

NUCLEAR REGULATORY COMMISSION

ORIGINAL

Title: Advisory Committee on Reactor Safeguards
490th Meeting - OPEN SESSION

PROCESS USING ADAMS
TEMPLATE: ACRS/ACNW-005

Docket Number: (not applicable)

Location: Rockville, Maryland

Date: Thursday, March 7, 2002

Work Order No.: NRC-272

Pages 1-38/50-97/118-271

[Closed pps. 39-49/98-117]

NEAL R. GROSS AND CO., INC.
Court Reporters and Transcribers
1323 Rhode Island Avenue, N.W.
Washington, D.C. 20005

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

TROY

DISCLAIMER

UNITED STATES NUCLEAR REGULATORY COMMISSION'S
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

March 7, 2002

The contents of this transcript of the proceedings of the United States Nuclear Regulatory Commission's Advisory Committee on Reactor Safeguards, as reported herein, is a record of the discussions recorded at the meeting held on the above date.

This transcript has not been reviewed, corrected, and edited, and it may contain inaccuracies.

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
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
+ + + + +
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)
490TH MEETING
+ + + + +
THURSDAY,
MARCH 7, 2002
+ + + + +
ROCKVILLE, MARYLAND
+ + + + +

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

COMMITTEE MEMBERS PRESENT:

GEORGE E. APOSTOLAKIS	Chairman
MARIO V. BONACA	Vice Chairman
F. PETER FORD	Member
THOMAS S. KRESS	Member
DANA A. POWERS	Member
WILLIAM J. SHACK	Member
JOHN D. SIEBER	Member

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

ACRS STAFF PRESENT:

MAGGALEAN W. WESTON

PAUL A. BOEHNERT

SAM DURAISWAMY

SHER BAHADUR

CAROL A. HARRIS

JOHN T. LARKINS

MICHAEL T. MARKLEY

NEAL R. GROSS

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

I N D E X

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

<u>AGENDA ITEM</u>	<u>PAGE</u>
Opening Remarks by the ACRS Chairman	4
Clinton Nuclear Power Station Core Power	5
Uprate	
By Bill Bohlke	7
By Bill Specer	11
By Eric Schweitzer	32
By John Zwolinsky	78
By Ed Throm	93
By Bob Pettis	96
Proposed NEI 00-04, Option 2 Implementation	
Guideline for Risk-Information for Special	
Treatment Requirements of 10 CFR Part 50	
By Tony Pietrangelo	170
Arkansas Nuclear One, Unit 2 Core Power	
Uprate	
By John D. Sieber	180
By Craig Anderson	181
By Bryan Daiber	185
By Dale James	208
Adjourn	271

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

(8:33 a.m.)

CHAIRMAN APOSTOLAKIS: The meeting will now come to order.

This is the first day of the 490th meeting of the Advisory Committee on Reactor Safeguards. During today's meeting, the committee will consider the following: Clinton Nuclear Power Station Unit One Core Power Uprate; Proposed NEI 00-04, "Option 2 Implementation Guideline," for Risk-Informing the Special Treatment Requirements of 10 CFR Part 50; Arkansas Nuclear One, Unit 2 Core Power Uprate; and Proposed ACRS Reports.

Portions of the meeting may be closed to discuss GE Nuclear Energy and Westinghouse proprietary information. This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. Dr. John T. Larkins is the designated federal official for the initial portion of the meeting.

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

A transcript of portions of the meeting is being kept, and it is requested that the speakers use

NEAL R. GROSS

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

1 one of the microphones, identify themselves, and speak
2 with sufficient clarity and volume so that they can be
3 readily heard.

4 The first item on the agenda is the
5 Clinton Nuclear Power Station Core Power Uprate. Dr.
6 Powers is the cognizant member. Please.

7 MEMBER POWERS: A fact. Thank you, Mr.
8 Chairman.

9 We're going to discuss the Clinton power
10 uprate with both the applicant and the staff. There
11 is going to be episodic interruptions in the meeting
12 in order to close it to handle proprietary data, and
13 I'll beg the Chairman's indulgence for any extension
14 of the schedule that occurs because of that.

15 The Clinton power uprate is for BWR6.
16 We've certainly heard power uprates before, but this
17 is the first BWR6 we'll hear about. The uprate is
18 significant. It's overall 20 percent. It's taking
19 place, however, in two steps -- a seven percent, a 13
20 percent. It also involves a change in the fuel.

21 There was a subcommittee meeting dealing
22 with this subject, and some draft positions have been
23 taken -- developed by that subcommittee. What the
24 subcommittee found was that the licensee is, of
25 course, pursuing this power uprate under what has come

NEAL R. GROSS

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

1 to be called the ELTR1 and ELTR2 methodologies that
2 the staff have approved.

3 But, in fact, this is a constant power --
4 a constant pressure power uprate, and the details of
5 that methodology are still being reviewed by the
6 staff. As a consequence, the applicant will take
7 certain exceptions to the ELTR1 and ELTR2
8 methodologies, and I encourage the committee to pay
9 close attention to these exceptions.

10 At least one of the exceptions is the
11 familiar large transient testing that we've discussed
12 before. I'm disappointed Mr. Rosen is not here to
13 hear the discussion on that particular exception, but
14 there are other exceptions having to do with the
15 analyses. And I, again, suggest the committee pay
16 close attention to it.

17 The use of a constant pressure power
18 uprate converts the problem of power uprate from one
19 that's primarily from a hydraulic issue to one that's
20 much more neutronic flavor. There are, however, some
21 thermal hydraulic issues that you have to deal with,
22 even for a constant power -- constant pressure power
23 uprate, because you've got to have increased flow
24 someplace in this system.

25 And, of course, that flow takes -- those

NEAL R. GROSS

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

1 increases in flow take place in the feedwater and the
2 steam flow, and that raises some issues of flow-
3 assisted corrosion in some of the piping systems.
4 And, indeed, we have issues of flow-assisted corrosion
5 in this particular unit, and I encourage the committee
6 to pay close attention to those particular issues.

7 The applicant and the staff, of course,
8 think they have this issue well under control through
9 a combination of modeling and monitoring. There is a
10 history in the nuclear industry of these methods not
11 working, with some substantial consequences. So it's
12 worth paying attention to that.

13 With that introduction, I will turn to Mr.
14 Bill Bohlke from the applicant to begin the discussion
15 of their proposed extended power uprate for the
16 Clinton Power Station Unit Number 1.

17 MR. BOHLKE: Thank you. Good morning, Mr.
18 Chairman, and members of the committee. I'm Bill
19 Bohlke, Senior Vice President of Nuclear Services for
20 Exelon Generation.

21 I just thought I'd spend a minute or so
22 giving you the background on AmerGen, which is a
23 company that you may not be particularly familiar
24 with.

25 MEMBER POWERS: True.

NEAL R. GROSS

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

1 increases in flow take place in the feedwater and the
2 steam flow, and that raises some issues of flow-
3 assisted corrosion in some of the piping systems.
4 And, indeed, we have issues of flow-assisted corrosion
5 in this particular unit, and I encourage the committee
6 to pay close attention to those particular issues.

7 The applicant and the staff, of course,
8 think they have this issue well under control through
9 a combination of modeling and monitoring. There is a
10 history in the nuclear industry of these methods not
11 working, with some substantial consequences. So it's
12 worth paying attention to that.

13 With that introduction, I will turn to Mr.
14 Bill Bohlke from the applicant to begin the discussion
15 of their proposed extended power uprate for the
16 Clinton Power Station Unit Number 1.

17 MR. BOHLKE: Thank you. Good morning, Mr.
18 Chairman, and members of the committee. I'm Bill
19 Bohlke, Senior Vice President of Nuclear Services for
20 Exelon Generation.

21 I just thought I'd spend a minute or so
22 giving you the background on AmerGen, which is a
23 company that you may not be particularly familiar
24 with.

25 MEMBER POWERS: True.

NEAL R. GROSS

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

1 MR. BOHLKE: AmerGen is co-owned by
2 British Energy and Exelon. When it was recently
3 formed, it was co-owned by British Energy and PECO.
4 But with the Comed and PECO merger, Exelon assumed the
5 original PECO share. So that's the ownership, and
6 AmerGen is, in fact, the licensee.

7 Operationally, Clinton is part of the
8 Midwest Regional Operating Group, just as Oyster Creek
9 and TMI are parts of the Mid-Atlantic Regional
10 Operating Group. What that means is we share a Chief
11 Nuclear Officer, who last week became Jack Scolds who
12 succeeded Oliver Kingsley who is now our head of
13 generation.

14 And specifically, in the Midwest, the
15 executive direction and corporate oversight for the
16 Clinton station is executed by the Midwest ROG out of
17 Warrenville, Illinois.

18 The staffing for Clinton, similar to the
19 staffing for the other two AmerGen units, is a
20 combination of Exelon employees and AmerGen employees.
21 Those AmerGen employees have various heritages
22 depending upon the utility from which they came. In
23 fact, the station leadership at Clinton currently
24 consists of a site vice president, plant manager, site
25 engineering director, site operations director, and

NEAL R. GROSS

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

1 training manager, all of whom are Exelon Nuclear
2 employees.

3 So we also use Exelon policies, Exelon
4 programs and processes, down to a level where we want
5 station or unit individuality as opposed to common or
6 standardized processes, so that many of the
7 organizational structure and management approaches for
8 Clinton are the Exelon approaches. And the technical
9 approaches, including the technical approaches
10 embodied in this request for power increase, is
11 derived from the Exelon approach.

12 Specifically, this is a fourth boiling
13 water reactor station in Illinois that we've subjected
14 to this. LaSalle was the first one, and you reviewed
15 that in either late '99 or early 2000. And then, of
16 course, last fall you heard the presentation on the
17 Dresden and Quad Cities power uprates.

18 Dresden 2, in fact, has been uprated and
19 is operating at 912 megawatts, which is its generator
20 limit. That startup and testing went extremely
21 smoothly. Quad Cities 2 has just completed its outage
22 and is at about 40 percent power this morning going --
23 undergoing its testing. And so far so good on that
24 one also. So Clinton will be the fourth in a series
25 of that.

NEAL R. GROSS

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

1 To try to achieve continuity, the project
2 manager for the Clinton power uprate was, in fact,
3 project manager for the LaSalle power uprate. Some of
4 the technical people are the same. You probably
5 recognize some of them. So what we do is we allow
6 ourselves to benefit from the lessons learned and move
7 it on down the line, so that every project has a
8 benefit of its predecessor.

9 And so what we'll see is, when we do the
10 startup testing for Clinton, it's subject to the
11 granting of the power uprate license. We'll have
12 startup testing personnel who have worked at Dresden
13 or Quad or LaSalle previously, so that we'll have that
14 lessons learned. We think that's a real strength of
15 the program.

16 So that's the extent of my introductory
17 remarks. I did want to set the stage for that, and
18 now let me introduce Dale Spencer, who is the Project
19 Manager for the Clinton extended power uprate.

20 Thank you.

21 MEMBER POWERS: Mr. Bohlke, I appreciate
22 your giving us that introduction to this company. We
23 see the name all the time, but we really don't know
24 too much about it.

25 MR. BOHLKE: You're quite welcome.

NEAL R. GROSS

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

1 MR. SPENCER: Thank you, Bill. Good
2 morning.

3 Dale Spencer, Exelon Nuclear, Project
4 Manager for the Clinton Unit 1 extended power uprate.
5 Over the next hour, our experts will be providing a
6 summary of the EPU project, including the
7 modifications, the analyses performed, and our plans
8 for implementation. Presentation material has been
9 chosen based on the agenda that been provided to us by
10 the ACRS.

11 As we discussed previously, portions of
12 our material are proprietary to the General Electric
13 Company, and we'll ask that a portion of the meeting
14 be closed. We have grouped the information that's
15 proprietary together, so we can minimize
16 interruptions.

17 MEMBER POWERS: If you will just indicate
18 to me when you need to close it --

19 MR. SPENCER: Yes, sir, we will.

20 MEMBER POWERS: -- we will go through
21 whatever machinations we have to.

22 MR. SPENCER: Yes. Yes, sir, we will.

23 As an introduction, I want to first spend
24 a few minutes and provide a summary of the overall EPU
25 project, and then I'll follow by an overview of the

NEAL R. GROSS

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

1 modifications and analyses that we have performed.

2 We're requesting a license for a 20
3 percent increase in reactor power. We use the GE
4 standard EPU process as the guide for our analyses and
5 the schedule. These GE processes, as you know, have
6 been used for a number of extended and stretch power
7 uprates in the industry, both domestically and abroad.

8 We'll be performing modifications to the
9 plant to facilitate power ascension, and I'll cover
10 these in more detail in a couple of slides. And these
11 modifications will be installed between now and early
12 2004.

13 Of these modifications, we'll show that
14 we're making relatively few changes to the operation
15 of safety systems. Our plans are to implement the
16 power ascension in two steps. The first step will be
17 -- take place when we start up this May after our
18 refueling outage.

19 MEMBER POWERS: Let me ask a question.
20 You make a point that you're making relatively few
21 changes to the safety system. Am I supposed to derive
22 comfort from that?

23 MR. SPENCER: Yes.

24 MEMBER POWERS: Why?

25 MR. SPENCER: Essentially, our analyses

NEAL R. GROSS

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

1 have shown that the modifications to the plant and the
2 limits to the plant post uprate will be on the BOP
3 side. Our changes are essentially, as I'll get into
4 in the next slide, the nuclear instrumentation that
5 we're going into. Other plants have gotten into
6 modifications in other areas, and with the BWR6 we
7 have found that this is not the need. And this is a
8 plus.

9 MEMBER POWERS: I mean, what you're
10 essentially saying is that your safety systems have
11 enough margin to handle the additional 20 percent.

12 MR. SPENCER: Absolutely.

13 MEMBER POWERS: Okay. But, clearly,
14 you're reducing the margins you have in those systems.

15 MR. SPENCER: Yes, absolutely.

16 MEMBER POWERS: And somehow that's
17 acceptable.

18 MR. SPENCER: Yes, it is.

19 We talked about our first step for our
20 license, for our power ascension in May of this year.
21 And the second step of our power ascension will take
22 place after our ninth outage, and that's scheduled for
23 early 2004.

24 On the next slide is a simple graph of the
25 power-to-flow map at EPU conditions. For clarity, in

NEAL R. GROSS

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

1 the upper right-hand corner, the gold area, is the EPU
2 operating region. Simply, as we stated in the
3 subcommittee, we're increasing power along the
4 previously licensed MELLLA flow control line.

5 Other plants that have licensed the
6 extended power uprate have licensed the MELLLA as part
7 of their EPU process. In the case of Clinton, this
8 has already been licensed, so we are not changing any
9 of the flow control line in our power uprate.

10 MEMBER KRESS: The axis is 100 percent of
11 what? The core flow is for what -- percent of what?
12 I mean, core power -- core flow. Is that 100 percent
13 of what?

14 MEMBER POWERS: It's both. I mean, the
15 question applies to both.

16 MEMBER KRESS: Yes. What are the units on
17 your --

18 MR. SPENCER: The axis on the power is the
19 100 percent of uprated reactor power, in the top of
20 the graph right here, the 3473.

21 MEMBER KRESS: Okay. So that's the full
22 new uprated power.

23 MR. SPENCER: Yes, sir.

24 MEMBER KRESS: What's the one on the
25 bottom?

NEAL R. GROSS

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

1 MR. SPENCER: The one on the bottom is the
2 core flow. The core flow is not changing. The core
3 flow is based on the capability of the recirc system.
4 So we will need to --

5 MEMBER KRESS: So when you go up to 110
6 percent almost there, what does that mean?

7 MR. SPENCER: I'm sorry. Which --

8 MEMBER KRESS: Well, at the --

9 MR. SPENCER: Are you looking right in
10 here?

11 MEMBER KRESS: No. Looking at the yellow
12 part.

13 MEMBER SHACK: The X axis.

14 MEMBER KRESS: The X axis, and looking
15 there. That's like 109 percent or something.

16 MR. SPENCER: Oh. This is the ICF, the
17 increased core flow region. This is previously
18 licensed on --

19 MEMBER KRESS: This is the previously
20 licensed core flow.

21 MR. SPENCER: Yes, sir.

22 MEMBER KRESS: There's a maximum core flow
23 in your license?

24 MR. SPENCER: Yes, sir.

25 MEMBER KRESS: I see.

NEAL R. GROSS

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

1 MR. SPENCER: This was our license as we
2 have it right now, and it's in the same X axis, if you
3 can see on the graph.

4 MEMBER KRESS: The dotted line is --

5 MR. SPENCER: Yes.

6 MEMBER KRESS: It goes all the way up to
7 108 percent?

8 MR. SPENCER: In core flow, that's
9 correct.

10 MEMBER KRESS: Okay.

11 MR. SPENCER: You know, that's actually
12 107, I believe.

13 MEMBER KRESS: Is there any reason why you
14 can't use that little triangle up at the top?

15 MR. SPENCER: That's basically the
16 capability of the recirc system.

17 MEMBER KRESS: Okay. You would have to
18 change out your jet pumps to --

19 MR. SPENCER: That would be a pretty
20 significant change. Yes, sir, that's correct.

21 On the next slide, I just have a brief
22 summary of the change in plant conditions graphically.
23 Briefly, the increase in steam flow is accomplished by
24 replacement of the high pressure turbine, and, thus,
25 no changes in the reactor steam dome pressure is

NEAL R. GROSS

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

1 needed. And we discussed this at the opening of the
2 meeting.

3 I'd like to spend just a few minutes going
4 over some of the modifications we'll be performing.
5 As we stated in our uprate safety analysis report, no
6 safety-related hardware changes will be required to
7 implement the EPU at Clinton.

8 Upon issuance of the revised operating
9 license, we're going to perform changes to nuclear
10 instrumentation which will allow us to increase our
11 output. These set point changes include the APRM, the
12 flow bias, both the SCRAM and the rod block, the main
13 steam line group 1 isolation, the control and stop
14 valve and recirc pump trip bypasses, and the low power
15 and high power set points on the control rod block
16 pattern controller.

