --

9               MR. TRUE: I would say the point estimate  
10       value wasn't changing because they didn't -- I'm not  
11       sure they actually computed a mean. But the point  
12       estimate they compared didn't change significantly  
13       between the two groups. I don't remember whether they  
14       computed --

15              CHAIRMAN APOSTOLAKIS: Is that the Idaho  
16       study that --

17              MR. TRUE: No. This is --

18              MR. TRUE: We're talking in South Texas.

19              CHAIRMAN APOSTOLAKIS: Well, was --

20              MR. TRUE: Now, there are -- there are --

21              DR. KRESS: It was based on that.

22              CHAIRMAN APOSTOLAKIS: I thought that  
23       there was an Idaho study, wasn't it?

24              DR. KRESS: Yes, I think so.

25              CHAIRMAN APOSTOLAKIS: It was not a South

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 Texas study?

2 MR. TRUE: It was South Texas. There may  
3 be some work from Idaho, but I haven't seen that.

4 So we start off with a dearth of evidence.  
5 But the evidence that we have says it don't look like  
6 it changes a lot. Then there's a pretty big change.

7 DR. SHACK: Two to 5 is a small change.

8 MR. TRUE: Two to 5 is more reflective of  
9 what we've seen. And given that the evidence shows  
10 there's not a lot of change, we said well if there's  
11 not -- the evidence says there's not a lot of change,  
12 maybe we should just be operating within the same  
13 distribution and moving our value we're using from the  
14 mean out towards a more 95th percentile kind of value.

15 And, as you know, the nature of the  
16 lognormal distribution is that the mean doesn't get  
17 more than about a factor of 4 away from the 95th  
18 percentile. And, in fact, as the uncertainties get  
19 larger, once you get above about a range factor of  
20 about 20, the mean starts approaching the 95th  
21 percentile and can even pass the 95th percentile.

22 So the graph on the next slide between 14  
23 and 15 shows the simple property of the lognormal  
24 distribution that the range factors we typically deal  
25 with on these kind of parameters are down in the low

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 310, 30 kind of a range. But the ratio of the 95th  
2 percentile to the mean in that range is below a factor  
3 of 5 and above a factor of 2.

4 So we said if we're going to do it and we  
5 don't have evidence that the mean does shift or the  
6 point estimate -- factors where it does shift, what we  
7 don't believe will happen. We believe individual ones  
8 may go up by a factor of 2 or 5 maybe at times. But  
9 we'll take them all at the same time and see what the  
10 delta risk is.

11 It's only a sensitivity study. And here's  
12 a point that Steve made earlier, it's not intended to  
13 say this is how bad it's going to get, this is where  
14 it's going to go. It's just to say that if this  
15 happened, as a sensitivity what would the implication  
16 be on changing the CDF.

17 And that's the basis for the 2 to 5.

18 DR. KRESS: Well, the fallacy in that  
19 argument is staying within the same --

20 CHAIRMAN APOSTOLAKIS: Yes.

21 DR. KRESS: There's nothing that I know of  
22 to say.

23 MR. PARRY: Well, everything's changing.  
24 It has to change some.

25 CHAIRMAN APOSTOLAKIS: It's a matter again

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 of going back and understanding what the distribution  
2 represents. Is a plant-to-plant variability that the  
3 reactor safety study talked about? And what if you're  
4 one of the plants that is on the tail already? Right?  
5 Or does it mean something else? You know, these are  
6 the kinds of things that I think we need a little more  
7 careful investigation.

8 Does the whole distribution change or not  
9 doesn't change, or --

10 MR. PARRY: I think also it's setting a  
11 dangerous precedent in some ways that that uncertainty  
12 distribution is purely a reflection of what we know  
13 about the parameters for the state of the plants as  
14 they exist at the moment. If we then start using that  
15 as an excuse for changing it; when we change the state  
16 of the plants, then I think that's -- it's  
17 intellectually dishonest, let's put it that way.

18 CHAIRMAN APOSTOLAKIS: And you say 2 to 5.  
19 Now the problem is what if I do it for 3 and it  
20 doesn't pass the criterion, then I go down to 2 and it  
21 does, then what do I do? You say --

22 MR. TRUE: Yes, I think in the end I  
23 believe we're going to end up picking an A number  
24 based on treatment. But we have yet to define what  
25 treatment we're going to do.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 CHAIRMAN APOSTOLAKIS: Can you document  
2 that somewhere.