17 Proceeding to the modifications we'll be
18 performing on the BOP side of the plant, as I talked
19 previously, we're going to be implementing our power
20 ascension in two steps. During our upcoming refueling
21 outage, we'll be replacing the high pressure turbine.
22 We'll be replacing the main power transformers, as
23 well as associated changes to the isolated phase bus
24 duct configuration and cooling.

25 The main generator hydrogen coolers will

NEAL R. GROSS

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

1 be replaced, and we'll increase the hydrogen pressure
2 in the generator from the current 60 to 75 pounds.
3 The exciter anode transformer will be replaced, and
4 we'll be upgrading five supports associated with the
5 feedwater system, all of which will allow us to
6 achieve the additional 80 plus megawatts for the next
7 operating cycle.

8 MEMBER POWERS: When you make changes in
9 your hydrogen system, changes in transformers, how do
10 you affect the risk of fire-initiated accidents in
11 your plant?

12 MR. SPENCER: The fire-initiated accidents
13 were analyzed, and we are going to be discussing some
14 of the risk from all of the risk factors a little bit
15 later in the presentation. I believe Bill Burchill is
16 going to get into that at some later time. Can we
17 discuss that then, or would you like to --

18 MEMBER POWERS: That would be fine.

19 MR. SPENCER: Okay. And that is part of
20 our presentation material at a later time.

21 Proceeding on, to ensure we get the full
22 potential from our uprate, we'll be performing
23 additional modifications to -- and I call them BOP
24 efficiency improvements in the future. These are
25 targeted to be installed either online or during the

NEAL R. GROSS

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

1 ninth refueling outage to facilitate future power
2 increases. And since these are a little bit down the
3 road, these modifications are in the scoping stage,
4 and I'm just going to provide a conceptual overview
5 right now.

6 Improvements will be made to the condenser
7 to perform at a higher efficiency. Improvements will
8 be made to allow condensate polisher stop rate and
9 balanced flow configuration at the higher condensate
10 flows we expected. Moisture separator reheat Chevrons
11 will be replaced to improve the MSR, and that goes
12 forth to the plant efficiency.

13 Changes will be made to the breakers,
14 conductors, relay schemes associated with the
15 switchyard to allow the increased megawatts electric
16 and MVA output of the plant. Improvements to the
17 exciter plan, which will allow the plant to run at the
18 full capability of the generator. And we do foresee
19 future improvements in the cooling capability of the
20 bus duct cooling.

21 MEMBER FORD: Can you just elaborate on
22 the --

23 CHAIRMAN APOSTOLAKIS: Microphone.

24 MEMBER FORD: Could you elaborate on the
25 main condenser improvements? What are they, and why

NEAL R. GROSS

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

1 are they being made?

2 MR. SPENCER: Okay. These are changes
3 that we're going to make in our ninth refueling
4 outage, which is currently scheduled for early 2004.
5 And I'll preface it with the fact that we're doing
6 conceptual studies, and this is not finalized at this
7 time.

8 The most -- I'll say the most front
9 runners we have right now are changes in online
10 cleaning system and making sure that we're using the
11 condenser to its full capability, not having any air
12 entrained in the condenser. Essentially, making sure
13 we run it at its highest efficiency.

14 MEMBER FORD: With the increased steam
15 flow, are you not expecting vibration problems in the
16 condenser --

17 MR. SPENCER: We have --

18 MEMBER FORD: -- with the current design?

19 MR. SPENCER: We have performed analyses
20 of the condenser tubes. We are -- obviously, we are
21 putting more steam flow in. We have analyzed this to
22 be acceptable.

23 MEMBER FORD: Was there any basis for
24 saying that? I mean, is it based on analysis, or
25 other plants' experience? I guess these are GE

NEAL R. GROSS

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

1 turbines, and there's plenty of other GE turbines with
2 the same design out there.

3 MR. SPENCER: Sure. And --

4 MEMBER FORD: Are there any with the same
5 flow rate, the increased flow rates, to draw on?

6 MR. SPENCER: For our analysis, we used a
7 specialty vendor who does this kind of work in several
8 locations, and every condenser is just a little bit
9 different. There is a mix between analytical
10 techniques and actual industry experience that he
11 factors into his work. We also do routinely monitor
12 the performance and perform inspections on equipment,
13 even down to the condenser stage in our plant. And
14 that's an ongoing type evaluation.

15 We'll continue to do these inspections
16 even post uprate and continually monitor the
17 performance of all of our plant equipment.

18 MEMBER FORD: Okay. So these improvements
19 aren't necessarily related to increased steam flow,
20 the EPU. It's just -- you just want to increase the
21 efficiency. It's got nothing at all to do with --
22 it's not driven by the fact that you've got increased
23 steam flow.

24 MR. SPENCER: At the current efficiency of
25 the condenser, it's not -- we're not going to be able

NEAL R. GROSS

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

1 to get a whole lot extra out of the condenser, unless
2 we do something to it. So it is a little bit of both.

3 MEMBER FORD: Okay. Thank you.

4 MR. SPENCER: So I'd like to change the
5 focus just a little bit here, and I want to
6 concentrate on some of the analyses and evaluations
7 that we've performed in support of EPU. Listed on the
8 slide are the specific subjects for which we have
9 prepared presentation material and our experts will be
10 talking.

11 As I stated previously, we have chosen the
12 subjects based on the agenda provided us to the ACRS.
13 So at this time, I'd like to introduce Fran Bolger of
14 General Electric, who will discuss the core and fuels
15 analyses.

16 MR. BOLGER: Morning. I'd like to discuss
17 some of the details of the core fuel analysis that
18 have been performed. As part of the power uprate,
19 there was an equilibrium core analysis, which did
20 demonstrate a full extended power uprate power, that
21 the core was able to provide the desired energy and
22 have adequate thermal margins.

23 I'd like to discuss some of the details of
24 the actual core design which was performed for
25 Cycle 9. Cycle 9 is the first step in the two-step

NEAL R. GROSS

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

1 process that was previously described.

2 Next slide.

3 To the left, there is a -- this is a
4 picture of the core design for Cycle 9. What you see
5 are the color -- these shaded bundles are the fresh
6 core, the fresh bundles in the core. Up here on the
7 top you see the locations. And the I and J location,
8 we'll be talking a little bit about those.

9 Looking at the core design map, you'll
10 notice a value in the center of each square, and
11 that's the bundle exposure, megawatt days per shore
12 ton. The zero indicates that it's a fresh bundle.

13 The value here on the bottom, which you
14 can't see very well, that correlates to a bundle type
15 used in the simulator. This core was analyzed with
16 the PANACEA 3D simulator, and that relates to this
17 value here called IAT down here on the bottom.

18 If you look on the bottom, you'll see the
19 bundles that are loaded in this core. The top bundle
20 is a two cycle depleted bundle, which is a GE10 type
21 fuel, which is eight by eight design. The next two
22 bundles are one cycle depleted bundles, which are GE14
23 type. And the last two are the fresh fuel, which are
24 also GE14 type.

25 If you look, you'll -- if you look on this

NEAL R. GROSS

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

1 bundle name, you'll see these numbers here. These
2 indicate what the bundle average enrichment is for the
3 bundle. There is 268 fresh bundles being loaded,
4 which is a fairly large bag size. These values here
5 are the batch average exposures for the fresh bundles
6 at beginning of cycle.

7 Over here on the right is a batch average
8 radial peaking. These values are actually rounded two
9 points past the decimal.

10 What I'd like to do now is talk a little
11 bit about -- a question?

12 VICE CHAIRMAN BONACA: Just G14, what is
13 it, a 10 by 10, 11 by 11?

14 MR. BOLGER: G14 is a 10 by 10 design.

15 VICE CHAIRMAN BONACA: 10 by 10.

16 MR. BOLGER: I'd like to talk now about
17 some of the results -- the key results in the core
18 design, cycle design analysis. Over here on the right
19 you see this column here, which is the cycle exposure,
20 and this is measured in megawatt days per shore ton.
21 And you see the core is designed with various steps
22 through the cycle, and each one of these steps has a
23 different control rod pattern.

24 For example, you see here this is the
25 control rod pattern at the beginning of cycle. You

NEAL R. GROSS

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

1 see the rod positions shown here on the map. The red
2 boxes are actually the controlled cell locations.

3 The next column is the critical Eiger
4 value. When a core is designed, a target critical
5 Eiger value is developed through the cycle, and this
6 target is developed based on previous cycle experience
7 with that plant. It's based on other plants with a
8 similar fuel design and size, and also based on the
9 fuel design characteristics.

10 The next column is a -- is for this
11 depletion, the core flow as a function of exposure.
12 If you look at the core flow, you'll notice that some
13 of the core flow values are below what was on that top
14 corner of the power flow map previously shown. The
15 minimum core flow at full EPU is 99 percent, but this
16 is lower than that because this depletion is actually
17 about 90 percent of full EPU power.

18 The next column is the ratio of the
19 operating limit, minimum critical power ratio -- I'll
20 call it MCPR -- to the calculated MCPR. When a core
21 is designed, you try to achieve sufficient MCPR margin
22 so that the core will operate when it is actually
23 monitored in the plant. You design the core typically
24 with about seven percent MCPR margin.

25 In this case, this core -- the maximum is

NEAL R. GROSS

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

1 about .9, and so there is a little bit of margin
2 relative to what typically would be the target of
3 about .93. So there is actually a little bit
4 additional margin, and this core could probably
5 operate at a little bit higher power.

6 These values in parentheses over on the
7 right of the MCPR margin is the location of the
8 limiting bundle, and those values correspond to these
9 locations on this I and J location over here on the
10 core map. And you see the limiting location does move
11 around in the core.

12 The next column is the ratio of the
13 calculated peak rod LHGR relative over the LHGR limit.
14 And in this case these locations are the I and J
15 location as described over here, but also this right-
16 most is the axial location. The core is designed with
17 25 axial nodes. So, for example, you see over here
18 node 4 is toward the bottom corner of the core.

19 MEMBER POWERS: You said that the core was
20 designed with 25 axial nodes. Do you really mean it
21 was analyzed with 25 axial nodes?

22 MR. BOLGER: Yes, that's correct. The
23 core was analyzed with 25 axial nodes.

24 The right -- this column here is the ratio
25 of the average planar linear heat generation rate to

NEAL R. GROSS

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

1 the average planar linear heat generation rate limit.
2 And this is where the LOCA limits are factored in.

3 The right-most column is the core average
4 axial power shape peak value, and what you see here is
5 the value for the core average peak and the node. For
6 example, node 10 is toward the center of the core.
7 You'll notice that the core peak for most of the time
8 in the cycle is toward the bottom of the core. And as
9 you get down toward the end of the cycle, the power
10 shade moves up to the top.

11 The BWR will naturally try to peak to the
12 bottom because of the voids -- the voids in the core.
13 The core -- this core, as shown, has -- provides the
14 desired energy and has adequate MCPDR and LHGR margin.

15 Next slide, please.

16 What I'm showing here is -- this is the
17 same core design as you saw on the previous slide at
18 beginning of cycle. This is just to show what you
19 would get if you depleted the same core with the same
20 control rod patterns at a lower reactor power -- in
21 this case, about a seven percent lower reactor power.

22 You'll see, if you compare the two pages,
23 that the critical Eiger value is slightly higher,
24 because it's at a lower void fraction. The thermal
25 limits are lower because -- obviously, because the

NEAL R. GROSS

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

1 core is at a lower core thermal power.

2 And you'll also see that the power shape
3 has shifted up somewhat, because the core is at a
4 higher void fraction. That allows the power shape to
5 move somewhat.

6 If this were an actual design in this
7 case, there is more than adequate MCPR and LHGR
8 margin. So you would -- the designer would try to
9 take advantage of that additional margin. And we'd
10 try to reduce bundles. We would try to move some of
11 the bundles towards the center to try and improve the
12 efficiency of the core. The designer might try to
13 simplify the operating rod patterns to give more
14 flexibility to the site.

15 So the designer will actually try to
16 target the same margins to limits at the power level
17 that it is being designed to.

18 Next slide, please.

19 MEMBER POWERS: Might I ask you one
20 question on this? Your axial power peak moves fairly
21 continuously through this. But there's a
22 discontinuity in the node where you have your axial
23 peak power. That occurs around an exposure of 11,500.
24 Why does that discontinuity occur?

25 MR. BOLGER: Right here you see the power

NEAL R. GROSS

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

1 shape moving -- moves -- starts moving up to the top.
2 You'll also -- I can't tell you exactly, but you'll
3 notice that the actual peak is -- the value of the
4 peak is not very different. It could be that the
5 power shapes are -- have a double peak or a fairly
6 flat distribution, and just a very small variation in
7 the power shape will shift it up to the top.

8 MEMBER POWERS: So this is more a
9 numerical thing than it is --

10 MR. BOLGER: Yes.

11 MEMBER POWERS: -- a real discontinuity in
12 the core performance.

13 MR. BOLGER: Yes.

14 Next slide.

15 In summary, the equilibrium core design
16 that was analyzed for the EPU, and also the Cycle 9
17 design, has adequate margin.

18 Any questions? I'd like to -- the next
19 presenter is Eric Schweitzer from AmerGen, who will
20 present the containment analysis.

21 MEMBER POWERS: Maybe before you depart,
22 I'll just ask you one question. The fuel exposures
23 that you've shown in these two analyses are relatively
24 modest. If I ask you about Cycles 10, 11, and 12,
25 what kinds of fuel exposures do you anticipate taking

NEAL R. GROSS

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

1 fuel to?

2 MR. BOLGER: You know, I don't -- I can
3 just answer you generally.

4 MEMBER POWERS: Yes, a general answer is
5 fine.

6 MR. BOLGER: You know, the fact that the
7 batch size is fairly large means that the two cycle
8 depleted bundles are -- it's not a full batch, and
9 it's -- you wouldn't expect it to go to a three cycle
10 depleted bundle. So the fuel will be depleted -- will
11 be discharged after its second cycle. And the two
12 cycle depleted bundles are primarily on the periphery.

13 So from a batch average standpoint, the
14 batch has not a significantly different batch
15 discharge than you would have if it were depleted at
16 the current rate of power, just because the batch size
17 would be lower and it would be possible to have a
18 larger percentage of the batch loaded in the internal
19 part of the core on the -- on its third cycle.

20 MEMBER POWERS: Can you give me a number?

21 MR. BOLGER: I don't have the value with
22 me.

23 MEMBER POWERS: It sounds like you're
24 going to discharge something a little over 30.

25 MR. BOLGER: I have a picture of the end

NEAL R. GROSS

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

1 of cycle exposure map. It may be around slide 30 or
2 so of the backups. Actually, you're interested more
3 on the -- even the further on cycles.

4 MEMBER POWERS: I'm really interested in
5 the --

6 MR. BOHLKE: Dr. Powers, let me see if I
7 can -- if I recall correctly -- this is Bill Bohlke
8 from Exelon. We won't have any burnups over 50,000
9 megawatt days per ton.

10 MEMBER POWERS: That's what it sounded
11 like. Thank you. That's all the more precision I
12 needed.

13 VICE CHAIRMAN BONACA: Just have a
14 question regarding the cycle length. What is the
15 cycle length of Cycle 9?

16 MR. BOLGER: The cycle length for Cycle 9
17 is a 21-month cycle.

18 VICE CHAIRMAN BONACA: And the following
19 cycles, are they planning the same cycle length or --

20 MR. BOLGER: Maybe Exelon would like to
21 discuss that.

22 MR. SPENCER: Future cycle lengths.

23 MR. SCHWEITZER: Your question was, what
24 is the future cycle lengths?

25 VICE CHAIRMAN BONACA: Yes. Are you going

NEAL R. GROSS

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

1 to stay at a 21-month cycle or --

2 MR. SCHWEITZER: Exelon does plan to
3 transition to 24-month cycles, and there will be a
4 future license amendment submittal for that.

5 VICE CHAIRMAN BONACA: Any idea now how
6 that would change some of this neutronics here? What
7 you just showed us?

8 MR. BOLGER: With -- go back to the
9 previous slide. There is a -- for a 24-month cycle,
10 there is a little margin for a higher enrichment.
11 These bundles have not been designed to the maximum
12 enrichment capability. So they can probably go to
13 about the 415 level, and that will provide some
14 additional energy for a 24-month cycle.

15 There is a benefit in having higher
16 enrichment bundles in preceding cycles. They will
17 carry more of the load as they get down into further
18 cycles. So as you have higher enrichment
19 transitioning, that will help you to create such a
20 core design. And there is still a little bit of room
21 to add a little more fuel, so it'll be challenging but
22 the capability exists to do that.

23 VICE CHAIRMAN BONACA: Thank you.

24 MR. SCHWEITZER: My name is Eric
25 Schweitzer from AmerGen, and I'd like to present the

NEAL R. GROSS

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

1 Clinton MARK III containment analysis.

2 To evaluate the containment for extended
3 power uprate, we followed the established method for
4 containment analysis in ELTR1. The limiting events
5 that were analyzed were the main steam line break, the
6 recirculation suction line break, and the alternate
7 shutdown cooling.

8 The next slide shows a summary of the
9 results. This table shows the drywell and containment
10 pressures and temperatures and the suppression pool
11 temperature following the analyzed events. The first
12 column of values on the left are the original analysis
13 in the Clinton updated safety analysis report.

14 The second column of values are the
15 comparison benchmark cases, which used the EPU methods
16 with the original licensed power. The third column of
17 values are the EPU results, and the last column shows
18 the design basis.

19 Comparing the first and second columns
20 shows the effect of the change in methodology. And
21 comparing the second and third columns shows the
22 effect of EPU, which is relatively minor with no
23 vessel pressure change. Comparing the third and
24 fourth columns shows the margins to the limits.

25 I'd like to point out that all remain

NEAL R. GROSS

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

1 below the design limit with the exception of the
2 drywell temperature. This value is above the design
3 temperature of 330 degrees for less than .5 seconds.
4 This has been evaluated as acceptable, because there
5 is insufficient time to heat up the structure.

6 In conclusion, these results show
7 acceptable performance for the containment in EPU.

8 MEMBER FORD: Could I ask a question?
9 This is more for clarification. This seems fine,
10 assuming that a containment maintains its original
11 integrity. Now, I'm out of my depth here, but that's
12 a big assumption, isn't it? That the containment
13 maintains its original design integrity. Could you
14 not have degradation of that integrity?

15 MR. SCHWEITZER: The containment is tested
16 on a periodic basis, leak rate tested, and so it's
17 maintained.

18 MEMBER FORD: So corrosion of rebar, for
19 instance, that would be detected?

20 MR. SCHWEITZER: The leakage would
21 definitely be detected, if that would cause any
22 leakage, but the strength of the materials would not
23 be expected to be changed outside its design margins.

24 MEMBER FORD: I know this is a topic that
25 can be -- probably go into the -- a revised version of

NEAL R. GROSS

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

1 GALL. But you're taking as right that the monitoring
2 programs you have regarding the containment integrity
3 are adequate.

4 MR. BOHLKE: Dr. Kress, let me -- excuse
5 me. Dr. Ford, let me answer that. First of all, it's
6 a steel containment.

7 MEMBER FORD: It's a steel containment.

8 MR. BOHLKE: And it's accessible. It's go
9 ta shield going around it, so it's accessible for
10 inspections and it does have the periodic leak rate
11 test --

12 MEMBER FORD: So it's rather like Oyster
13 Creek.

14 MR. BOHLKE: -- of the penetrations and
15 the shell as a whole. So it's pretty robust, and it's
16 pretty inspectable. We don't -- we have been doing
17 containment ISI inspections on other plants in the
18 fleet, and the extent of corrosion that we found after
19 as much as 30 years of operation at Dresden and Quad
20 Cities, for example, is pretty minimal. But, in fact,
21 there is an inspection program as part of our
22 requirements.

23 MEMBER FORD: The reason why I bring up
24 the question is I never hear this topic mentioned, and
25 yet I remember when I was employed by General Electric

NEAL R. GROSS

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

1 that we were concerned about corrosion at Oyster Creek
2 of the containment.

3 MR. BOHLKE: That's right. Exactly.

4 MEMBER FORD: And I have never heard
5 anything along these lines mentioned since, and this
6 is why I just bring the question up. As I say, it's
7 more for my information. Are we kind of opening up a
8 potential there for --

9 MR. BOHLKE: No. We think we're okay
10 because we have a program which specifically focuses
11 on that.

12 MEMBER FORD: Fine. Okay. Good.

13 MEMBER POWERS: I'm a little surprised
14 that the applicant didn't bring to your attention that
15 in establishing these limits that they take a certain
16 amount of corrosion and degradation into account. I
17 mean, there is a margin built into them for those
18 reasons.

19 MEMBER FORD: Yes. A concern -- my
20 concern is that whenever you look at these corrosion
21 allowances they are almost going to be picked out of
22 the air.

23 MEMBER POWERS: They are, and they are
24 minuscule compared to what you saw at Oyster Creek.

25 MEMBER FORD: Correct. Correct.

NEAL R. GROSS

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

1 MR. BYAM: Good morning. I'm Tim Byam
2 with AmerGen. The next part of our presentation will
3 address the exceptions that we've taken to the
4 requirements specified in the extended power uprate
5 licensing topical reports. That is, ELTR1 and ELTR2.

6 This portion of our presentation does
7 contain General Electric company proprietary
8 information, and we, therefore, ask that the meeting
9 be closed at this point.

10 MEMBER POWERS: Okay. There will be a
11 little interruption while we go through our steps
12 here.

13 MR. STROMQUIST: This is Eric Stromquist
14 from General Electric. I'd kindly ask that Mr.
15 Wilson, Mr. Huff, and Mr. Moss leave.

16 MEMBER POWERS: You will switch to --

17 CHAIRMAN APOSTOLAKIS: You have to speak
18 in the microphone.

19 MR. STROMQUIST: I'm sorry.

20 MEMBER POWERS: I don't know for this
21 step, but we need to -- no, I don't think this is --
22 we should be switching at this point.

23 MR. STROMQUIST: This is Eric Stromquist
24 with General Electric. All persons are acceptable in
25 the room now.

NEAL R. GROSS

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

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

MEMBER POWERS: Thank you.

(Whereupon, the proceedings went
immediately into Closed Session.)

1 CHAIRMAN APOSTOLAKIS: Okay. Proceed.

2 MR. BYAM: Kent Scott will now continue
3 with our presentation on the anticipated transient
4 without SCRAM event response.

5 MR. SCOTT: Thanks, Tim.

6 Now I would like to discuss the response
7 of the plant to an ATWS at uprated conditions. First,
8 we found our response as operators to an ATWS remains
9 unchanged. For example, when we lower reactor water
10 level to reduce subcooling and trip the reactor
11 recirculation pumps, we find the plant operating at
12 the same power-to-flow conditions as pre-EPU.

13 This is due to the fact that the plant is
14 currently licensed and operating under the maximum
15 extended operating domain analysis. This is the
16 MELLLA analysis with increased core flow that Dale
17 spoke of earlier.

18 Since we already operate at these extended
19 load lines, the plant reacts the same, simply moving
20 down the existing load line on recirculation pump
21 trips. Also, the symptoms we must observe as
22 operators to detect an ATWS remains unchanged.

23 And, finally, our actions to mitigate an
24 ATWS remain unchanged for controlling reactor power,
25 reactor level, and reactor pressure.

NEAL R. GROSS

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

1 MEMBER KRESS: But do you have to change
2 how far you lower the water level into the core?

3 MR. SCOTT: No. We haven't changed -- we
4 still lower level to the same values. We train on the
5 same bands that we lowered the level to reduce
6 subcooling. So that did not change at all.

7 VICE CHAIRMAN BONACA: The time for you to
8 take action, however, has been reduced, right?

9 MR. SCOTT: And the analysis that Bill
10 Burchill is going to talk about a little bit later
11 about probabilistic risk assessment talks about those
12 times. Those times are well within the capabilities
13 of the operators to perform. The sequence of the
14 actions we take are the same. The required times do
15 reduce, but they are well within the capabilities of
16 the operators. We're trained to do that, and I fully
17 expect everybody to be --

18 VICE CHAIRMAN BONACA: Could you tell me
19 what the times are? I mean, just for information.

20 MR. SCOTT: And Bill may be able to help
21 me out a little bit with those times. I could tell
22 you on the order, but I'd rather Bill tell you some
23 particulars with that. Bill?

24 MR. BURCHILL: This is Bill Burchill with
25 Exelon. The realistic analysis indicates that with --

NEAL R. GROSS

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

1 I think it's with one slick pump the time is reduced
2 from nine minutes to six minutes, and with two it's
3 from 12 to nine minutes. And those times, as you
4 recognize, are well beyond the licensing calculation,
5 which assumes the times are on the order of a couple
6 of minutes.

7 MR. SCOTT: Right. And my experience with
8 initiating standby liquid control in an ATWS situation
9 -- the times that Bill is talking about are an
10 eternity for operators to get those actions performed.

11 MR. BURCHILL: Yes. This is Bill Burchill
12 again. Again, the operator, of course, operates off
13 of symptoms. You know, the response is specifically
14 to the symptom, and, you know, the time is probably
15 not in their mind at the moment when they're doing
16 that. They're reacting to a symptom and taking
17 action.

18 VICE CHAIRMAN BONACA: Yes. But, I mean,
19 time available is important to determine whether they
20 will take the action within a certain time.

21 Now, you mentioned something about two
22 minutes. That's the design basis analysis rather than
23 the -- so these values you gave us, nine minutes
24 versus six, are a best estimate?

25 MR. SCOTT: Those are the probabilistic

NEAL R. GROSS

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

1 risk assessment values, realistic analyses.

2 MR. BURCHILL: Right. Right. Dr. Bonaca,
3 those are based on map runs specifically to look at
4 the time available.

5 VICE CHAIRMAN BONACA: Okay. But your
6 ATWS analysis that you have docketed with the NRC has
7 different values.

8 MR. BURCHILL: Those are the licensing
9 analysis. You're correct.

10 VICE CHAIRMAN BONACA: And two minutes are
11 the reduced times for this design, or the previous --

12 MR. BURCHILL: Two minutes are the design.

13 VICE CHAIRMAN BONACA: And before it used
14 to be three? Two? Two. So --

15 MR. BURCHILL: Yes, it's the same.

16 VICE CHAIRMAN BONACA: Why would it be the
17 same?

18 MR. BURCHILL: I'm sorry. I didn't
19 understand.

20 VICE CHAIRMAN BONACA: I said, why would
21 it be the same time?

22 MR. BURCHILL: Because it's already a
23 bounding time. It's already well within what we
24 consider as a realistic evaluation of the time
25 available.

NEAL R. GROSS

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

1 VICE CHAIRMAN BONACA: I mean, as a number
2 that comes out of an analysis, which is a bounding
3 analysis, I would have expected to see a change in
4 that time, too, with respect --

5 MR. PAPPONE: Yes. This is Dan Pappone,
6 GE. The two minutes is actually an input assumption
7 into the analysis. And, again, that's based on --
8 that's based on the knowledge that the operators are
9 going to be working off of the symptoms, performing
10 the same actions based on the same symptoms that are
11 occurring actually a little faster when you get to
12 power uprate, when you're looking at power levels
13 going up and water levels coming down.

14 When you're getting into those ATWS
15 situations, the symptoms are going a little bit
16 faster. So the operator is going to go through his
17 motions in the same time period. The two minutes is
18 what we're assuming in the analysis. It's not a
19 number coming out -- it's not a number calculated from
20 the analysis results.

21 VICE CHAIRMAN BONACA: Okay. thank you.

22 MR. SCOTT: Okay. One thing we have done
23 is to raise the minimum allowable standby liquid --

24 CHAIRMAN APOSTOLAKIS: Let me understand
25 this. The two minutes are used in the analysis. What

NEAL R. GROSS

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

1 analysis is this?

2 MR. SCOTT: Dan, can you --

3 MR. PAPPONE: This is Dan Pappone again.

4 We perform a safety analysis to confirm that the peak
5 vessel pressure, the peak suppression pool
6 temperatures, are going to be acceptable. And in
7 performing that analysis, we have to make certain
8 assumptions, say, on operator reactions, because we're
9 using --

10 CHAIRMAN APOSTOLAKIS: So the shorter you
11 assume the action is, the more optimistic you are,
12 aren't you?

13 VICE CHAIRMAN BONACA: That's right.

14 CHAIRMAN APOSTOLAKIS: So if you are
15 saying in the PRA that the actual number will be
16 around six minutes, and you assume two, then the
17 deterministic analysis is optimistic.

18 MR. PAPPONE: No. The --

19 CHAIRMAN APOSTOLAKIS: No? Am I missing
20 something?

21 MEMBER POWERS: It's the time available.

22 MR. PAPPONE: The PRA analysis is looking
23 at the maximum time available for the operator to
24 perform those actions as part of a success criteria.
25 He has a period of six minutes or nine minutes to

NEAL R. GROSS

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

1 perform that action.

2 CHAIRMAN APOSTOLAKIS: Okay. And in --

3 MR. PAPPONE: And if he completes that
4 action within that time, then the event is successful.
5 If he fails --

6 CHAIRMAN APOSTOLAKIS: Right.

7 MR. PAPPONE: -- if he fails to complete
8 that action in that six minutes, then that's
9 considered failure.

10 CHAIRMAN APOSTOLAKIS: Right.

11 MR. PAPPONE: It's just a simple success
12 criteria on the PRA side.

13 CHAIRMAN APOSTOLAKIS: Yes. Well, I mean,
14 if I do the deterministic analysis --

15 MR. PAPPONE: The deterministic
16 analysis --

17 CHAIRMAN APOSTOLAKIS: -- it's six minutes
18 down to two minutes.

19 MR. PAPPONE: No, no. The --

20 VICE CHAIRMAN BONACA: The deterministic
21 was a previous analysis they did for licensing --

22 MEMBER SHACK: No. But George's point is
23 if they used six minutes in the deterministic
24 analysis, they wouldn't have liked the answer.

25 MR. PAPPONE: Absolutely.

NEAL R. GROSS

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

1 CHAIRMAN APOSTOLAKIS: And, therefore,
2 would you fill in the blanks there?

3 MR. PAPPONE: The deterministic analysis
4 has certain levels of conservatisms in the code. So
5 that's going to -- and methods that we're using. So
6 that's going to push the answer above what we'd like
7 to see. In the PRA analysis --

8 CHAIRMAN APOSTOLAKIS: But we can't
9 separate the PRA analysis from everything else. I
10 mean, it's not a different world.

11 MR. PAPPONE: But it's a different set of
12 -- it's a different set of modeling assumptions that
13 are used in the calculation.

14 CHAIRMAN APOSTOLAKIS: For the same
15 system.

16 MR. PAPPONE: Right.

17 CHAIRMAN APOSTOLAKIS: Yes. So, you know,
18 which ones do we go by? I mean, would the calculated
19 temperatures and pressures change significantly if you
20 assumed a realistic six-minute response time?

21 MR. SCOTT: In my experience, as an
22 operator and watching the crews train, and being a
23 part of the crews in training, is that the PRA
24 analysis versus the two-minute analysis, it doesn't
25 matter to me. You know, my actions are the same.

NEAL R. GROSS

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

1 I'm going to step through, and I'm going
2 to do those actions in the same amount of time. I can
3 get those actions done in two minutes whether we have
4 a power -- whether I'm at 50 percent power or 100
5 percent power or at 120 percent power. It doesn't
6 matter.

7 I think the key is that as long as we can
8 say that, yes, the times change from nine to six
9 minutes, and two minutes is still bounding, I'm
10 comfortable as an operator in being able to take those
11 actions to protect the plant.

12 CHAIRMAN APOSTOLAKIS: Right. And you are
13 speaking now in PRA space, the response of the
14 operators.

15 MR. BURCHILL: Well, this is Bill Burchill
16 again. I want to clarify one thing, Dr. Apostolakis.
17 The PRA doesn't calculate that it will take the
18 operator six minutes.

19 CHAIRMAN APOSTOLAKIS: I understand that.
20 I understand that. It's the deterministic analysis
21 that bothers me.

22 VICE CHAIRMAN BONACA: Yes.

23 CHAIRMAN APOSTOLAKIS: I mean, the --

24 MEMBER SHACK: Well, he's using a more
25 conservative analysis. You know, it's sort of a

NEAL R. GROSS

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

1 bounding analysis versus a best estimate. So that
2 when he does the bounding analysis --

3 VICE CHAIRMAN BONACA: Yes. But two
4 things bother me there. One is that for the
5 deterministic analysis there must have been a best
6 case that was analyzed some time in the past for this
7 plant that said that, based on conservative estimates
8 of what it takes to reach those points, it takes two
9 minutes. Okay?

10 And now you are saying you feel
11 comfortable with two minutes, and I don't. I mean, at
12 some point I will become uncomfortable.

13 MEMBER SHACK: Well, I think the answer is
14 he takes the action in two minutes.

15 VICE CHAIRMAN BONACA: I understand.

16 MEMBER SHACK: And, you know, he gets 1440
17 in one case and 1477 in the other. So as he keeps the
18 time fixed and he ups the power, the temperature does
19 go up, which is what you would expect.

20 VICE CHAIRMAN BONACA: Yes. No, but I was
21 saying that now I would have expected that if you now
22 go up in power you will have a change in that time.

23 MEMBER SHACK: He kept that time fixed,
24 presumably because the regulator accepted the two
25 minutes, and so he lives with the two minutes and sees

NEAL R. GROSS

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

1 what happens.

2 MR. CARUSO: Dr. Bonaca, this is Ralph
3 Caruso from the staff. I've been informed that I
4 believe that the two minutes was a number that came
5 about as part of the original ATWS rulemaking.

6 VICE CHAIRMAN BONACA: That's right.

7 MR. CARUSO: That was an input assumption
8 that was established at that time as a reasonable
9 amount of time for an operator to respond to these.
10 So that's an input to these assumptions.

11 I believe also there's a comparison going
12 on here between a deterministic calculation using one
13 particular GE code and the PRA calculations which are
14 done using the MAP code, which is an entirely
15 different code. So you get -- unfortunately, you get
16 different numbers when you use different codes.

17 VICE CHAIRMAN BONACA: I understand. But
18 the fact is, you know, it's important we understand
19 how going up in power -- okay, what effect it's going
20 to have on operator reaction.

21 MR. CARUSO: Yes.

22 VICE CHAIRMAN BONACA: And time is always
23 an effect on that. There may be confidence on the
24 part of the operator that he can perform the action,
25 but at some point the confidence will be decreased,

NEAL R. GROSS

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

1 just because time is an issue for him to detect, to
2 respond, and to take action.

3 So that's why we're pursuing this kind of
4 questioning, and it's confusing to hear an assumed
5 number of two minutes for the ATWS and, you know,
6 there -- I would have to look at the analysis to
7 understand why it's done in a particular way, because
8 you cannot get an input from that. And, therefore, we
9 have to depend on the MAP analysis to get the sense of
10 time dependency. That's the whole issue.

11 CHAIRMAN APOSTOLAKIS: So we have to live
12 with the two minutes, then. This is something
13 that's --

14 VICE CHAIRMAN BONACA: I guess so.

15 CHAIRMAN APOSTOLAKIS: -- NRC given.

16 MEMBER KRESS: Well, the two minutes --

17 MEMBER SHACK: NRC accepted at least.

18 MEMBER KRESS: The two minutes in the
19 original rule must have come out of observations on
20 simulators and saying, "Well, they've always" --

21 MEMBER POWERS: Oh, I wouldn't think so.
22 I bet -- I bet the original analysis came out a wide-
23 ass guess with a bunch of conservative --

24 MEMBER KRESS: Well, it's one of --

25 MEMBER POWERS: -- considerations.

NEAL R. GROSS

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

1 MEMBER KRESS: It could be one or the
2 other.

3 MEMBER POWERS: It could be one or the
4 other.

5 MR. CARUSO: I am informed by people who
6 have some knowledge of this that this arose out of the
7 recirculation pump trip time. And there are a number
8 of different things that go into this 120-second value
9 that's used. We can identify this for you in more
10 detail if you wish, where it came from, but I think
11 the issue here really is, for the deterministic
12 analysis, they use a value of 120 seconds, then come
13 up with a certain result which is acceptable.