3 MR. TRUE: If a change in treatment is  
4 nominal, we think that the change in reliability would  
5 be nominal.

6 CHAIRMAN APOSTOLAKIS: Okay.

7 MR. TRUE: If it's more significant, then  
8 it might be more significant.

9 DR. ROSEN: Can I ask a few questions?

10 CHAIRMAN APOSTOLAKIS: Yes.

11 DR. ROSEN: I just wanted to clarify with  
12 Adrian that what you're going to do with this is come  
13 back with another draft of it? And that's going to  
14 take out all the treatment stuff as well as be  
15 responsive to what you know of the Commission's -- of  
16 the staff's intent with regard to 50.69?

17 MR. HEYMER: We will take a look at their  
18 comments, factor those in. We will take a look at the  
19 lessons learned we've documented from the pilots, and  
20 there's still one more pilot to go. And once we've  
21 done that, we'll take an attempt to redraft it. We'll  
22 meet with the task force to review it. And then we'll  
23 submit it as Rev. C.

24 DR. ROSEN: Could you answer my question  
25 about the treatment?

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MR. HEYMER: The treatment -- the  
2 guideline based on some decisions that were made in  
3 January will focus just on treatment. Just on  
4 categorization.

5 DR. ROSEN: And all the treatments on it  
6 will be --

7 MR. HEYMER: The treatment it's our intent  
8 to call that out and put that into a specific industry  
9 guideline that will not be endorsed by the NRC.

10 DR. ROSEN: Okay. Thank you.

11 MR. HEYMER: And industry guide.

12 DR. ROSEN: Now I have another question,  
13 which is really goes to our agenda, which is that I  
14 came to hear what the NRC -- to hear what the industry  
15 said in response to our questions for sure, and you've  
16 done an credible job doing that. But I also came to  
17 hear what the staff thought of NEI 00-04.

18 Can somebody from the staff respond to  
19 that, Mr. Chairman?

20 MR. CHEOK: Can I real quickly mention  
21 about the 2 to 5 factor 2. The staff has asked I  
22 guess NEI to justify the fact that 2 to 5, NEI has  
23 submitted to us data from STP. The staff has not  
24 looked at this data yet and I guess we eventually may  
25 do that. But I guess treatment also gets factored

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 into this factor 2 to 5.

2 What happens if you pick a factor of 5  
3 even? Does that mean when treatment is IST, does that  
4 mean you cannot increase the test intervals from 3  
5 months to more than 15 months because the 5 bounds you  
6 to your lambda T by 2 factor? So we need to pull  
7 treatment into this discussion when we talk about  
8 factors of 2 to 5.

9 DR. ROSEN: Now you answered the question  
10 about this particular point. But I was more generally  
11 asking the question overall; what is the staff view  
12 about Rev. B of NEI 00-04? Do you have any comments  
13 on it beyond that?

14 MR. REED: Steve, I can say a few words.

15 DR. ROSEN: Yes, go ahead.

16 MR. REED: I'm just going to focus on one  
17 slide. It's going to reiterate a lot of what was said  
18 to start off the meeting that Adrian mentioned at the  
19 very beginning of the meeting.

20 It starts with a little bit of history,  
21 but I think it's important to keep remembering this.  
22 Because I think often times we lose the context and we  
23 lose the bigger picture.

24 We've been doing this since back in '99  
25 when we came out with SECY 99.256 with ANPR. That's

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 what started this whole thing really rolling. And  
2 since then NEI has been developing the document. And  
3 we are now on the third round of comments that I  
4 believe you all have a copy of, which was sent to NEI  
5 several weeks ago. And those comments reflect both  
6 our review of draft Revision B as well as all the  
7 pilot activities that have been observed to date being  
8 collected.

9 The reason I think that we didn't hear a  
10 strong opinion a whole lot on these specific issues is  
11 the fact that we are largely in agreement. Now, you  
12 look at the comments and, of course, there's a pretty  
13 long list of comments. But to me, anyway, looking at  
14 the entire Option 2 picture and categorization, I  
15 don't think we're far off. We have some big issues in  
16 other areas, but in the categorization area I think  
17 all of these can be technically solved. I may be a  
18 little too optimistic here, so that's why I'm saying--

19 DR. ROSEN: What do you mean big issues in  
20 other areas? What other areas are there besides  
21 treatment?

22 MR. REED: Yes, exactly.

23 DR. ROSEN: Are you ready to talk to that?  
24 I thought you opted out of treatment?

25 MR. REED: Well, no, I'm talking about in

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 terms of in the rule. For example, I'll give you an  
2 issue of whether 50.55(a), a special treatment  
3 requirement, whether those requirements should be  
4 placed on RISC-3 SSCs or removed from RISC-3 SSCs.  
5 That's a very big issue.

6 In fact, we met yesterday with NEI and  
7 ASME on that particular issue to try to understand,  
8 you know, gather more information to help us make a  
9 decision on whether that should be one of the list of  
10 the special treatment requirements that should be --  
11 you know, the requirements that should be removed from  
12 RISC-3.

13 As you know, South Texas was exempted from  
14 pieces of 55.55(a).

15 DR. ROSEN: Yes.

16 MR. REED: For Option 2 we've been  
17 considering in this particular instance all the way  
18 from 55.55(a) requirement staying on RISC-3 to the  
19 pieces being removed in a similar fashion to South  
20 Texas, or the entire regulation being removed from  
21 RISC-3. So, it's a very big issue. In fact, I think  
22 it's the biggest issue.

23 DR. ROSEN: I would really be puzzled if  
24 you deviated from what you did at South Texas. I  
25 mean, it seems to me it was agonizing in the staff

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 when we came to a conclusion. Why would you want to  
2 recognize that? You don't have to answer that.

3 MR. REED: Well, it's been very agonizing  
4 for us, I can certainly agree with you on that. And  
5 there are other issues.

6 I know this Committee and this meeting  
7 today was focusing on the concerns and issues on the  
8 categorization process, and so that's what we were  
9 focused on here today. And --

10 DR. ROSEN: But I would echo your comment  
11 about 50.55(a). I mean, 50.55. I am concerned that  
12 we are doing something -- that we would do something  
13 different and that -- and I said why earlier on, was  
14 that this is about scope. It's always been about  
15 scope; that which is within the special treatment  
16 requirements and that which is not. And so if you  
17 start using code cases, you're not really talking  
18 about scope anymore. You're really talking about  
19 iterating with the fine detail. And I think that's  
20 the essence of my trouble of going with an approach  
21 that relies on code cases rather than dealing with it  
22 directly in this building.

23 MR. REED: To continue then, as I think  
24 you probably gathered then from -- we were trying to  
25 meet on a few of the technical issues where I think it

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 was very clear that, you know, for example on CCF and  
2 RAW, that there were some disagreements. But, by in  
3 large, we weren't trying to do a lot because, in fact,  
4 we are I think in fairly good agreement on the  
5 categorization process and, you know, understanding  
6 that ACRS may have some concerns separate from that.

7 But, you know, I just pull out what I  
8 think we would consider the three biggest issues. And  
9 I think all these are solvable.

10 The issue of long term containment  
11 integrity and its consideration within defense-in-  
12 depth. The issue of the IDP guide, that's where I  
13 think where we agree with the ACRS. I think it's also  
14 been a feedback from the pilot activities. And I  
15 think NEI recognizes in fact that there needs to be a  
16 little bit more structure and guidance to the IDP.

17 DR. ROSEN: Can I stop you right there?

18 MR. REED: Sure.

19 DR. ROSEN: In my view what came out of  
20 the experience at South Texas was the absolute  
21 importance of the IDP. We really didn't anticipate  
22 that at first at South Texas. It wasn't clear to us  
23 when we started that that was how it was going to  
24 shake out. But it became clear very soon.

25 And so the things that were done to

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 select, to train and qualify the members of the expert  
2 panel, the IDP, and its working group became very  
3 important. And the structure that they worked in  
4 because it was going to be so difficult, we could see.  
5 The answers were not just going to come out of the end  
6 of a computer.

7 The issues of structure and scrutability  
8 became even more important. Documentation, clarity.  
9 Even continuity of membership of the members; didn't  
10 want to have people scuffling in and out of the thing.  
11 And that the guideline is absolutely almost silent on  
12 those issues, which to me turn out to be some of the  
13 important issues, the soft issues, if I may call them  
14 those.

15 So, I would encourage both the staff and  
16 NEI to pay more attention to what we found to be some  
17 of the more important dimensions of this process.

18 MR. REED: I think all the parties agree  
19 that there needs to be some work done there, and it's  
20 already been mentioned this is a interim product. And  
21 so we'll see how it evolves to the next Rev. I think  
22 it will.

23 And, of course, the last item there, this  
24 is a big issue, it's a lot of what was talked about  
25 today. In fact, Mr. Burchill talked quite a bit about

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)

1 PRA quality. But that's a very important aspect of,  
2 you know, is your PRA is a sufficient quality really  
3 to support this categorization process? And, you  
4 know, staff has -- work has been underway for quite  
5 some time reviewing the peer certification process.  
6 And we recognize that that's something that will have  
7 been done. Now the question is what's necessary for  
8 licensees to implement Option 2, what do they need to  
9 provide to the staff as a submittal for us to take a  
10 look at so we can conclude that, yes, what you've got  
11 there in place is good enough to implement this to  
12 Option 2.