14 In PRA space, they've determined that they
15 might be able to go even longer, might be able to go
16 six or nine minutes.

17 VICE CHAIRMAN BONACA: Okay.

18 MR. CARUSO: Okay? But as the operators
19 here are saying, they feel comfortable that they would
20 recognize these symptoms and respond to them very
21 quickly. So there is a little bit of a disconnect
22 here, but it's -- I think it's explainable and
23 understandable. It's more of an artifact of the way
24 that the different methods calculate these parameters.

25 CHAIRMAN APOSTOLAKIS: So if they respond

NEAL R. GROSS

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

1 in six minutes instead of two, in real life now, the
2 peak clad temperature will be higher than this, won't
3 it?

4 MR. BURCHILL: This is Bill Burchill
5 again. No. In fact, if they respond in the six or
6 nine minutes, depending upon the number of pumps, they
7 will meet all of the success criteria in the PRA
8 analysis. It's likely you would not meet the
9 licensing limit, but you would be using an apples and
10 oranges comparison because --

11 VICE CHAIRMAN BONACA: The 2200 degrees?
12 Is that the licensing --

13 MR. BURCHILL: Right. But that also has
14 restrictions on the -- you know, the various inputs to
15 the calculation, the heat transfer correlations, and
16 all of that stuff that we're -- you know,
17 traditionally imposed on the design basis analysis,
18 which would not be true in a realistic analysis that's
19 used for the PRA.

20 CHAIRMAN APOSTOLAKIS: So where does that
21 leave us? I don't understand that. Now, are you
22 saying --

23 MEMBER POWERS: Wherever it leaves us,
24 let's move on, so that I cannot destroy your schedule.

25 MEMBER KRESS: It leaves us with the

NEAL R. GROSS

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

1 thought that the idea of using best estimate codes
2 with 95 percent confidence was a pretty good idea,
3 because you can understand what the number is.

4 VICE CHAIRMAN BONACA: Well, I think it
5 would have been interesting I guess -- and I really
6 don't need -- I accept the fact that two minutes in
7 the design basis analysis are acceptable for both
8 conditions. I would have liked to know at what point
9 I could see those two minutes -- what number does it
10 become before it becomes unacceptable? You know, to
11 understand what -- how the margins --

12 MEMBER POWERS: It depends on -- it
13 depends critically on whether you're taking core
14 damage as your criteria for acceptability or 2200
15 degrees Fahrenheit as your criteria for acceptability.

16 VICE CHAIRMAN BONACA: I mean, whatever
17 was the licensing value.

18 MEMBER POWERS: I mean, it seems to me
19 that had I known when I did the analysis for peak clad
20 temperature that my maximum temperature was going to
21 be 1440, I would have said, "Well, instead of putting
22 in two minutes for that criteria, I'll put in three
23 and a half, because I've got more room and I like my
24 operators. I don't want to put too much torque on
25 them." And, indeed, they would have probably found

NEAL R. GROSS

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

1 that they met the 2200.

2 If instead they said your criteria is core
3 damage, they might well have been able to put in seven
4 minutes.

5 VICE CHAIRMAN BONACA: Well, I understand
6 that, but that was --

7 MEMBER POWERS: Or 15 minutes maybe.

8 MR. CARUSO: Dr. Powers, I mean, actually,
9 you're focusing on peak clad temperature here. For
10 ATWS events, the more limiting parameter is the pool
11 temperature.

12 MEMBER POWERS: And if I bring that up, I
13 protract a discussion that's already gone on too long.
14 Okay?

15 MR. CARUSO: Oh, okay. I just wanted to
16 make that point. Everyone is focusing on peak clad
17 temperature, but in an ATWS really the limit that
18 you're going to hit first is the suppression pool
19 temperature. That's more important than the peak clad
20 temperature, because you've got water going through
21 the core. So you -- it's -- you're going to keep --

22 MEMBER POWERS: They were trying to
23 understand where the time comes, and I was --

24 MR. CARUSO: Okay.

25 MEMBER POWERS: -- trying to point it out

NEAL R. GROSS

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

1 to them. And even if you had taken the suppression
2 pool temperature in PRA space, that's not too
3 important. What is overpressurization of the drywell
4 becomes important.

5 MR. CARUSO: Right.

6 MEMBER POWERS: And the times even go
7 longer than that.

8 MR. CARUSO: Right.

9 MEMBER POWERS: Can we go ahead?

10 MR. SCOTT: Certainly. Okay. One thing
11 that we have done is to raise the minimum allowable
12 standby liquid control boron concentration with --

13 MEMBER POWERS: The points that you might
14 want to make is, where do you inject your boron into
15 this core?

16 MR. SCOTT: The boron goes in through the
17 high pressure core spray sparger, which goes right
18 onto the core, so it's a core --

19 MEMBER POWERS: On top of the core.

20 MR. SCOTT: That's correct.

21 MEMBER POWERS: And not on the bottom.
22 And so now you're not relying on raising and lowering
23 the water to mix the boron.

24 MR. SCOTT: That's correct.

25 MEMBER POWERS: That's an important

NEAL R. GROSS

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

1 feature of this plant.

2 MR. SCOTT: Thank you.

3 So we are raising the minimum allowable
4 standby liquid control boron concentration to ensure
5 the rate of negative reactivity addition remains
6 acceptable after the power uprate. And we have
7 included the table here. I'm showing some of the
8 major parameters pre- and post EPU, along with the
9 associated design limits.

10 And just to conclude, that these values
11 show and support the acceptability of maintaining the
12 existing operator response to an ATWS after
13 implementing the power uprate.

14 So now I'd like to introduce Harold
15 Crockett from Exelon Nuclear, who will discuss plant
16 response to flow accelerated corrosion.

17 MR. CROCKETT: Thank you, Kent.

18 I'm Harold Crockett, and I'm the flow
19 accelerated corrosion program manager for AmerGen and
20 Exelon, and I'd like to talk with you a few minutes
21 about our program and what we have done.

22 The Clinton station has a program that is
23 consistent with the industry recognized EPRI
24 recommendations for flow accelerated corrosion, and
25 what we have done is we have updated our analysis with

NEAL R. GROSS

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

1 the new design conditions.

2 MEMBER POWERS: And the spelling of
3 CHECKWORKS.

4 MR. CROCKETT: Yes. And as noted, we use
5 the EPRI program CHECKWORKS. It is a predictive
6 analysis. And because our analysis is largely cycle-
7 dependent, dissolved oxygen temperatures flow, we want
8 to look at each line that is modeled.

9 And so what we did, we saw the results,
10 and in our particular station here, the scavenging
11 steam line had the most significant increase. And we
12 wanted to cite this example, because the numbers are
13 a little bit high in the world of fact.

14 Normally, there are generally small
15 numbers -- wear rates are maybe five mils per year and
16 you get a 15 percent increase, so you're up to a
17 whopping six mils per year. This one was a little bit
18 higher. We went and focused on this particular line
19 and looked at the actual measured wear and compared it
20 with the previous predicted wear. Actual measured
21 wear was about 20 mils per year, and the old predicted
22 methodology gave us 38 mils per year.

23 And what -- the goal is to merge the
24 predicted with the measured and get a refined
25 correction factor on this --

NEAL R. GROSS

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

1 MEMBER POWERS: Well, somehow 52 mils per
2 year doesn't give me much more comfort than 70 mils
3 per year.

4 MR. CROCKETT: That's correct. And as
5 we'll note further down, this particular line we will
6 be visiting for replacement. We have found that
7 proactive replacement is a good policy for us if, at
8 the same station we've seen wear, or at our other
9 stations we've seen wear.

10 By the time you put up the scaffolding and
11 remove the insulation, you've spent so much effort
12 that a lot of times it's easiest just to go ahead and
13 upgrade it with chrome-olly and stainless. And yes,
14 sir, you're exactly right. We have done that, and we
15 continue to do that.

16 We've learned a lot in the past decade
17 about which lines are wearing. And Clinton being a
18 younger station, they're just getting to the point
19 where they're doing some of these replacements.

20 MEMBER FORD: Maybe it's a moot point if
21 you're going to replace the carbon steel steam line
22 with chrome-olly. But could you comment on the
23 qualification of CHECKWORKS for wet steam? Given the
24 fact that there are different corrosion mechanisms or
25 different corrosion criteria between wet steam and

NEAL R. GROSS

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

1 water. So how well has CHECKWORKS been qualified by
2 observation versus prediction, with steam versus
3 water?

4 MR. CROCKETT: Yes, sir. The check family
5 predictions -- the CHECKWORKS, it is set up for a
6 single phase and two phase, and steam quality is an
7 input. And we continue to refine the code. There has
8 not been a dramatic amount of changes in the past
9 eight years. There's been some small refinements.

10 EPRI sponsors meetings twice a year, and
11 we are very active in those meetings, which is the
12 domestic utilities as well as the international
13 utilities. We have strong support from around the
14 world at these meetings. And when we're seeing high
15 wear we go visit those very areas. So it's --
16 everybody is pretty much talking to each other.

17 MEMBER FORD: Would the fact that there
18 are different mechanisms involved, between those two
19 environments, is it fair --

20 MR. CROCKETT: Yes, sir.

21 MEMBER FORD: -- is it fair to use
22 CHECKWORKS from one -- from water and then just do a
23 flip to steam?

24 MR. CROCKETT: Right. As I mentioned
25 earlier, steam quality is an input. And what we're

NEAL R. GROSS

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

1 really talking about is not a mechanical attack. It's
2 a corrosive attack. It's a dissolution of the oxide
3 layer -- washes away, dissolves the next oxide layer,
4 and repeats itself.

5 And it is different, but the code has been
6 consistently substantiated where it has been used.
7 And there have been some industry events, and the code
8 was not properly used. I think at the last
9 subcommittee meeting --

10 MEMBER FORD: Okay.

11 MR. CROCKETT: -- they talked a little bit
12 about Fort Calhoun's rupture. And when they did go
13 back and look at the code and properly analyze it, it
14 did have wear rates that were exactly or very
15 consistently with the --

16 MEMBER FORD: But a difference between
17 less than 20 and 38, between measured and calculated,
18 that's not unusual. Is that unusual or not?

19 MR. CROCKETT: That is not unusual to have
20 a predicted off by that much. And that's why we
21 continue to select, inspect, and evaluate, and feed it
22 back into the process. It's not unusual for it to be
23 off by that much.

24 MEMBER FORD: And is a discrepancy always
25 the same way?

NEAL R. GROSS

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

1 MR. CROCKETT: No, sir. It can be --

2 MEMBER FORD: Plus or minus.

3 MR. CROCKETT: That is correct.

4 MEMBER FORD: Oh, okay.

5 MR. CROCKETT: It could be more than
6 measured in a prediction or less.

7 MEMBER FORD: Okay.

8 MR. CROCKETT: As I mentioned earlier, the
9 model will continue to be calibrated with post-EPU
10 conditions. And these changes were anticipated. We
11 talk about power uprates at our conferences, so the
12 code is consistently applied.

13 The schedule replacements, we will
14 continue to inspect this particular line, both trains
15 of it. So if we get up to data we receive from this
16 particular outage that will start up next month, we
17 may elect to proactively replace this line even before
18 that time. But it is an ongoing process.

19 And the programmatic controls are in place
20 to ensure that inspections continue, and the extent of
21 the condition is assessed. So if we find wear, we'll
22 measure upstream and downstream and that -- that
23 analysis.

24 MEMBER POWERS: Let me just ask one point
25 of fact. This line that's corroding at 70 mils per

NEAL R. GROSS

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

1 year in your analysis, what's the wall thickness on
2 it?

3 MR. CROCKETT: This is a half-inch wall
4 thickness.

5 MEMBER POWERS: Half-inch. And I can't
6 resist just pointing out that programmatic controls
7 were in place at Fort Calhoun and Surry.

8 MR. CROCKETT: Well, Surry certainly was
9 the birthplace of the modern codes. And Fort Calhoun
10 -- I was asked to be on a team that assessed that
11 particular station. And prior to their rupture, they
12 had not been active with the industry meetings. And
13 their analysis was partial I guess would be the way to
14 address that.

15 MEMBER POWERS: A generous way to put it.

16 MR. CROCKETT: Yes.

17 MEMBER SHACK: What are your wear rates in
18 your feedwater lines?

19 MR. CROCKETT: Feedwater lines -- BWRs
20 typically, because of the dissolved oxygen, are not
21 high. Some of the PWRs have had some feedwater
22 replacements --

23 MEMBER SHACK: It's a big difference. But
24 just -- I mean, is it a couple mils a year?

25 MR. CROCKETT: On the order of five to 10

NEAL R. GROSS

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

1 mils per year. And that's a much thicker pipe
2 typically. That's an inch and a half or more.

3 Yes, sir.

4 MEMBER FORD: I have a question, not
5 related to flow assisted accelerated corrosion.
6 Fluent use vibration -- I recognize that fatigue is
7 probably another problem in the upper head. However,
8 there have been stress corrosion problems of core
9 spray lines and dryers, and this was brought up at the
10 Quad Cities and Dresden applications.

11 We raised the question about whether
12 there's a loose parts problem, and we were assured
13 that it was not a problem. Has this been revisited
14 for this particular station -- Clinton?

15 MR. MOSER: Yes. Dr. Ford, Keith Moser,
16 Exelon, Reactor and Internals Program Manager.

17 Yes. We did exactly the same thing we did
18 for Dresden and Quad. We went back, component by
19 component, looked at all of the different problems.
20 And as you suggested, flow-induced vibration was one
21 of the issues we looked at. You know, for this plant,
22 we didn't have to put in any mods. Everything worked
23 out fine. The dryer we looked at before. We're going
24 to be looking at it right after this outage.

25 Again, we don't think there will be any

NEAL R. GROSS

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

1 issues. But we do have programs in place to look at
2 it, and we will be looking --

3 MEMBER FORD: My concern was entirely the
4 fact -- I'm not concerned about exceeding -- that it's
5 going to cause fatigue. I'm more concerned about
6 exacerbating cracking, stress corrosion cracking, by
7 the fact that you're superimposing a vibrational load,
8 which has been increased because of the EPU.

9 Therefore, if you're going to inspect once
10 every outage, which is appropriate, is that good
11 enough?

12 MR. MOSER: For which component in
13 particular?

14 MEMBER FORD: Well, I was thinking of core
15 spray lines, steam dryers, the brackets holding the
16 steam dryers to the pressure vessel. They have all
17 undergone stress corrosion cracking at one time or
18 other.

19 MR. MOSER: You know, for the core spray
20 lines, flow-induced vibration really isn't a big
21 problem in those lines. The steam dryer, yes, we have
22 concern, and we have some industry experience on that
23 -- Peach Bottom, some other overseas plants. But
24 based on the fact that the loose parts issue got such
25 a big dryer, big component, even if it would crack

NEAL R. GROSS

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

1 there's nowhere for it to go, and it's not a safety
2 concern.

3 MEMBER FORD: Except down.

4 MR. MOSER: Yes. But that would go right
5 on top of the separator, correct?

6 MEMBER FORD: That's correct.

7 MR. MOSER: And so, in a sense, you don't
8 have anything that can really cause you concern as far
9 as a safety perspective. And so from that
10 perspective, yes, we are absolutely sure that we want
11 a cycle of looking at the dryers, making sure there
12 isn't any gross degradation -- is the right thing to
13 do.

14 For the brackets themselves on the RPV
15 wall, yes, we looked at them before. There has been
16 some industry experiences. We are going to look at
17 them after the outage -- after the EPU conditions and
18 make sure that we have everything modeled correctly.

19 MEMBER FORD: Okay.

20 MR. MOSER: Does that answer your
21 question?

22 MEMBER FORD: Yes. Kind of.

23 MR. MOSER: Okay.

24 MEMBER FORD: Yes.

25 MR. CROCKETT: In conclusion, the EPU

NEAL R. GROSS

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

1 changes are acceptable to the FAC program.

2 I'd like to turn the --

3 MEMBER POWERS: Well, at this point, I'm
4 going to intercede. We've exceeded the allotted time
5 for this. This is not a risk-informed submission. I
6 believe those interested in the risk significance of
7 this submission can read the viewgraphs, and I propose
8 that we move right to the closing. And any points you
9 want to make about the implementation you can make
10 there.

11 MR. SIMPKIN: I am Terry Simpkin. I'm the
12 Manager of Licensing for Exelon Nuclear. First of
13 all, I'd like to thank the staff for their rigorous
14 review and I'd like to thank this Committee for its
15 consideration of our request to uprate the power level
16 at the Clinton Power Station.

17 We have completed extensive analyses,
18 using accepted methodology. We have identified no
19 significant impacts on plant response or system
20 integrity. Our request involves minimum changes in
21 plant risk and we believe that plant operation is
22 acceptable at the extended power uprate conditions.
23 Subject to any questions from the Committee, this
24 concludes our presentation.

25 MEMBER POWERS: Do Members have any other

NEAL R. GROSS

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

1 questions they would like to pose on this to the
2 licensees about this?

3 Well, thank you very much, gentlemen, and
4 I'm sorry to eliminate a couple of sections of your
5 presentation, but I think the visual aids were very
6 clear and made your essential points there.

7 I'd like now to call on Mr. Zwolinsky to
8 make a presentation for the Staff and their review of
9 this application.

10 (Pause.)

11 Mr. Zwolinsky, I understand that in the
12 course of teh Staff's presentation we'll have to
13 interrupt the meeting for a protection of proprietary
14 interests?

15 MR. ZWOLINSKY: This is my understanding.

16 MEMBER POWERS: You'll let me know when
17 that has to take place?

18 MR. ZWOLINSKY: Yes sir.

19 MEMBER POWERS: Please.

20 MR. ZWOLINSKY: Good morning. For those
21 of you that don't know me, my name is John Zwolinsky.
22 I'm the Director for the Division of Licensing Project
23 Management. Staff is here to present its review of
24 the 20 percent power uprate request for the Clinton
25 Plant.