13 And it just really turns into a review  
14 guidance for the staff in reviewing a submittal to  
15 support this. And we actively are working on that,  
16 you know, right now.

17 So, you know, a very quick overview. What  
18 I'm really trying to point out is we're pretty far  
19 down the road here. We're on the third round of  
20 comments. We're not too far off in categorization.  
21 We have some big issues. From the staff's perspective  
22 I think we can solve. We're hearing, you know, some  
23 issues of course from the Committee.

24 In fact, George, I think we would like if  
25 possible to get a letter from the Committee. I think

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 it would help us do our job better. Because we need  
2 if possible to get these concerns documented to help  
3 us when we get to the proposed rule stage to help  
4 address this when we bring the proposed rule to the  
5 Committee.

6 So, if possible, I think we would  
7 appreciate a letter. I understand there's a lot of  
8 views bouncing around, that's going to be a difficult  
9 thing for you to do. But --

10 DR. ROSEN: If we agreed to that, you'd  
11 get a letter on Rev. B of NEI 00-04. You need a  
12 process letter? Because we know they're going to  
13 change it?

14 MR. REED: Yes, but it helps us -- some of  
15 these concerns are pretty broad based and I think it  
16 would help us, I believe, to try to have them  
17 addressed as we go forward. That's -- in other words,  
18 to be better prepared and hopefully get the proposed  
19 rule package to this Committee. That's my thinking  
20 going forward. But, you know, again, what we were  
21 focused on was the issues and concerns from the letter  
22 from the ACRS, and we were charming in as we went  
23 along. And that was the main focus. This is really to  
24 give you a view of where we stand.

25 And, of course, you have our letters, our

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 specific comments on NEI 00-04.

2 CHAIRMAN APOSTOLAKIS: Any other comments  
3 from the members?

4 DR. ROSEN: Well, I have one more, George.

5 CHAIRMAN APOSTOLAKIS: Yes. Go ahead.

6 DR. ROSEN: On this last point, the  
7 relationship of NEI 00-02. It was my understanding  
8 that that relationship was nil, and that is -- and let  
9 me give you my version of it and I will stand  
10 corrected if you can help me, or if Adrian can help.

11 00-02 describes the PRA certification  
12 process. It is part of -- it is referenced in the  
13 ASME standard. The standard stands tightly linked  
14 with the PRA certification process. And 00-04 invokes  
15 the standard, which it hence evokes 00-02. Those are  
16 not separable things. We insist on good quality PRAs  
17 to support this process would be required. And,  
18 therefore, need to meet the standard, the ASME  
19 standard which -- or if you prefer a shorthand, you  
20 need to meet 00-02 but I think it's a more complete  
21 thing and it's certainly scrutable to the public,  
22 which may or may not have access to 00-02, to say that  
23 you need to meet the ASME standard which incorporate  
24 the certification process which is explained in 00-02,  
25 although it stood alone before that. I mean, it was

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 part of another process.

2 So, I don't think -- to me the  
3 relationship is not unknown. I'd be interested in  
4 your views.

5 MR. PARRY: Yes, I think the relationship  
6 is not unknown in general, but I think the question is  
7 what can the staff make out of what the reports say  
8 about -- what submittal that come in using NEI 00-04  
9 said concerning the definition of quality, if you  
10 like, that came out of NEI 00-02. And I think the  
11 staff has some concerns about that, largely because  
12 what we have to do as the staff, I think, is to be  
13 convinced that the risk input to the IDP is adequately  
14 supported by the licensee's PRA. Okay.

15 Now, for us to do that I think we have to  
16 understand precisely what has gone into NEI 00-02 and  
17 how the grading process has gone on. And there are  
18 some things that I think that we feel a little nervous  
19 about.

20 For example, and our understanding is that  
21 NEI 00-02 requires the documentation of facts and  
22 observations when a grade 3 is not awarded to a  
23 particular element. I may have this slightly wrong,  
24 but that's at least what we read into it. But there  
25 are equally important issues that are related to the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 assumptions that the analysts have made. I'm going to  
2 give you a good example, like the HRA method, for  
3 example. Human reliability analysis method. They may  
4 meet the criteria that are in the ASME standard and  
5 the other requirements, I should say, and in NEI 00-  
6 02, but those are flexible enough that they would  
7 allow a licensee to use any one of a number of  
8 different methods which could give you very different  
9 estimates of human error probabilities.

10 To some extent that worries us less in  
11 Option 2 on that particular issue because one of the  
12 requirements is for the licensee to do sensitivity  
13 studies on human error probability values, for  
14 example, which would make us feel more comfortable  
15 that they haven't obscured SSCs because of using very  
16 conservative HEPs or they haven't pushed some SSCs to  
17 be unimportant because of using very optimistic HEPs.

18 But nevertheless, there are issues like  
19 that that we're sorting through that I think that we  
20 have to have more confidence about to accept the  
21 results of a categorization using NEI 00-04 coupled  
22 with NEI 00-02. And that's the guidance that Tim  
23 talked about that we're putting forward as to which of  
24 these areas do we need to look at.

25 And just to give you one of the reasons I

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 think why this occurs, is that the sub-tier criteria  
2 on which the grading is performed in NEI 00-02 we  
3 don't feel that they clearly define what goes into the  
4 grades, and in particular what goes into grade 3. So  
5 knowing something that has grade 3 doesn't tell us  
6 what was done.

7 CHAIRMAN APOSTOLAKIS: Adrian?

8 MR. HEYMER: Yes. You had a number of  
9 questions on the certification process, and we didn't  
10 really get to those today. We covered the PRA quality  
11 ones in some depth. And I think before we can sort of  
12 look to some response from this Subcommittee or the  
13 full committee, is I think we need to explain where we  
14 are with regards to certification process and Option  
15 2, and respond to some of those questions.

16 If we want to start discussing those now,  
17 we'll introduce --

18 CHAIRMAN APOSTOLAKIS: Well, that brings  
19 up another issue. We will have a presentation at the  
20 full Committee meeting, right? An hour and a half?  
21 Are you planning to come, NEI?

22 MR. HEYMER: We're planning to be there,  
23 yes.

24 CHAIRMAN APOSTOLAKIS: Well, maybe, you  
25 know you can focus on major issues and not take every

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 question that we have asked in detail and address them  
2 then.

3 MR. HEYMER: We can focus on the major  
4 issues, but I think we also need to emphasize that  
5 this document will change. You'll probably see, I  
6 wouldn't say substantial changes, but there will be  
7 changes in certain areas like the IDP guidance, and  
8 there were some specific reasons why we went down that  
9 approach.

10 CHAIRMAN APOSTOLAKIS: Yes.

11 MR. HEYMER: And what I understand the  
12 staff needs some help in input is regards to drafting  
13 the notice of proposed rulemaking, it is a notice of  
14 proposed rulemaking. It is not the final rule.

15 CHAIRMAN APOSTOLAKIS: Yes.

16 MR. HEYMER: And we still have a long way  
17 to go. There are some substantial issues on the table  
18 not associated with categorization.

19 DR. ROSEN: I would only comment, now that  
20 I've listened to the staff and Adrian, NEI, that I'm  
21 a little bit uncomfortable with the idea, mainly from  
22 what you said, Gareth, that the staff is worried about  
23 or is uncomfortable with some tier guidance in the NEI  
24 00-02 in the certification process.

25 It seems to me that that process is now

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 embedded in the standard and the proper place to have  
2 voiced those concerns and had them addressed was in  
3 the consensus process. And to now be worried about  
4 that at this stage smacks a little bit of wanting to  
5 change the outcome of the consensus process. I may be  
6 wrong about all that, but think about that comment in  
7 the light of what you said.

8 MR. PARRY: Yes, I'd like to respond to  
9 that. I don't think that the fundamental process of  
10 a peer review is reflected both in the standard. And,  
11 obviously, the peer process is NEI 00-02. However,  
12 NEI 00-02 has not been changed to reflect the  
13 consensus process that was done in the standards. So  
14 that is a different issue.

15 And I think it's actually no secret that  
16 we have been concerned about the sub-tier criterion in  
17 NEI 00-02. We've made this point over the last 3 or  
18 4 years. So I think this is nothing new. This is  
19 just a continuing situation. But I think that, you  
20 know, the standards is something -- is another animal  
21 and that's in terms of the requirements. They're  
22 clearer, I think, than the sub-tier criteria of NEI  
23 00-02.

24 DR. ROSEN: So what you're saying is that  
25 NEI needs to conform 00-02 to the standard?

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MR. CHEOK: Actually, I think both NEI and  
2 the staff recognize that there are some differences  
3 between 00-02 and the standard. And as a result of  
4 that, I think NEI has asked the staff to look at 00-02  
5 with respect to Option 2. And I guess to provide  
6 comments as to the adequacy of 00-0s with respect to  
7 Option 2.