NEAL R. GROSS

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

1 I'd like to take a minute to acknowledge
2 several of our management team that are in attendance
3 today that are clearly supportive of our staff and are
4 here to represent that support, beginning with Suzanne
5 Black, our Deputy Director for the Division of System
6 Safety and Analysis; along with her, we have Gary
7 Holahan, the Division Director of the Division; John
8 Hannon, our Plant Systems Branch Chief; Ted Quay, our
9 Equipment and Performance and Human Factors Branch
10 Chief; Singh Bajwa, our Project Director responsible
11 for power uprates. We also have a number of our
12 Section Chiefs, our first line supervisors responsible
13 for assuring a high quality product: Dale Thatcher in
14 the Equipment Performance Branch; Corney Holden,
15 Electrical and Instrumentation and Control Systems
16 Branch; Matt Mitchell from our Materials Branch; Ralph
17 Caruso, of course, from Reactor Systems, Kamal Manoly
18 from our Mechanical Branch; Brian Thomas from our
19 Plant Systems Branch; Louise Lund from our Materials
20 Branch.

21 I go through that only to articulate the
22 sense of importance that we place on assuring that top
23 notch products are generated and that would be in
24 response to the Committee and any concerns or
25 questions that may arise.

NEAL R. GROSS

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

1 The Staff made a presentation on this
2 review to the Subcommittee on thermohydraulic
3 phenomena on February 14. The Clinton power uprate is
4 similar to the Duane Arnold, Dresden and Quad Cities
5 power uprates which were reviewed by the ACRS late
6 last year. Clinton's application does deviate from
7 the approved ELTR1 and 2 methodologies for GE BWRs and
8 extended power uprates in four areas. These areas are
9 and we did go through this with the Subcommittee,
10 transient analysis, LOCA analysis, stability and large
11 transient testing. The Staff will discuss these areas
12 today.

13 The Staff has conducted thorough reviews
14 of the Clinton power uprate with the focus being on
15 safety. The reviews were conducted consistent with
16 the existing practices which includes the lessons
17 learned from Maine Yankee. As indicated in the draft
18 safety evaluation, many areas affected by the power
19 uprates have been reviewed and evaluated and results
20 were transmitted in that draft safety evaluation
21 report. We have additional work to perform in
22 cleaning the safety evaluation up.

23 With that, I'd like to get on with the
24 presentations. Our lead project manager for this
25 particular facility, Clinton, is John Hopkins. John

NEAL R. GROSS

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

1 will walk up through the presentations as we go
2 forward and as I said earlier to Dr. Powers, our staff
3 is available to answer any questions associated with
4 the presentation or beyond.

5 MEMBER POWERS: Let me ask you one
6 question. You said this was similar to the ones we've
7 looked at before including Quad Cities, Dresden. It
8 strikes me, in fact, that this is simpler than those.

9 Clinton just seems like a much easier
10 power uprate than those other plants have. Is that
11 your kind of sense or not?

12 MR. ZWOLINSKY: The amount of time that we
13 spent, staff time in reviewing especially Quad Cities
14 and Dresden was quite large compared to the other
15 applications. We did not spend as much time reviewing
16 this application. That would be a metric.

17 MEMBER POWERS: That may or may not be a
18 metric, but I mean the general amount of changes, the
19 effort that they have to go to and the changes -- I
20 mean, I point to just the power uprate is much easier
21 in this plant than --

22 MR. ZWOLINSKY: Yes sir. I think as a
23 general comment, I think we can agree with that.

24 MEMBER POWERS: Good.

25 MR. ZWOLINSKY: John.

NEAL R. GROSS

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

1 MR. HOPKINS: Good morning, I'm John
2 Hopkins, NRR Senior Project Manager assigned to
3 Clinton. I'll go quickly over the overview. To start
4 with, I'll be starting and then our next presenter
5 will be Plant Systems area and then we'll have --
6 discuss large transient testing and then in the end,
7 we'll discuss reactor systems and those exceptions.
8 We will need to close the session for when we discuss
9 those, even though the handouts are all
10 nonproprietary. We really have to close it to discuss
11 it.

12 To start with, as has been previously
13 stated, this is a BWR6 Mark III. After the 20 percent
14 uprate is completed, Clinton will still be just the
15 third largest BWR6 as far as megawatt thermal power is
16 considered. Perry will be slightly larger and Grand
17 Fulf will be about 400 megawatt thermal larger.

18 The licensee went through many balance of
19 plant mods to accomplish this uprate. GE14 fuel is
20 being used and they'll have about a two-thirds core
21 after they start up from this upcoming refueling
22 outage which is projected to start April 2nd.

23 MEMBER POWERS: Maybe you better be clear
24 by what you mean by two thirds core.

25 MR. HOPKINS: Two thirds GE14.

NEAL R. GROSS

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

1 MEMBER POWERS: You are not loading jsut
2 two thirds of the core.

3 MR. HOPKINS: Okay, I'm sorry. I was
4 trying to go quickly.

5 (Laughter.)

6 This application came in in June of last
7 year and so it's been a fairly quick review. To
8 respond to you, Dr. Powers, what you asked John, I
9 think this has been a simpler review. They already
10 have had GE14. They already have had MELLLA approved
11 for this plant. There's no recirculation, new recirc
12 runback system associated with the plant, so I do
13 think it's been simpler in those regards.

14 It is on 18-month cycles. However, this
15 next cycle is expected to be run approximately 20 to
16 21 months and I expect to get an application to go to
17 24-month cycles during that time.

18 It is nonrisk informed as previous EPU's,
19 however, risk was looked at and we did not identify
20 anything that would argue against the uprate.

21 AmerGen is the licensee and they have
22 previous experience in operating applications as the
23 staff does also.

24 We have one license condition at this
25 time. It's on a feedwater nozzle cumulative usage

NEAL R. GROSS

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

1 factor. The licensee is still performing analyses of
2 this and they expect to submit the analyses to us
3 fairly soon and so we'd condition the license for the
4 next operating cycle for us to review these analyses
5 and then find them acceptable.

6 MEMBER POWERS: John, just for Members'
7 information. Your cumulative usage factor refers to
8 the fatigue issue?

9 MR. HOPKINS: Yes.

10 MEMBER POWERS: And it is a thermal
11 fatigue or vibrational fatigue?

12 MR. HOPKINS: My understanding is it's
13 thermal fatigue.

14 They list the four exceptions there. We
15 will discuss each of the four exceptions during this
16 presentation. Again, the first three will be
17 discussed at the last presenter and that will be
18 closed.

19 Right now, unless there are any other
20 questions, I'm going to briefly discuss flow
21 acceleration corrosion. This is a question that came
22 out of the Subcommittee meeting and the question I
23 received was basically when NRC inspectors look at
24 flow acceleration corrosion, what understanding do
25 they have of it and what resources can they tap to

NEAL R. GROSS

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

1 help them?

2 MEMBER POWERS: I think more so than that
3 particular question is do the people doing the
4 inspection of programs at the plant understand from
5 you in looking at this power uprate quest that there
6 are certain critical components including the
7 scavenger line where flow acceleration corrosion could
8 be high and the licensee is relying very heavily on
9 programmatic issues, constraints to assure this
10 doesn't get out of hand.

11 MR. HOPKINS: My answer to that is we are,
12 the staff is developing a power uprate inspection
13 procedure at this time. It's out to the Regions for
14 comment. We expect to finalize it in a few months.

15 One issue that's being considered to be
16 included in there, specifically FAC. Now all of our
17 inspections are based on risk importance and mainly
18 from a nuclear safety perspective. So I don't --

19 MEMBER POWERS: It seems to me one of the
20 problems you're going to run into is that we're
21 talking about flow acceleration corrosion in a line
22 that probably doesn't rank very high on a risk
23 analyses, but when you break these lines, they
24 typically have some pretty substantial consequences,
25 nevertheless.

NEAL R. GROSS

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

1 So you worry about using risk where you're
2 talking about damage to the public in tehse kinds of
3 context.

4 MR. HOPKINS: I undrestand that. I think
5 we'd have to get back to you as we develop our uprate
6 inspection procedure to fully respond.

7 MR. ZWOLINSKY: I think your comment is a
8 fair comment. Yesterday, at the Regulatory
9 Information Conference, Jack Robe was our Division
10 Director for Reactor Safety and Region 3 was
11 presenting the inspection program that was conducted
12 at Quad Cities, Dresden and Duane Arnold and he did
13 not get to that level of specifics, but they did
14 implement a specific inspection program, targeted to
15 power uprate, seeking key vulnerability that they felt
16 had been identified not just in the application, but
17 in the safety evaluation.

18 MEMBER POWERS: I think that's what needs
19 to -- there needs just to be some communication here.

20 MR. ZWOLINSKY: Okay, the left hand and
21 right hand were clearly communicating and I think that
22 was one of the major points he was making.

23 MEMBER POWERS: Very good.

24 MR. ZWOLINSKY: But as John alluded to, we
25 are developing the temporary instruction for more

NEAL R. GROSS

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

1 uniformed inspection across the country.

2 MEMBER POWERS: If you happen to have the
3 slides from his presentation, I'd enjoy seeing them.

4 MR. ZWOLINSKY: We can forward those to
5 you.

6 MEMBER POWERS: Okay.

7 MR. HOPKINS: Okay, at this time I'd like
8 to introduce Richard Lobel who is from our Plant
9 Systems Area. And he will talk about another question
10 from the Subcommittee on spent fuel pool temperature
11 distribution and briefly discuss contributory
12 containment analyses that we performed on Clinton.

13 MR. LOBEL: Good morning. I was giving a
14 presentation on the plant system's areas of review for
15 the Subcommittee and a question came up about the
16 temperature distribution, the water and the spent fuel
17 pool and I said that I believe there had been studies
18 done on that. Let me just go over it briefly.

19 The heated water in the spent fuel pool is
20 collected around the periphery of the pool and
21 circulated through heat exchangers and then discharged
22 at the bottom of the pool to enhance circulation. The
23 power uprate doesn't change the design aspects of the
24 spent fuel pool, cooling, the circulation mixing
25 patterns and the operation of the spent fuel pool.

NEAL R. GROSS

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

1 Based on staff experience, it's not power uprate, but
2 spent fuel pool reracking that results in the greatest
3 increases in spent fuel pool temperatures and we have
4 reviewed many rerack applications. As part of that,
5 the staff reviews the thermal hydraulic analyses
6 including the maximum water temperatures with and
7 without water circulation, without forced circulation.
8 In one rerack review that was done a while ago, the
9 staff performed extensive two and three-dimensional
10 calculations of the water distribution in the spent
11 fuel pool, compared the calculations with the
12 licensee's calculations and concluded that the
13 license's calculations were conservative.

14 As we discussed with the Subcommittee, the
15 spent fuel pool water and the fuel temperature
16 increases aren't a concern for the Clinton power
17 uprate. Their analyses show that they're below the
18 spent fuel pool limits.

19 I hope that answered the question.

20 MEMBER KRESS: Those limits are set based
21 on the concrete --

22 MR. LOBEL: Right. The limits are really
23 separate from the question of the temperature
24 distribution. There's a limit because of the material
25 that's used in the purification system and there's a

NEAL R. GROSS

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

1 limit of 150 degrees on the concrete. And Clinton was
2 well below both of those limits.

3 MEMBER KRESS: Was the temperature
4 distribution significantly different from what it is
5 normally?

6 MR. LOBEL: Well, it depends on the
7 loading pattern and the density of the loading pattern
8 and that's why the reracking really has more of an
9 effect than the power uprate. Typically, in a rerack
10 you're moving the fuel closer together and higher
11 energy density into the same amount of water.

12 MR. ZWOLINSKY: Dr. Kress, the biggest
13 issue we've identified is length of time that the
14 licensee retains the fuel in the core and it's initial
15 configuration from shutdown. The longer it cools in
16 the reactor vessel and then transfers over to the
17 pool, the smaller effect it has on the pool's
18 temperature.

19 MR. LOBEL: Also at the Subcommittee
20 meeting I mentioned that we were doing confirmatory
21 analysis for the containment calculations and at that
22 time I wasn't sure whether we'd be done in time for
23 this meeting, but it turns out that the calculations
24 are completed and if you'd like, we can talk about
25 that a little.

NEAL R. GROSS

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

1 MEMBER KRESS: Yes, I think we would like
2 to.

3 MR. LOBEL: Well, let me introduce Edward
4 Throm from Plant Systems Branch who did the
5 calculations and he can discuss it.

6 MEMBER POWERS: Well, maybe you better get
7 the speaker on with a mobile microphone.

8 (Pause.)

9 MR. THROM: Am I on? Okay, real quick, my
10 name is Ed Throm. I'm with the Plant Systems Branch
11 and what we attempted to do in a very short time was
12 do some confirmatory calculations for the Clinton
13 extended power uprate.

14 What we wanted to do was look at the
15 contained two which is the staff containment code and
16 compare it to the M3CPT and SUPERHEX results that GE
17 typically calculates.

18 We started off with an existing Grand Gulf
19 Mark III deck and modified it to look like Clinton.
20 This modification is dry well/wet well. Volumes,
21 initial conditions to represent the plant. We used the
22 mass and energy releases provided by the licensee
23 directly and this leads to a little bit of a
24 discrepancy and one of the results of that I will show
25 you.

NEAL R. GROSS

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

1 This particular time we've done three
2 calculations, two short term for the recirculation
3 line break and then the steam line break and we also
4 did the recirc line long-term cooling temperature
5 response calculation. We couldn't do the shutdown
6 calculation in a short time because that would have
7 required additional model changes that I didn't have
8 time to do. And basically, by looking at the
9 qualitative comparison for the studies we've done, we
10 believe that our conclusion that the licensee's
11 analyses are acceptable for the extended power uprate
12 is a true statement.

13 The model is fairly simple. It's
14 basically got three models of dry well with the
15 annulus region that connects to the wet well and for
16 this particular design it has the three vent paths.

17 I'm just going to put up two results
18 because of time. This is the short term recirculation
19 line break. This is a comparison of the contained
20 results to the M3CPT. As you can see, M3CPT is
21 calculating a little higher pressure than the staff's
22 calculation and overall the dry well temperature
23 response is very consistent with the licensee's
24 calculation.

25 And the long term break, this is one of

NEAL R. GROSS

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

1 the areas where you learn as an analysis that you may
2 have missed a piece of information that was important
3 if you were trying to do it, an audit calculation and
4 what's happening here is by using the licensee's
5 provided mass and energies, we got a very coarse set
6 of data and the data tends to show more of a steam
7 release, high energy release over the initial portion
8 of the transient. That's why we're predicting this
9 higher initial pressure response and a slightly higher
10 temperature in the suppression pool.

11 This is very evident from that little
12 spike there, where we have three points, one at a
13 liquid, one at a steam, and one at a liquid. So we've
14 just done a linear interpolation so that's what the
15 offset is doing for these types of calculations. But
16 again, qualitatively, we don't see anything between
17 the two codes that suggest that the analysis method
18 that's been approved and accepted by GE, by the staff
19 or GE plants is any different for Clinton than it was
20 for the Duane Arnold which basically the staff did a
21 similar evaluation for Duane Arnold. That's pretty
22 much what I have to present.

23 MEMBER KRESS: Thank you.

24 MR. ZWOLINSKY: Thank you, Ed.

25 MR. THROM: Okay, sure.

NEAL R. GROSS

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

1 MEMBER POWERS: Thank you.

2 MR. THROM: Sure.

3 MR. ZWOLINSKY: Okay, our next presenter
4 will be Bob Pettis and he'll talk about the exception
5 from ELTR1 and 2 to not perform large transient
6 testing.

7 MR. PETTIS: Good morning. My name is Bob
8 Pettis and I'm with the Quality and Maintenance
9 Section within the Division of Inspection Program
10 Management.

11 Our review of the Clinton application
12 focused on the testing section of the application with
13 some specific attention to the exception for not
14 performing a large transient test. The Clinton EPU
15 tst program follows ELTR1 which is basically
16 delineated in Appendix L2.

17 As discussed previous by the Applicant,
18 Clinton will perform a limited subset of original
19 start up tests to demonstrate capability of the plant
20 systems to perform as designed through the EPU power
21 extension. Routine measurements are taken for reactor
22 and system pressures, flows and vibrations, up through
23 EPU conditions and main steam and feedwater systems
24 will be monitored for vibration.

25 The exception to ELTR1 is in the area of

NEAL R. GROSS

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

1 the mainsteam valve closure and generator load reject
2 tests. This exception was also previously approved
3 for the Dresden and Quad Cities EPU's.

4 The staff felt that the exception to the
5 ELTR1 is acceptable for several reasons. First
6 reason, GE had stated the constant reactor dome
7 pressure simplifies the analyses and plant changes to
8 achieve EPU conditions.

9 Text spec surveillance testing will
10 confirm the performance capability of the components
11 challenged by large transients. Another point is that
12 CPS is not installing any new safety-related systems,
13 features or significant additional components as a
14 result of achieving EPU. There are some balance of
15 plant modifications that were discussed previously.

16 An analysis was also performed by the
17 licensee in coordination with GE that reviewed some of
18 the components that would be challenged by large
19 transient testing. Some of those components included
20 MSIVs, safety relief valves, turbine stop valves and
21 turbine control and bypass valves. They also reviewed
22 main steam line geometry and control rod insertion
23 times.

24 The CPS test program also will monitor
25 important plant parameters during power ascension,

NEAL R. GROSS

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

1 operating pressures and flows, temperatures,
2 vibration and closure times for MSIV turbine stop and
3 control valves. Operating history and experience at
4 other BWRs has also been recognized. There's been a
5 slide that was presented yesterday that was more
6 extensive than this, but the KKL plants or the KKL
7 plant is operating at 116 percent; the KKM at 117;
8 Monticello at 106; and Hatch around 113. And also,
9 the Dresden, a plant as well.

10 MEMBER POWERS: Have any of these plants
11 performed the equivalent of a large transient test?

12 MR. PETTIS: To our knowledge, the only
13 plant that has was the KKL plant in Sweden and from
14 what we have reviewed, at least in our section, those
15 results appear to correlate very well with the
16 analytical models that would have predicted the
17 response to the transients.

18 MEMBER POWERS: What I'm struggling with
19 is what you mean by operating history and experience
20 at other updated BWRs. If say one has performed the
21 test, that's not a whole lot of experience to judge
22 them, is there?