8 DR. ROSEN: Well, it doesn't make any  
9 sense to me to have another set of how you do things  
10 different from the standard. I think both NEI and the  
11 staff understand that it'll have to come together on  
12 the issue of peer certification ultimately.

13 CHAIRMAN APOSTOLAKIS: Okay.

14 MR. BURCHILL: Can I make a comment?

15 CHAIRMAN APOSTOLAKIS: Yes, sure.

16 MR. BURCHILL: I want to just clarify  
17 something that Gareth said, and then I also wanted to  
18 make a comment on the relationship between the  
19 standard and 00-02.

20 In the NEI 00-04 there is an outline of  
21 the submittal an applicant would make relative to this  
22 categorization process. And in it it's stated that  
23 the applicant should have a high level summary of the  
24 results of the peer review including any PRA elements  
25 that are graded below 3 in the standard elsewhere --

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 or the guideline rather elsewhere says that it's  
2 expected that a grade 3 is the nominal grade measure  
3 of capability of the PRA for this application. But it  
4 also says that the disposition of all peer review fact  
5 and observations classified as A or B would be  
6 reported.

7 And there's a clear distinction between  
8 the grading scheme under the peer review process and  
9 the fact and observation sheets which their level of  
10 significance relative to the capability of the PRA is  
11 measured in this A, B, C category. And everything in  
12 the A/B category, whether it is associated with an  
13 element that was graded, you know, 1, 2, 3 or 4, it  
14 doesn't matter. All of those are to be reported and  
15 how they were dispositioned.

16 So, I just wanted to clarify that there's  
17 two different dimensions to how that's actually done.  
18 And that's required by the guideline to be included.

19 Relative to the ASME standard and the peer  
20 review process, I think it is -- help me on this. I  
21 think it's section 6 of the standard that refers to  
22 the peer review process. I think --

23 MR. PARRY: Yes, I think that's right.

24 MR. BURCHILL: Yes. I think section 6  
25 refers to the peer review process. And at least in

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 the last draft that I've seen, I think which is 14(b)  
2 I believe, it's very clear that there's a very tight  
3 linkage between the standard and the peer review  
4 process. And, in fact, having just gone through it  
5 myself personally in order to look to adapt that  
6 element of the standard to the one that we're working  
7 on for low power and shutdown in ANS, you know, what  
8 I found is that it very tightly ties the peer review  
9 process into determination of compliance with the  
10 standard.

11 And, in fact, the owners groups jointly  
12 have underway with the BWR owners group in the lead  
13 presently, a very detailed comparison between the sub-  
14 element criteria in the peer review process and what  
15 the standard calls out. And I think by the time that  
16 we're in a position to apply this under Option 2 that  
17 will have become in widespread use in the industry for  
18 demonstrating through the peer review process how the  
19 PRA compares to the standard.

20 MR. PARRY: Can I just add to that?

21 MR. BURCHILL: Yes.

22 MR. PARRY: I think where the comparison  
23 has to be made, Bill, if that would be compatible is  
24 at the sub-tier criteria level.

25 MR. BURCHILL: Right.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MR. PARRY: And at the supporting level  
2 requirements of the standard. When that comparison is  
3 made, then I think they will be more --

4 MR. BURCHILL: That is what we're doing.

5 MR. PARRY: Okay. Good.

6 DR. ROSEN: Good. That's very helpful.  
7 And I think that that linkage between those things is  
8 what was intended when we set out on this process.

9 CHAIRMAN APOSTOLAKIS: Okay. So is it  
10 clear now what the presentation at the full Committee  
11 meeting is going to be? The presentation will be by  
12 you or you and NEI, or just NEI?

13 MR. HEYMER: Well, I think there's been  
14 some confusion over the full Committee meeting,  
15 George. What actual date is that?

16 CHAIRMAN APOSTOLAKIS: March --

17 MR. MARKLEY: Let me get the agenda real  
18 quickly. Yes.

19 MR. PARRY: The 7th, I think.

20 MR. MARKLEY: I think the 7th, but I can't  
21 tell you the time off the top of my head.

22 CHAIRMAN APOSTOLAKIS: It's March the 7th  
23 at 10:15 in the morning.

24 MR. HEYMER: We need to caucus amongst  
25 ourselves to make sure that we can get the right

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 people here for that.

2 CHAIRMAN APOSTOLAKIS: Okay. So it's  
3 primarily the staff then if they come.

4 MR. REED: And to make sure I understand,  
5 this is going to focus on NEI 00-04 and the staff's  
6 issues with 00-04 now?