23 MR. PETTIS: Well, the way that should be
24 looked at is KKL did perform the large transients and
25 there is information that correlates well for the KKL

NEAL R. GROSS

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

1 plant.

2 MEMBER POWERS: Okay, so if I were to
3 rewrite the line, it would say we have one plant
4 that's done this test and it seemed to match the code
5 predictions and so we'll live with code predictions?

6 MR. PETTIS: The expectation level, I
7 think, has been achieved with KKL. With respect to
8 the domestic plants, the only experience there that
9 we're trying to demonstrate is the fact that they have
10 undergone EPU conditions. They are operating at EPU
11 or near EPU conditions with no anomalies.

12 MEMBER SHACK: They had a transient at
13 Hatch, right?

14 MR. PETTIS: Yes, that was in 1999. It
15 should also be noted that Clinton is not making any
16 modifications to the reactor recirc runback system
17 which was an area of concern for one of the ACRS
18 Members previously for Dresden and Quad Cities.

19 Large transient testing is also not needed
20 for code validation. I believe that's probably the
21 ODEN code, but I'll let our reactor systems folks
22 discuss that.

23 And also, the incident that did or the
24 event that happened at Hatch in 1999 where they
25 experienced a load reject from 98 percent power and

NEAL R. GROSS

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

1 KKL had a turbine trip at 113 and a low generator
2 reject at 104, and both of those events followed again
3 code predictions.

4 Our conclusion is taht conducting large
5 transient tests would not provide significant new
6 information regarding transient modeling and component
7 performance and that the Clinton EPU test program is
8 acceptable.

9 Thank you.

10 MR. ZWOLINSKY: Good job. Okay, I would
11 ask that the session be closed now because we'll be
12 doing our reactor systems.

13 (Whereupon, the proceedings went
14 immediately into Closed Session.)

15

16

17

18

19

20

21

22

23

24

25

1 MR. HOPKINS: Again, this concludes our
2 presentation. The Staff finds that 20 percent power
3 uprate for Clinton can be accepted and approved. We'd
4 request a letter from the licensee discussing our
5 presentation.

6 MEMBER POWERS: You discuss, you request
7 a letter from the licensee discussing your
8 presentation? I'm sure they'd be happy to critique
9 you.

10 (Laughter.)

11 MR. HOPKINS: They probably will.

12 CHAIRMAN APOSTOLAKIS: Or disagree with
13 you.

14 MR. HOPKINS: You got me. A letter from
15 the Committee. Thank you.

16 MR. ZWOLINSKY: I do thank the Committee
17 for your time and while we may have rushed through a
18 few of our presentations, we were trying to push a
19 number of our Staff before the Committee to give an
20 indication of some of the areas that we focused on.

21 With that, I feel the staff has completed
22 their presentations.

23 MEMBER POWERS: Thank you, John. I'm
24 going to pass on a comment from the Subcommittee and
25 that is that the Subcommittee found that this safety

NEAL R. GROSS

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

1 evaluation report was among the most readable in the
2 power updates that they had. I know that's been an
3 area of concern for you and the Subcommittee detected
4 real progress in improving the readability of those
5 reports.

6 MR. ZWOLINSKY: Thank you.

7 MEMBER POWERS: Mr. Chairman, I think at
8 this point I think we're done with this session.

9 CHAIRMAN APOSTOLAKIS: Thank you, Dr.
10 Powers. I also thank the representatives from the
11 licensee and the Staff for their presentations and we
12 will recess until 10 minutes past 11.

13 (Off the record.)

14 CHAIRMAN APOSTOLAKIS: Okay, we are back
15 in session. The next agenda item is the proposed NEI-
16 00-04 report, Option 2 Implementation Guideline for
17 Risk-informing the Special Treatment Requirements of
18 10 CFR Part 50.

19 We sent to the Staff and NEI a set of
20 questions last January and we had an opportunity at
21 the Subcommittee meeting in February, February 22nd to
22 discuss these questions and the responses from NEI.
23 The Staff has forwarded the questions to NEI. So --
24 well, I must also point out as it will be pointed out
25 later, this Committee has also written two reports to

NEAL R. GROSS

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

1 the Commission, one dated October 12, 1999 and the
2 other February 11, 2000 on importance measures and
3 related matters.

4 So today, we will -- the Staff has
5 requested a letter. Last time, at least, at the
6 Subcommittee meeting, you said that you would like to
7 see a letter with the Committee's views. I assume you
8 still would like to have a letter from us. You can
9 change your mind, if you wish.

10 MR. REED: Yes, as you'll see in the
11 slides, currently, we're asking for a letter. If
12 there are big issues, show stopper issues that the
13 Committee has that we really need to address in order
14 to go forward and get your concurrence on the proposal
15 --

16 CHAIRMAN APOSTOLAKIS: Okay, so why don't
17 we start then and see how well -- and then we'll
18 discuss the issue.

19 MR. GILLESPIE: Well, knowing that the
20 Committee was really going to focus today on
21 categorization process which is kind of a cornerstone
22 of the rule, let me kind of give you just in a
23 nutshell the status of kind of where we stand.

24 Frank Gillespie, NRR. The rule has been
25 delayed. So the nature of the letter and the nature

NEAL R. GROSS

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

1 of this meeting might be slightly different, so let me
2 kind of give you the context of that. Two things
3 we're still wrestling with that within the staff. One
4 is having a categorization document, guidance document
5 and working with NEI which right now is kind of a work
6 in progress. We sent 17 pages and comments to them
7 and they're digesting them and so it's going to be
8 another iteration.

9 And the importance of the categorization
10 document going with the rule and being substantially
11 finished or at least let's say at 80 and 85 percent,
12 so the people can understand what the cost of doing
13 this rule is, having a categorization process and
14 committees and other things. So that was considered
15 an important element. Our original schedule for
16 April, even my optimistic view, I said well, let's
17 send up what they have with our 17 pages of comments
18 and that wasn't going to be the right thing to do. It
19 wasn't going to be -- we would not have worked out
20 back and forth with all the stakeholders the right
21 kind of document, so we've delayed the rule from April
22 to July.

23 Now, if we can beat July, our criteria
24 really is less to date and is more having both the
25 rule and a guidance document that goes to set. And

NEAL R. GROSS

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

1 taht's our real criteria. And the guidance document
2 has to be close enough that we have a high possibility
3 of general acceptance that it's rational.

4 So the guidance document is still kind of
5 a work in progress. Besides the guidance document and
6 it might be a subset and I know you're not here to
7 discuss this, but in my mind they're not unrelated, is
8 the question under special treatment, if you notice
9 the last draft words, the only real special treatment
10 that still is left in for RISC-3 components is
11 50.55(a). And what the Staff is still grappling with
12 is how to achieve -- how do we write achieving what
13 50.55(a) is trying to achieve, even for low risk
14 components. And do you have to continue to have
15 50.55(a) apply or is there a way to deal with that
16 wthin a more performance-oriented approach, for
17 example, within cateogroization. And I'll give you
18 one example and then turn it over to Tim of -- this is
19 kind of an on-going discussion in the staff so I can't
20 even say ther'es a position on it. There are several
21 positions.

22 It's not clear to me right now that our
23 current rule and the current guidance says explicitly
24 that you have to consider known degradation mechanisms
25 as part of your consideration in what you're going to

NEAL R. GROSS

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

1 do relative to a RISC-3 component. Yet, does not
2 50.55(a) try to continue a certain level of assurance
3 for a component, even if you're in a risk-informed space
4 which fundamentally is saying we're maintaining our
5 input reliability or the input to our decision process
6 is being sustained.

7 And so what kind of what we're grappling
8 with is the only way to say to do that for some
9 mechanical components and pressure things and passive
10 things is by dictating 50.55(a) or is there another
11 way of dealing with it in what the various committees
12 would be considering within the guidance and within
13 categorization.

14 I've taken my best shot at what we're
15 grappling with and we've got the staff here. If you
16 want to discuss that later as a point, Tom Scarborough
17 and John Fayer are here, Gareth and Mike Cheof, so
18 we're still grappling with that one point. And it's
19 an important point and we haven't come up with the
20 exact way to deal with it and make that decision yet.

21 There is a meeting next week where we're
22 trying, going to try to make a definitive decision and
23 the Staffs are kind of working on different points of
24 view and how do you approach that problem. Not a
25 problem, but how do you say what you want to say and

NEAL R. GROSS

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

1 get what you want to get in the most performance-
2 oriented risk-informed way?

3 So, that's in my mind those two decisions
4 are not mutually exclusive. And the other comment we
5 did get back to NEI was that these committees, the IDP
6 Committee, we haven't necessarily articulated how they
7 should establish criteria or what the higher level
8 criteria they should be considering is. And that's a
9 piece that we need some time to go back and forth on
10 to discuss because clearly all the components are not
11 considered in the PRA and the mathematical model and
12 in particular, how do you deal with the passive
13 components. Again, not disconnected from 50.55(a) and
14 is that in or out, particularly for passive pressure
15 kind of things.

16 So that's what we're wrestling with and
17 with that, I'm going to turn it over to Tim. I talked
18 to George, yesterday, and I've asked Tim to go through
19 the presentation, the formal presentation as quickly
20 as possible, so that maybe we can get your advice on
21 these questions we're grappling with and we got the
22 staff here that maybe we can have some interactive
23 discussion on it. Because we don't know the right
24 answer.

25 CHAIRMAN APOSTOLAKIS: Good idea.

NEAL R. GROSS

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

1 MR. GILLESPIE: Thanks, George.

2 MR. REED: This is Tim Reed from NRR and
3 I have with me also over at the side table Mike Cheof
4 from Gareth Parry to assist here today. The focus
5 here really is focusing on the categorization pieces,
6 Option 2 and looking at what are the remaining key
7 issues that we need to resolve so that ultimately we
8 can get this Committee's endorsement going forward.
9 So that's what I'll be trying to focus this discussion
10 towards.

11 And this won't look -- this should look
12 very familiar to most of you from the Subcommittee.
13 This tries to give a high level overall status of
14 where we stand on categorization. We recently sent
15 our third round of comments to NEI back in early
16 February and those comments, as Frank mentioned, like
17 14 pages or whatever, represent what the Staff believes
18 are the key issues that need to be resolved for us to
19 reach agreement on the categorization guideline NEI-
20 00-04. They reflect both the Palo Verde activity
21 feedback that we've had to date. We've observed three
22 pilots. In effect, next week is the last pilot, Palo
23 Verde, and we'll be observing that one two. And they
24 also reflect the staff's review of draft revision B of
25 NEI-00-4. As you're aware, that document is going to

NEAL R. GROSS

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

1 be revised and it's a work in progress and ultimately
2 will become, I believe, draft revision C.

3 There are some major issues and I've just
4 hit a few here and there are several other issues in
5 this 14 pages that, in fact, I agree with some of the
6 comments that ACRS brought up in the Subcommittee, but
7 hitting some of the bigger ones here, the issue of
8 long-term containment integrity and how you consider
9 that within the element of defense-in-depth and how
10 the IDP considers that. That's an issue, that's a
11 comment, you'll see in our comments back to NEI. It's
12 been an on-going issue.

13 The element of the IDP, the IDP guidance
14 and whether that's sufficiently structured, I think it
15 probably needs a little bit more structure there.
16 That's the nature of our comments. I think the
17 Committee has that. In fact, I think NEI would agree
18 to that to some extent. That's a feedback coming back
19 to the pilot activities also. And then the whole
20 issue of the PRA quality, the use of the PRA review
21 process, how we roll that in and how the staff develops
22 review guidance to judge whether, in fact, a PRA has
23 sufficient to support the categorization process. So
24 that's a very key issue here.

25 All these issues, I believe, from a

NEAL R. GROSS

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

1 technical standpoint, I think the staff believes, can
2 be resolved. So there's nothing here that can't
3 technically be resolved. That doesn't mean that we
4 have significant work, but nothing appears to be a
5 technical roadblock at this point.

6 Of course, we have to come back to this
7 Committee and get -- the Committee needs to see more
8 of a final product, obviously. And so we need to come
9 back for the proposed rule concurrent stage and as
10 Frank mentioned, our schedule at this point is to try
11 to get this to the Commission by the end of July. And
12 so that puts us actually in a very, very tight,
13 difficult schedule to try to get this Committee, get
14 a letter from this Committee to support that schedule
15 to get this whole package to the Commission by the end
16 of July.

17 And I don't know if NEI is going to speak
18 today or not, but NEI is in a very tight situation
19 too. They have our comments. They'll have the IDP
20 next week. They have to take the feedback from that.
21 Roll it back into NEI-00-04, work through their side
22 to get agreement and then send it to us and then we
23 need to look at that and with the draft reg. guide,
24 get it to the Committee and all that before July. So
25 you can see there's an awful lot that has to happen

NEAL R. GROSS

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

1 here in the schedule.

2 So that kind of gives you the high view,
3 the important pieces of categorization and where they
4 fit into the proposed rule schedule.

5 Now these are some of the high points and
6 I'm not going to suggest that this is the Committee's
7 views. This is what the Staff heard, what we think
8 are important and I'm sure the Committee would think
9 there are other issues that were discussed that are
10 more important to individual members. But I'm just
11 going to hit a few of the high points here. But an
12 overriding theme, I think, we heard numerous times
13 during the Subcommittee meeting was that several
14 members mentioned or expressed concerns with the
15 underlying basis that supports the NEI-00-04 document
16 and whether or not that basis is really there, or the
17 document or the studies there -- is there something
18 you could point to that says yeah, we all agree. I
19 think most people, in fact, agreed, that they thought
20 it was conservative, but that's more of a subjective
21 judgment and I think it was the Committee's view that
22 we probably ended to have more in place as far as
23 something to point to, in fact, that demonstrates more
24 clearly, in fact, that a lot of these assumptions that
25 we're making are, in fact, robust and lead to a robust

NEAL R. GROSS

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

1 categorization.

2 These were some of the issues that we took
3 away, the staff took away, you see listed there, what
4 should be the -- what kind of failure rates and what
5 should be the increase in failure rates. AS you're
6 well aware, the numbers are being bantered about
7 between 3 and 5 increase in factor of failure rates
8 for the sensitivities. When you roll this up into the
9 CDF and LERF sensitivities, as you're well aware,
10 South Texas uses a 10. What should be the
11 sensitivity? What should the number be? Should it be
12 a distribution? There's lots of discussion there.

13 The fuseell-Vesely and the risk
14 achievement worth screening criteria or guideline
15 values, what they should be? I think there was even
16 mention of distributions and how you might want to
17 handle that.

18 There was consideration of rolling up and
19 addressing uncertainties in the whole model, whether
20 that should be done or not. And the whole issue of
21 common cost failure was addressed pretty extensively
22 also. And also in combination with RAW, as a matter
23 of fact, at the Subcommittee.

24 And as I mentioned, the Committee's --
25 I'll let the Committee speak for itself, but I think

NEAL R. GROSS

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

1 some of the Committee would like to see some of this
2 more documented out there for everybody so everybody
3 could -- and I believe the ACRS mentioned another
4 important comment. I think it agrees with the staff
5 that perhaps the 00-4 guidance, the NEI-00-04 guidance
6 should have a little more structure, a little more
7 guidance to the IDP. I think we think that too. I
8 think it would help to make more effective, efficient,
9 repeatable decisions from IDPs, wherever they occur.
10 I think we all agree with that. I think even Mike
11 even agrees with that to some extent also.

12 CHAIRMAN APOSTOLAKIS: After the expert
13 panel makes its determination in whatever way, we're
14 going to work on the process, but let's say at the
15 very end, they have categorized now system structures
16 and components, how do you know that they're right?
17 You're putting all your trust in the process or are
18 there other mechanisms at the end for you to gain some
19 confidence that yes, what they have done is, in fact,
20 reasonable?

21 Remember now, we're talking about
22 thousands of system structures and components. IN
23 other words, are we approving a process and then
24 telling the licensee go ahead and implement it and as
25 long as you follow the process, we're happy.

NEAL R. GROSS

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

1 MR. REED: I'll answer the easy part. It
2 is a process approval. To the extent of the
3 confidence in the process and whether the validity of
4 that process is maintained over time, I'll answer
5 another easy piece of it. That's a function, I think,
6 of monitoring and bringing information, operational
7 experience back into the process and ensuring that
8 you're assumptions, the categorization assumptions are
9 maintained valid over time.

10 I'll let Gareth and Mike, if you want to
11 say something intelligent than that.

12 MR. CHEOF: Basically, I think after the
13 IDP categorizes all the SSCs, the PRA is supposed to
14 qualify the change in risk from all the SSCs that are
15 put in RISC-3. And this change in risk is supposed to
16 be shown to be small, according to the guidelines we
17 provide in Reg. Guide 1174, but I don't think that's
18 the question you're asking. I think the question is -
19 -

20 CHAIRMAN APOSTOLAKIS: That's part of the
21 process.

22 MR. CHEOF: That's right, that's part of
23 the process.

24 CHAIRMAN APOSTOLAKIS: The process has
25 been completed and they go ahead and they categorize

NEAL R. GROSS

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

1 things.

2 How do yo uknow that what they are doing
3 is reasonable?

4 MR. CHEOF: I think --

5 CHAIRMAN APOSTOLAKIS: Not that they are
6 trying maliciously to not implement it, but we're
7 talking about thousands of SSC's here and peoplea re
8 people. They make mistakes and so on.

9 MR. PARRY: I think Tim was right. In a
10 part of this follow-up is the monitoring of the SSCs
11 and we do have an update requirment for the risk
12 analysis and the process itself that takes into
13 account operating experience. I think the one problem
14 we see is that in the monitoring for the RISC-3 SSCs
15 might also decrease which might not provide you with
16 enough feedback that you might need. So it's
17 something we need to work on.

18 CHAIRMAN APOSTOLAKIS: Operating
19 experience in these things is probably admitted by
20 you, I would say, because a lot of these systems and
21 components, I mean we are really intersted in their
22 performance during an accident, right? So I mean you
23 would probably be concerned about the proper
24 categorization of particular things and you would not
25 wait until something happens to see whether things

NEAL R. GROSS

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

1 work. Are you planning to have sort of an audit on a
2 random basis or some other basis to get that feeling
3 that things are being implemented the way they're
4 supposed to and the results are reasonable?

5 I've heard -- Frank told me the other day
6 that the MSIVs were according to some people were
7 miscategorized at the South Texas project. I'd like to
8 know a little more about it, why they feel that way.
9 That's a major component. I mean it's something that
10 we can look at.

11 I don't know, Gareth, if you don't have an
12 answer now, that's fine, but that's something that
13 concerns some Members of this Committee. What is
14 happening? Are we turning over the responsibilities
15 now to the licensees?

16 MR. PARRY: There's one other program we
17 have on place, the reactor oversight program that I
18 think also has a role in finding degradation for
19 components.

20 CHAIRMAN APOSTOLAKIS: Good.

21 MR. PARRY: It obviously is not foolproof,
22 but I think it is -- if there is a finding, then it
23 has to be pushed through the SDP and that can -- that may
24 reveal another --

25 CHAIRMAN APOSTOLAKIS: The actual

NEAL R. GROSS

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

1 oversight process it not really looking at the
2 categorization.

3 MR. PARRY: No, no, it's not looking at
4 the categorization. It would be looking at
5 conditions that might arise because, for example, a
6 lack of treatment in certain areas.

7 MR. GILLESPIE: This is hard to answer,
8 but the answer is we haven't figured it out yet and I
9 think I want to be careful. The oversight program is
10 us overseeing a licensee carrying out its
11 responsibilities.

12 CHAIRMAN APOSTOLAKIS: Right.

13 MR. GILLESPIE: And we cannot build in a
14 dependency on our actions for the safety of the
15 facility. And one of the things that we're groping
16 with just a little bit this morning and in an earlier
17 meeting was how do we deal with the exact question
18 you're asking. And have we actually, have we
19 necessarily given either the right comments in the
20 area of reinforcing -- you're attesting is the quality
21 of the decision. What's our confidence when we made
22 the decision that RISC-3 is really RISC-3? I don't
23 have an answer for you, but it was a question that we
24 had on the table and we were kicking it around this
25 morning.

NEAL R. GROSS

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

1 The other question is how do you know that
2 the input criteria that you made your decision are
3 continuing to be sustained?

4 For example, if you did a sensitivity
5 study and you did vary things by a factor of 4, how do
6 you know that all those RISC-3 components were still
7 within that envelope? And then we got into a
8 discussion of the word degradation mechanisms need to
9 be considered and right now it's not clear that within
10 our guidance and clearly not within our rule that the
11 word considered known degradation mechanisms up front
12 is actually any of our rule or the guidance. And I'm
13 going to -- Tom Scarborough has got an example he gives
14 of - and I've got to give him credit, but I got it
15 third hand, so if I don't say it right, Tom, jump in,
16 is if you have valves, a lot of small valves that have
17 grease on the stems and they are in a steam tunnel and
18 you're going to get hardening of the grease, that's an
19 environmental condition that needs to be considered in
20 all aspects of what we now have in the rule where
21 we've got monitoring and all those different
22 paragraphs. And yet we haven't necessarily written in
23 the rules the idea of considering environmental
24 conditions. So we're grappling with that right now.
25 And I'm going to suggest that that's my connection to

NEAL R. GROSS

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

(202) 234-4433

www.nealgross.com

1 50.55(a) which is a mechanism right now within our
2 requirements that tries to grapple with assuring that
3 continued reliability. So what we're trying to do is
4 get to the roots of how do we say that. We don't have
5 it righ tnow.

6 CHAIRMAN APOSTOLAKIS: It's something that
7 woudl be --

8 MR. GILLESPIE: WE've got it on the table.
9 I'm not sure qyite how to do it, and do it without
10 superimposing just a bevy of QA requirements on the
11 PRA and decision process also. I mean in my mind I've
12 got to keep, we've got to keep this as a staff in
13 perspective. We are delaing with low risk components
14 to the greatest degree possible. We hope we have a
15 credible process, but how do you check that your
16 process was carried out the way you thought it hshould
17 be.

18 MEMBER SHACK: But in yoru particular
19 example, that's an active component. Wouldn't that be
20 covered under the maintenance rule?

21 MR. GILLESPIE: The miantenance rule is
22 one of the exemptions within 50.69. So that's a
23 special treatment rule that this RISC-3 coponent
24 would be exempted from. So it's consideration in
25 advance of that to meet the other aspects of the rule,

NEAL R. GROSS

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

1 good enough, or do you need a requirement that says go
2 inspect it every eyar and we're caught between how do
3 we get at the essence of the deterministic go and
4 inspect it every year and the right oncontext of kind of
5 a risk-informed, performance-based and we're wrestling
6 with it. Again, I don't know the answer.

7 CHAIRMAN APOSTOLAKIS: I undrsatnd.

8 MR. GILLESPIE: I think we've got the
9 question.

10 MR. REED: Saying it a little bit
11 different way, when you look at whether you feel
12 comfortable with this process going forward as an NRC,
13 a regulator, you look well, what, whwere were the
14 requirements reduced, so that focuses you down on
15 RISC-3. That's where we removed ruquirements.
16 Everything else, we're keeping requirments and putting
17 more on. So I look down at Box 3 first and say what
18 could go wrong there. Well, what could go wrong there
19 is obviously they could degrade over time. YOu could
20 lose either functionality or you could go outside the
21 bounds of your sensitivity analysis. How do you fix
22 that? Well, then you look at what's the feedback
23 mechanism. So you can see how our logic works to try
24 to get to the exact sisue you just brought up and
25 maybe we can do it in a performance based manner

NEAL R. GROSS

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

1 that's consistent with the principles of Option 2. I
2 don't know. We're wrestling with it.

3 MEMBER BONACA: On the issue that you
4 raised regarding how do you know, okay, one comfort we
5 got from SDP was that they claimed that for each
6 component that was in a certain category there was a
7 full document description of how they got to that
8 particular based. So therefore, one could envision
9 that you could have an audit to understand how it was
10 applied and there was -- I didn't understand that this
11 would be a requirement under the NEI document.
12 Traceability wasn't clear there to me.

13 MR. GILLESPIE: Yes, and that's part of
14 what I said. The guidance document is a work in
15 progress, and in fact our thoughts are actually
16 evolving even right now as people are putting these
17 issues, like the valve in the steam tunnel, or there's
18 RISC-3 and there's RISC-3. Which 3 is the spectrum,
19 and you draw a threshold. But as you get closer to
20 the top end of that threshold, the sensitivity study
21 actually takes on more importance as to whether you're
22 within the threshold or not.

23 How do you that in rules space and in
24 guidance space without overburdening a system? It's
25 a compromise to some degree. We're wresting with

NEAL R. GROSS

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

1 that, and that's why I think we're going to actually
2 have some more interaction with NEI on it, because we
3 want them wrestling with us with some of these same
4 questions, and we might not have articulated them the
5 same way in the letter we sent them. Because as we're
6 talking to you and other people, our thought processes
7 are saying how can we get along with this? How can we
8 kind of -- we're focusing in on these specific kind of
9 questions that we might not have -- our thinking might
10 not have been completely clear even three months ago.

11 CHAIRMAN APOSTOLAKIS: Anything else on
12 this topic? The second bullet there, "Some ACRS
13 Subcommittee members would like studies to perform."
14 I think it's important to make it clear what kind of
15 studies and what kind of analysis we're talking about
16 here. I think there are two categories. One is
17 genetic type of studies. And, again, we're not
18 talking about multi-year kind of things. I mean
19 experienced people can do these things in a short
20 period of time. But generic kinds of studies that can
21 support various approximations or assumptions that are
22 being made routinely, and NEI 004 articulates those,
23 what is being done. I don't expect that if one does
24 these studies, the basic approach will be really upset
25 too much.

NEAL R. GROSS

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

1 But it seems to me that we ought to be
2 doing things that we understood very well. For
3 example, this issue of uncertainty in importance
4 measures. Frankly, I don't think it's going to be a
5 big issue, but I would hate to have the only evidence
6 that I have come from a professor and a graduate
7 student somewhere who did something six years ago.
8 Can we make sure that we understand that this is not
9 an issue? And how long will it take to do that? I
10 don't think it's going to be a long study, and this is
11 kind of generic. It's not something that every
12 licensee will have to do later.

13 Now, speaking of what the licensees will
14 have to do, I don't understand why -- I mean, I agree
15 with you that the sub-bullet there, parametric as well
16 as model uncertainties, the real issue is really model
17 uncertainty here, not the parametric. And yet we're
18 mixing the two. We know -- I mean if there is one
19 thing we know now is how to handle parametric
20 uncertainty. And it's easy to do, to propagate. But
21 still the document ask that this be done. It plays
22 with sensitivity studies that it's not clear now which
23 part of the sensitivity study addresses the model
24 uncertainty, which part addresses the range of the
25 parameters of lambda and so on.

NEAL R. GROSS

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

1 Some of this stuff, it seems to me, can
2 become much cleaner and more convincing. And, again,
3 I don't -- I think it's going to be of great value to
4 the independent panel. It really will be. In fact,
5 in our letter of three years ago, we said that one
6 should do studies of this type, and then the insights
7 that will be gained -- let's see how we put it. Now,
8 at that time we were looking at Appendix T, but "The
9 guidance to be provided in the proposed Appendix T for
10 the Expert Panel should include insights gained from
11 the implementation of Recommendation 4 above, which
12 was really doing all these studies that I just
13 mentioned."

14 And that I see as an essential part to
15 making sure that the whole process is on solid ground.
16 In other words, just because somebody's an expert on
17 plant systems I'm not sure he's really qualified to
18 use fussell vesely and RAW without any other
19 information to categorize things. I mean, we need a
20 combination of types of expertise here to come up with
21 a reasonable product for the same reason that I
22 wouldn't trust a guy who understands RAW and fussell
23 vesely and never been to a plant to do this
24 categorization. Should you have some --

25 MEMBER POWERS: But I mean isn't that

NEAL R. GROSS

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

1 fairly a hypothetical thing? I mean who is going to
2 be involved in a categorization process that only has
3 fussell vesely and RAW data only?

4 CHAIRMAN APOSTOLAKIS: We should take PRA
5 guy who has never really been to a plant? I mean, I
6 don't think would be a proper member, but that's not
7 my point here. My point is that when you're
8 presenting the results from the PRA using RAW and
9 fussell vesely, to what extent should you train the
10 Expert Panel, or educate them, as to what these
11 measures mean, limitations perhaps, and so on. It's
12 like the expert opinion thing that was done for the --

13 MEMBER POWERS: Well, I think that's the
14 point is that it's the limitations on these measures.
15 I mean nobody's going to use them with no other
16 information. You simply can't. I mean, it's just not
17 physically possible to close your mind to other
18 information.

19 CHAIRMAN APOSTOLAKIS: No, no. That's not
20 what I meant. But I mean --

21 MEMBER POWERS: No. I think your point
22 that the limitations of these things are not well
23 appreciated.

24 CHAIRMAN APOSTOLAKIS: Right.

25 MEMBER POWERS: And they are severely

NEAL R. GROSS

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

1 limited, and it's the one of time variation that's the
2 principal limitation, to my mind.

3 MR. PARRY: George, I'm not sure that the
4 members of the IDP necessarily to be looking at the
5 RAW and fussell vesely values themselves. I think
6 that they would be looking at the overall results of
7 the categorization that would have been performed PRA
8 analysts that would have taken into account all these
9 uncertainties about fussell vesely and RAW. I mean
10 it's not clear to me that they need -- that the IDP
11 needs to actually understand what a RAW is.

12 CHAIRMAN APOSTOLAKIS: If I were them, I
13 would like to understand.

14 MR. PARRY: But that's not the only thing
15 that goes into the categorization that they're going
16 to be presented with. There's a whole slew of --

17 CHAIRMAN APOSTOLAKIS: But it's a major
18 input, though. It's a major input.

19 MR. PARRY: It's an input. I'm not sure
20 it's that major of an input. It's the starting point
21 for the categorization.

22 MEMBER POWERS: Well, I mean even if it's
23 just that, even if it's just the starting point for
24 the categorization, then I think it's important to
25 understand the limitations on that starting point.

NEAL R. GROSS

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

1 MR. PARRY: Yes. And I think the process
2 recognizes the limitations on the starting point and
3 compensates for it by requesting some other additional
4 studies. In particular, it also requests the
5 valuation of delta CDF and delta LERF.

6 MEMBER POWERS: Well, I think the concern
7 is that the choice of those augmenting studies that
8 you speak of here, the additional information,
9 requires some substantial understanding of what the
10 limitations of the fussell vesely and RAW numbers are.

11 MR. PARRY: And shouldn't that be a part
12 of the process NE 00-04 that recognizes those
13 limitations and designs the process to compensate for
14 them?

15 MEMBER POWERS: Yes.

16 MR. PARRY: And that's what it tries to
17 do.

18 CHAIRMAN APOSTOLAKIS: But the point is
19 that the Expert Panel also should become aware of
20 these at some level anyway. You don't want them to
21 become expert but at some level.

22 MR. PARRY: I think that might involve a
23 quite considerable amount of PRA training if go
24 through all that.

25 CHAIRMAN APOSTOLAKIS: Well, I don't know

NEAL R. GROSS

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

1 about that. You know, you can -- I'm not sure that's
2 the case.

3 MR. CHEOF: I guess let me add something.
4 I guess in the current NEI 00-04 guidance and in the
5 IDP that we have observed so far the IDP members have
6 been pre-trained in a one-day PRA training as to the
7 results they are getting and what they mean, and I
8 guess, like you all say, the limitations of the PRA.
9 I am not sure that the training includes things like
10 the uncertainties in terms of parameters and models.
11 And perhaps the models might get -- the modeling
12 uncertainty might get mentioned in the fact that these
13 initiators are not modeled and we will account for
14 these initiatives this other way using this flow
15 chart, for example, in NEI-00-04. But there is
16 training for the IDP members, for all IDP members, and
17 that training does include importance measures.

18 CHAIRMAN APOSTOLAKIS: I don't remember
19 that, but if there is, fine.

20 Now, you guys agree with the NEI, at least
21 the version we saw, that it's good enough to use so-
22 called point values and then do sensitivity analysis?

23 MR. PARRY: In general, yes.

24 CHAIRMAN APOSTOLAKIS: Even when you
25 calculate delta CDF, which is a very small number?

NEAL R. GROSS

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

1 MR. PARRY: Well, going back to --

2 CHAIRMAN APOSTOLAKIS: And why do it that
3 way? What do you say? Is it a big deal to do it
4 right?

5 MR. PARRY: Actually, for some people it
6 may be. But then that's just a technical issue on the
7 codes.

8 CHAIRMAN APOSTOLAKIS: For some people.

9 MR. PARRY: It depends on the
10 quantification code you have, George. Some of them
11 are not set up to do the proper state-of-knowledge
12 correlation on uncertainties, and you have to do that.

13 CHAIRMAN APOSTOLAKIS: Maybe they
14 shouldn't then be following Option 2.

15 MR. PARRY: No, no, no, no. Because what
16 it also -- we address this issue also in Reg Guide
17 1.174. We had the same issue. And what we said there
18 was you should do it by propagating uncertainties to
19 get the correct mean, but you could also -- if you
20 could demonstrate, by reviewing the cutsets, that in
21 fact this impact of the state-of-knowledge correlation
22 was not significant, then that would be another way of
23 demonstrating that you got close enough to the mean
24 value. Because that's the only thing that changes the
25 mean value from using input mean value as a point

NEAL R. GROSS

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

1 estimate in all the calculations.

2 CHAIRMAN APOSTOLAKIS: No, no. It's not
3 the only thing.

4 MR. PARRY: I believe it is.

5 CHAIRMAN APOSTOLAKIS: When you propagate
6 point values, don't you need the values?

7 MR. PARRY: No.

8 CHAIRMAN APOSTOLAKIS: Yes.

9 MR. PARRY: No. Not with cutsets, you
10 don't. Only if you have correlated variables.

11 CHAIRMAN APOSTOLAKIS: The early PRAs were
12 done that way. I did it by hand, and you have to use
13 the variance too. The expressions for the mean
14 involve the variance.

15 MR. PARRY: If you are multiplying
16 together basic events that depend on the same
17 parameter for their probabilities, yes, you have to
18 propagate the variance, but otherwise the mean
19 translates. If they're totally independent variables,
20 it doesn't matter if you add them or multiply them,
21 it's the mean value.

22 CHAIRMAN APOSTOLAKIS: Anyway, we don't
23 need to debate that now, but I don't think you're
24 right. I think to propagate the nth moment, you need
25 the N plus one moments.

NEAL R. GROSS

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

1 MR. PARRY: You don't need the nth moment
2 if --

3 CHAIRMAN APOSTOLAKIS: Well, you need the
4 first one; therefore, you need the second too. But
5 the point is that even though the -- by and large,
6 you're right, the number will be close enough.

7 Wouldn't the sensitivity studies be more
8 meaningful if you had such a baseline analysis to do
9 them, rather than playing with the point values and,
10 say, "I multiplied by two and I will go now to the
11 95th percentile." What's the basis for all this?

12 MR. PARRY: I think you'll find in the
13 latest version of NEI-00-04 that you were looking at,
14 certainly as far as the independent failure rates,
15 that taking them to the 95th percentile and the 5th
16 percentile's been taken out. The parameters that are
17 varied in that way are things like common cause
18 failure parameters and human error probabilities.

19 And the reason I think they're put in
20 there that way is because we know that those are
21 pretty uncertain values, and what we want to do by
22 doing those sensitivity studies is to make sure that
23 either -- the importance of certain components has not
24 been either inflated by using pessimistic common cause
25 failures value or deflated by using very optimistic

NEAL R. GROSS

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

1 values. It's like a safety net, if you like. And I
2 think that's the reason for it being there, and I
3 think it is informative to do that.

4 CHAIRMAN APOSTOLAKIS: And how will you
5 know that the point values that they will use will be
6 the mean values?

7 MR. PARRY: Because they've been declared
8 to be the mean values. And I think you'll find that
9 that's a lot of the way things were done in the past
10 and it's historically. But those point values are
11 probably chosen from generic -- for a start, if they
12 were point values and purely point values, they would
13 probably have been got from generic estimates. And I
14 think most people, in choosing the values, would have
15 chosen the mean value of any generic estimate. And if
16 it's a --

17 CHAIRMAN APOSTOLAKIS: So, in essence,
18 what you're arguing is that we should forget about the
19 additional uncertainty analysis, because it doesn't
20 really matter. I mean that's what you're saying.