7 CHAIRMAN APOSTOLAKIS: Well, it says  
8 proposed NEI 00-04.

9 MR. REED: Okay. In other words, not  
10 focusing on ACRS questions and concerns about on what  
11 our issues are?

12 CHAIRMAN APOSTOLAKIS: The whole report,  
13 yes.

14 MR. REED: Okay.

15 CHAIRMAN APOSTOLAKIS: Okay. I take it  
16 there are no more comments from my colleagues or  
17 questions?

18 Well, I thank the gentlemen from the  
19 industry for taking the time to come and talk to the  
20 Subcommittee, and staff members.

21 DR. ROSEN: Before we adjourn --

22 CHAIRMAN APOSTOLAKIS: Yes?

23 DR. ROSEN: We should discuss amongst  
24 ourselves, not that it's secret but just with the  
25 ACRS, the desire to write a report at this stage. I

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 think the staff has asked for that.

2 CHAIRMAN APOSTOLAKIS: Yes, the staff has  
3 asked for a letter, yes.

4 DR. ROSEN: A letter. And the question I  
5 have is --

6 CHAIRMAN APOSTOLAKIS: Well, let's go  
7 around the table and see how people feel about it.  
8 Who wants to start? Peter?

9 DR. FORD: I've still got a concern about  
10 a time dependent --

11 CHAIRMAN APOSTOLAKIS: No, but should we  
12 write a letter?

13 DR. FORD: My consideration is no.

14 CHAIRMAN APOSTOLAKIS: No.

15 DR. ROSEN: My consideration is no also,  
16 because I think it's a work in progress. There are so  
17 many questions that I have about this that I would  
18 like to see the final draft. I think if we wrote a  
19 Larkins Graham that said something like we think there  
20 hadn't been the right direction, we're glad to see  
21 that the staff and NEI at least from the staff's point  
22 of view we believe have general agreement, that it's  
23 likely to be a success path; that's fine. But I don't  
24 think we're ready to write a letter to the Commission  
25 on it.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 CHAIRMAN APOSTOLAKIS: Bill?

2 DR. SHACK: I sort of agree that we  
3 shouldn't write a work in progress. You know, if  
4 we're going to have fundamental problems with things  
5 like using fixed values for Fussell-Vesely, you know,  
6 and the staff seems to be heading down that road, then  
7 you know, maybe we do need to write a letter if  
8 there's a consensus that that sort of detail is a show  
9 stopper. I just don't know.

10 I think we'll need some discussion among  
11 ourselves to kind of -- you know, if we looked at the  
12 staff questions on 00-04 and we've looked at our  
13 questions on 00-04 -- you know, suppose they did  
14 resolve all their concerns? Would that resolve all  
15 our concerns? I don't think all of Mario's concerns  
16 will be addressed. But then, I'm not -- you know,  
17 he's standing in front of a train here.

18 CHAIRMAN APOSTOLAKIS: Now when you say we  
19 discuss, today or at the full Committee?

20 DR. SHACK: Somehow in an informal caucus.  
21 You know, as to whether -- what issues are still open  
22 for us.

23 CHAIRMAN APOSTOLAKIS: With all the  
24 members?

25 DR. SHACK: I think with all the members.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 You know, it seems to me, for example, a lot of my  
2 concerns with the IDP sound as though, you know,  
3 that's in such a state of flux.

4 CHAIRMAN APOSTOLAKIS: It is in a state of  
5 flux.

6 DR. SHACK: That, you know, I don't see  
7 there's any point in saying anything about that. You  
8 know, the treatment of uncertainties and the use of  
9 fixed Fussell-Vesely values, you know, that I'm not  
10 sure is going to be addressed in any changes that I  
11 sort of foresee coming from -- and, you know, if we  
12 feel that's a show stopper, then --

13 CHAIRMAN APOSTOLAKIS: Okay.

14 DR. SHACK: -- we should fire off on that.  
15 But, you know, my inclination is that my big questions  
16 were on the IDP, and that seems to be in such a state  
17 of flux that I don't see any real point in writing a  
18 letter at this moment.

19 CHAIRMAN APOSTOLAKIS: Dana?

20 MR. PARRY: It seems that you pointed out  
21 a variety of areas where you thought there needed to  
22 be some developmental refinement of the technical  
23 foundations of the methods. And it seems to me that  
24 it would be useful to document those needs within a  
25 letter that says basically this process is going on

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 pretty well. And that what the staff and NEI are  
2 doing is a pretty good thing. That the technical  
3 foundations may need to be shored up and in these  
4 areas we think that it would be useful to shore them  
5 up and lay them out and whatnot, so that they're in  
6 front of people and people can act on them.

7 CHAIRMAN APOSTOLAKIS: So the way I  
8 understand what Dana proposed is, you know, write  
9 something that recognizes that things are in a state  
10 of flex and a lot of the concerns we raised are being  
11 addressed. But here are 1, 2, 3, 4, however many  
12 there are issues where we feel we have to express our  
13 views now for the benefit of both NEI and the staff as  
14 they work on this revision? I think that's what you  
15 said?

16 MR. PARRY: Yes.

17 CHAIRMAN APOSTOLAKIS: There are certain  
18 things we feel we should document at this stage. And  
19 we don't have to, you know, be exhaustive and say well  
20 we have a worry about the IDP, but that's being  
21 addressed.

22 DR. ROSEN: Well, I think that's the point  
23 that I would -- I mean, I could agree with Dana's  
24 suggestion, except that I wouldn't want a letter that  
25 we wrote now to be viewed by anybody as being

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 inclusive or exhaustive.

2 CHAIRMAN APOSTOLAKIS: No.

3 DR. ROSEN: Because there's lots of things  
4 that we talked about.

5 CHAIRMAN APOSTOLAKIS: And we can say  
6 that, yes.

7 DR. ROSEN: Including the IDP, etcetera  
8 that we -- there's no point going into a detailed  
9 discussion of it at this point until we see what they  
10 come back with.

11 MR. PARRY: I wouldn't want it to be  
12 viewed as exhaustive. Similarly, I wouldn't want  
13 people to look at the areas where technical  
14 foundations need to be shored up to say -- and you  
15 can't do anything without shoring these. I didn't  
16 hear anything that was so fundamental that -- in the  
17 area of technical foundations that without its  
18 resolution we were hamstrung. I saw it a matter of  
19 persuasion, a matter of convincing that the  
20 approximate solutions were correct. I didn't see it -  
21 - I didn't hear any of them that said and this is  
22 likely to be a fatal flaw in these approaches.

23 CHAIRMAN APOSTOLAKIS: That's true. I  
24 guess an element that at least I tried to bring up  
25 here is the element of rigor and public confidence.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 Okay. And a lot of the responses have been, yes, but  
2 this doesn't matter or, you know, this is okay. We  
3 tried it in one place and it worked. And I want to see  
4 a little bit more there. And I believe there is a  
5 disagreement or at least an initial disagreement or  
6 not willingness to go along by both the staff and the  
7 industry. And that's something that I would like to  
8 document.

9 MR. PARRY: Well, there is an element of  
10 public confidence that's going to have be confronted  
11 sooner or later, and it's the question of if you are  
12 a heart surgeon, do you want a grade C student. I  
13 mean, if you're a heart patient do you want a grade C  
14 student doing the heart surgery on you? And, you  
15 know, it is --

16 DR. ROSEN: I think the analogy is not  
17 entirely apt.

18 CHAIRMAN APOSTOLAKIS: I wouldn't want to  
19 challenge the analogy right now. But you were in the  
20 middle of something.

21 Okay. I would suggest --

22 MR. PARRY: I don't want to stand in front  
23 of a freight train.

24 CHAIRMAN APOSTOLAKIS: I would suggest  
25 that Dr. Kress has agreed to send me an email -- I'm

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1       sure he will send it to everyone here -- with his  
2       views as to what should be in the letter. I think  
3       he's working under the assumption that there will be  
4       a letter, but you know, we can always talk to him.  
5       And I would urge you to do the same. In fact, it is  
6       Steve and I who are working on this. So if you can  
7       send both of us some points that are along the lines  
8       of what we just said; that it will not be an all  
9       inclusive letter. It will not address everything. It  
10      will acknowledge up front that this is work in  
11      progress, but here are a few things that we feel we  
12      ought to document at this stage knowing full well that  
13      the staff and the industry are still working on this  
14      document.

15                So, please send those to us. And then  
16      Steve and I will think about drafting something,  
17      perhaps.

18                DR. ROSEN:     To bring to the full  
19      Committee?

20                CHAIRMAN APOSTOLAKIS: Of course, to bring  
21      to the full Committee. Okay?

22                And, again, I thank everyone for coming  
23      here and spending time with us.

24                And this meeting of the Subcommittee is  
25      adjourned.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 (Whereupon, at 12:52 p.m. the Subcommittee  
2 was adjourned.)  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)

CERTIFICATE

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

Name of Proceeding: ACRS Reliability and  
Probabalistic Risk Assessment  
Subcommittee

Docket Number: (Not Applicable)

Location: Rockville, Maryland

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.



Pippa Antonio  
Official Reporter  
Neal R. Gross & Co., Inc.