21 MR. PARRY: That's not quite what I'm
22 saying.

23 CHAIRMAN APOSTOLAKIS: Well, when does it
24 matter then?

25 MR. PARRY: I'm saying that you don't

NEAL R. GROSS

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

1 necessarily need -- that you can survive without doing
2 it.

3 CHAIRMAN APOSTOLAKIS: The document was
4 very clear that you don't need it. It didn't say
5 necessarily.

6 MR. PARRY: We all said it's preferable to
7 do it.

8 CHAIRMAN APOSTOLAKIS: But you should have
9 some benefits when you do it.

10 MR. PARRY: If there is indeed a major
11 benefit to be obtained from it. And that's perhaps
12 one of your studies.

13 CHAIRMAN APOSTOLAKIS: Well, I mean one of
14 the goals of the Commission is to inspire public
15 confidence.

16 MR. PARRY: Yes.

17 CHAIRMAN APOSTOLAKIS: Also doing things
18 right has to have some value.

19 MEMBER POWERS: Well, I don't know that
20 doing it right, but calling something a mean value
21 that isn't a mean value does not sound very confidence
22 inspiring.

23 CHAIRMAN APOSTOLAKIS: That's right.

24 MR. PARRY: But there is -- I think for
25 very many of the parameters it's actually quite

NEAL R. GROSS

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

1 difficult to get the generic distributions. And I can
2 give you an example. A long time ago, I was involved
3 in an exercise to generate a database, a generic
4 database for ASEP. The way it went was that everybody
5 voted on what value they should use for the
6 parameters, and they said, "Okay, what uncertainty
7 should we put on this? Put down a factor of three or
8 should we put ten?" And that was a vote as well. And
9 that's how some of these old, generic databases were
10 generated.

11 Now, it turns out, actually, as data is
12 being collected that they were not all that bad, and
13 as more and more people have done data collection on
14 their own plants and updated the distributions using
15 the Bayesian methods, they haven't found that the mean
16 values, in general, have strayed too far from those
17 originals.

18 CHAIRMAN APOSTOLAKIS: My experience has
19 been different. In some plants, their operating
20 experience did indeed change the mean values.

21 MR. PARRY: There will be some specific
22 cases, yes.

23 CHAIRMAN APOSTOLAKIS: But were the IPEEEs
24 done that way? I mean did they use --

25 MR. PARRY: They're all over the map.

NEAL R. GROSS

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

1 CHAIRMAN APOSTOLAKIS: -- mean values that

2 --

3 MR. PARRY: They're all over the map.

4 CHAIRMAN APOSTOLAKIS: They're all over
5 the map.

6 MR. PARRY: Yes.

7 CHAIRMAN APOSTOLAKIS: So how do we know
8 that these will not be all over the map as well?

9 MR. PARRY: I think one of the things that
10 we're proposing to put in our view guidance with the
11 staff is that indeed the parameter value should be
12 compared to well-documented generic databases to see
13 if they are significantly different.

14 CHAIRMAN APOSTOLAKIS: But it seems that
15 the reason why you're arguing that way is because some
16 people might have difficulty doing it rigorously. So
17 why don't you then say, "This is the rigorous way of
18 doing it, and if you don't do it that way, you do it
19 another way, you also have to do something else, so
20 there is a penalty"? And that's fine.

21 MR. PARRY: But they do have to do
22 something else.

23 CHAIRMAN APOSTOLAKIS: The version we saw
24 did not ask for uncertainty propagation at all. It
25 just said --

NEAL R. GROSS

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

1 MR. PARRY: Right.

2 CHAIRMAN APOSTOLAKIS: -- these are the
3 point values.

4 MR. PARRY: But in calculating the delta
5 CDF.

6 CHAIRMAN APOSTOLAKIS: It didn't say
7 anything there either.

8 MR. PARRY: Maybe it didn't, but -- well,
9 I can't defend the NEI document in that regard, but --

10 CHAIRMAN APOSTOLAKIS: I mean when we
11 calculate the difference of two very small numbers,
12 are we arguing that uncertainty doesn't count? I
13 mean, boy, that's really -- when you calculate delta
14 CDF and delta LERF, has anybody demonstrated that if
15 you work with mean values, you get a reasonable
16 difference when you're talking about ten to the minus
17 six and seven? I don't know. Because as we know, the
18 uncertainty increases, right?

19 MR. PARRY: Again, I think you can -- by
20 reviewing the cutsets that drive those deltas, you can
21 see whether there's likely to be a difference. That's
22 the extra work you have to do to show it.

23 CHAIRMAN APOSTOLAKIS: One of the papers
24 that was published in '68 by Allen Cornell, that was
25 one of the first papers that showed that probablistic

NEAL R. GROSS

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

1 methods can indeed give you counter intuitive results,
2 had this example in it. You have the difference of
3 the stress minus the strength, you have some
4 uncertainty in each, okay? And the variance of the
5 difference is in fact the sum of the variances, which
6 is kind of counter intuitive. It increases the
7 uncertainty. The difference of the means -- I mean
8 the mean of the difference is the difference of the
9 means, and everybody says, "Yes, big deal. I knew
10 that." But the uncertainty increases by how much, and
11 the variance is the sum of the variances.

12 So now we are calculating these delta CDFs
13 and delta LERFs that are such small numbers, and this
14 morning we saw ten to the minus seven, and we are
15 completely ignoring these subtleties, if you wish, of
16 the methods. I mean somebody has to demonstrate that
17 it doesn't matter, if it indeed it doesn't. I don't
18 know.

19 So even if we accept the premise that
20 point values, mean values -- the declared means values
21 really don't matter when you do the baseline
22 calculation using fussell vesely and RAW, when you go
23 to the delta CDF they still don't matter, the
24 uncertainties? I mean when you're now calculating
25 differences of very, very small numbers? I don't

NEAL R. GROSS

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

1 know. I'm not saying it does, but can someone show me
2 some evidence that it doesn't matter?

3 And I think it's the same thing as we were
4 talking about the availability or unavailability of
5 PRA. If you have a PRA, your life should be easier
6 using fussell vesely and RAW and all that stuff. If
7 you don't, then your categorization process should be
8 much more conservative, right?

9 MR. PARRY: Yes.

10 CHAIRMAN APOSTOLAKIS: I mean is that
11 evident in NEI 00-04? I don't know.

12 MR. CHEOF: We think it is. We have made
13 that comment before that, you know, if a licensee has
14 a PRA for an external event, that they can be less
15 conservative, and if they were to categorize using a
16 method that's not PRA quantified, they have to be a
17 lot more conservative.

18 CHAIRMAN APOSTOLAKIS: Yes. We can agree
19 that that's the way it should be. But does the
20 document do something that guarantees that this will
21 happen?

22 MR. CHEOF: I think there's at least one
23 statement in there that says that. I'm not sure if
24 the process itself --

25 CHAIRMAN APOSTOLAKIS: Oh, okay.

NEAL R. GROSS

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

1 MR. CHEOF: I mean they do have flow
2 charts in there and how they can treat the other
3 external events. And the staff has looked at those
4 flow charts, and I think we are working with NEI as to
5 how we can ensure that those flow charts will indeed
6 give you more conservative results than if you had a
7 PRA.

8 MEMBER KRESS: Let me ask what might sound
9 like a strange question. This process of
10 recategorization of SSCs is -- the view, seems to me,
11 we've got to already have a categorization. That's
12 the reason we end up with four categories. And that
13 the process is going to be applied to plants that have
14 already categorized and we're just going to
15 recategorize. Can the process be applied to a brand
16 new plant that comes in and says, "I haven't
17 categorized yet."

18 MR. REED: Yes.

19 MEMBER KRESS: Do they have to go through
20 the old process first and categorize and then --

21 MR. REED: Yes.

22 MEMBER KRESS: So is the old --

23 MR. REED: I think they would have to.

24 MEMBER KRESS: So the old process would be
25 part of the overall process.

NEAL R. GROSS

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

1 MR. REED: Obviously, this hasn't happened
2 yet, and so it's going to be a little bit of a
3 speculation on my part, but if somebody was to, today,
4 decide to apply for a new license and follow the
5 current Part 50 and then try to adopt 50.69 in the
6 process, I think what they would first have to do is
7 basically go through like the old design basis,
8 safety-related world --

9 MEMBER KRESS: They have to go through the
10 whole design basis.

11 MR. REED: Do that on paper now.

12 MEMBER KRESS: Yes.

13 MR. REED: And then basically do a
14 categorization, and then take that whole safety-
15 related and non-safety-related world, translate it
16 into the four boxes, now all on paper, come in
17 basically with that submittal, and they would procure
18 from the get-go Box 3 to be RISC-3. So they would --
19 right from the start the whole plant would be procured
20 that way. That's a big difference versus current
21 facilities.

22 MEMBER KRESS: Yes. That's my impression
23 of what would have to be done.

24 MR. REED: That's correct.

25 MR. GILLESPIE: Yes. On the other side,

NEAL R. GROSS

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

1 if it's a certified design, the certification is, in
2 and of itself, a rulemaking. And so someone who has
3 a certified design could apply the concepts of Option
4 2 likely within the context of the certification. So
5 Tim described someone who would be coming in applying
6 for a license under the current Part 50 as if they
7 were 20 years ago. Yet we have a different process
8 which might actually allow a little more freedom and
9 innovation. Because a rule can offset a rule.

10 MEMBER KRESS: Yes.

11 MR. GILLESPIE: And the certification
12 itself is a rule.

13 MEMBER KRESS: I understand.

14 MR. GILLESPIE: I think that's how we'd
15 end up getting around this without rewriting all of
16 Part 50 again.

17 MEMBER KRESS: Yes.

18 CHAIRMAN APOSTOLAKIS: I can give you an
19 example from this morning's presentation of abuse of
20 PRA models, and only if you really have seen a lot you
21 appreciate it. We were told that the time to respond
22 to something was reduced from nine minutes to six
23 minutes. And there was a table that said, "and the
24 core damage frequency increases by less than one
25 percent." Now, Gareth, you don't believe that, do

NEAL R. GROSS

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

1 you? You know that it can't and on the face of it is
2 a misleading statement. Are there any models -- any
3 reliability models that can really tell the difference
4 between a nine-minute response and a six-minute
5 response, and everybody agrees that, yes, that's true?
6 I mean there are ideas, there are judgments, there is
7 this, there is that, and yet it was presented this is
8 what it is.

9 Now, the application was not risk-informed
10 so it didn't matter, but you see that my point is that
11 somebody who knows will look at this thing and say,
12 "What's going on here? This is really nonsense." But
13 it's not essential to the decision, so you let it go.

14 MR. REED: I think I'll just add a
15 comment; hopefully it's constructive. But I think
16 some of the issues you bring up are why in Option 2
17 space why we're risking forming only assurance
18 requirements and maintaining the design basis down in
19 Box 3, albeit with less assurance.

20 It almost -- I'm not saying I know what
21 you think, but sometimes I get the feeling that we're
22 trying to justify significant technical changes here,
23 and I think you'd have to know a lot better some of
24 these uncertainties if you were trying to make
25 technical changes to the facility. At least that's my

NEAL R. GROSS

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

1 own personal opinion; perhaps you don't. But in
2 Option 2 space, in think we get some comfort from the
3 fact that we're going to be maintaining the design
4 basis functions.

5 CHAIRMAN APOSTOLAKIS: The problem is that
6 when we start using PRA in real decisions, we seem to
7 be going backwards, and we seem to treat methods and
8 models in a cavalier way. You know, you want the
9 delta CDF involving time-dependent human errors? I'll
10 give you one. Okay. And everybody says it's one
11 percent. I mean when in fact the answer is there are
12 ten different models out there, and you can get any
13 answer you want. And the truth, in my mind, is that
14 you can't really quantify such a difference, I mean,
15 with any degree of confidence at this level.

16 I mean you know that it's a good thing.
17 It's actually a bad thing in this case because
18 available time was decreased by a little bit. But you
19 can't really put a number. But if you keep doing it
20 that way and you never really raise the flag and so
21 on, eventually it will become practice, and that's
22 bad.

23 MR. PARRY: Well, I think though, George,
24 in that particular example, I think it's incumbent
25 upon the reviewer to figure out what model's been used

NEAL R. GROSS

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

1 and whether if they used alternate models if they'd
2 get a different answer. And that's part of --

3 CHAIRMAN APOSTOLAKIS: And why isn't that
4 applicable here? If you use a different model, you
5 may get a different answer.

6 MR. PARRY: I think that there are -- I
7 mean at least in one of our comments, one of the
8 things we said was that you should identify the
9 assumptions that drive the changes, and they should be
10 candidates for performing sensitivity studies --

11 CHAIRMAN APOSTOLAKIS: That's right.

12 MR. PARRY: -- to see whether they impact
13 the categorization.

14 CHAIRMAN APOSTOLAKIS: I guess we're
15 talking about two different things now. You're
16 referring to comments you have submitted to NEI, which
17 I am not aware of.

18 MR. PARRY: Right.

19 CHAIRMAN APOSTOLAKIS: And I'm referring
20 to NEI 00-04, the document I have viewed.

21 MR. PARRY: I know. And one of the things
22 in 00-04 is if you look at the sensitivity studies
23 that are specified, they do have a category there
24 which are those that I think that are revealed by the
25 facts and observations from the peer review process.

NEAL R. GROSS

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

1 So that gets part of the way to where we want to be,
2 but I don't think it gets all the way there.

3 CHAIRMAN APOSTOLAKIS: Anyway, shall we go
4 on?

5 MR. REED: Sure.

6 CHAIRMAN APOSTOLAKIS: Unless there are
7 other --

8 MR. REED: Anymore questions on this
9 slide? Okay.

10 So continuing with two more key points
11 then, one of which has been made several times already
12 today, NEI 00-04 is an interim product, it's in a
13 state of flux. It's certainly going to change. NEI's
14 going to update it and roll back in the feedback
15 they've gotten from pilot activities and also address
16 our comments. And it's understandable and of course
17 appropriate that ACRS would reserve its final judgment
18 until they have a more final product. So that's all
19 this slide simply reflects.

20 MR. GILLESPIE: I think, George, part of
21 the discussion this morning has highlighted why it's
22 a work in progress. Fourteen pages of comments, and
23 I forget how long NEI 00-04 was, but I think it was
24 only -- Tony, help me out, about 30 pages long?

25 MR. ULSYS: Categorization piece --

NEAL R. GROSS

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

1 MR. GILLESPIE: Categorization piece.

2 MR. ULSYS: -- was 17 pages long.

3 MR. GILLESPIE: Okay. So we've submitted
4 comments that are in excess of approaching 15 percent
5 of the total document. And we need to see how it now
6 comes out of this next step in the process and have
7 another iteration. I'm not promising that everything
8 you've said will be considered, but I think the idea
9 of assuring the applicability of the study to what
10 we're using it for, the need to do that is a concept
11 that we will be trying to embody in it.

12 I don't know how to do it, and there's
13 been discussion that's over my head on how to do it,
14 but I think we understand the comment and have some
15 sympathy for it. Now, we have to figure out is how to
16 articulate it where it's consistent with what we think
17 are low-risk components also.

18 CHAIRMAN APOSTOLAKIS: The way I see it,
19 Frank, is you have to make approximations, you have
20 to. I mean that's the way life is. If you do, it
21 seems to me, somewhere there you have to demonstrate
22 that it's an approximation, rather than saying, "Well,
23 we've done it many times, and it came out that way."

24 The other thing is I think it would be
25 useful to say, "Look, if you do it this way, in a

NEAL R. GROSS

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

1 rigorous way, this is the benefit you get. If you do
2 it in a less rigorous way, you should be a little bit
3 more conservative, and this will guarantee that that's
4 case. And typical example here is when you have a PRA
5 or you don't. A guy who has a PRA for fires, for
6 example, should be able to get more benefit out of it
7 than somebody who did five, right?

8 MR. GILLESPIE: Yes.

9 CHAIRMAN APOSTOLAKIS: Or the seismic
10 Heathcliff, whatever they call it, or rigorous PRA.
11 And then when you go to the places where there is no
12 PRA at all, then you make sure that you have a
13 conservative approach. So this kind of phased
14 approach, I think, would go a long way towards
15 convincing me, at least, that this is a good, solid
16 approach.

17 MR. REED: I think everybody agrees with
18 that concept, and I believe we are trying to assure
19 that's in this guidance document.

20 MR. GILLESPIE: Yes. In fact, I'll say it
21 a little different way. What the staff would like to
22 do is give people who have gone that extra mile to do
23 an external event PRA in some detail or shut down PRA
24 in some detail or fire analysis, we'd like them to be
25 able to maximize the benefit they get from their

NEAL R. GROSS

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

1 investment.

2 CHAIRMAN APOSTOLAKIS: Exactly.

3 MR. GILLESPIE: So in principle, we're in
4 total agreement. And right now, though, we're trying
5 to endorse what -- I could generalize, this is a
6 generalization -- a one-size-fits-all kind of guidance
7 document. And what you're saying is when you read the
8 guidance document, you didn't see the spectrum that
9 would actually encourage people to do the right thing
10 because of the benefit from it.

11 CHAIRMAN APOSTOLAKIS: Exactly.

12 MR. GILLESPIE: So I think I got -- I know
13 where you're coming from and we're in total agreement,
14 but the staff being in agreement doesn't mean the
15 industry who's writing the industry guidance is
16 necessarily writing it with that same concept in mind.
17 We can give them the comment and they're here. If
18 they heard the comment. But how they embrace that
19 comment, we're going to be reviewing for the purpose
20 involved, whatever they submit. But I think it's a
21 valid comment. And, indeed, in disk space and risk-
22 informed tech spec space, we would also, in a risk-
23 management sense like to give people the maximum
24 payback for what they've invested and what should be
25 a better decision tool.

NEAL R. GROSS

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

1 How do we get there? We haven't figured
2 that out yet. You know, it's difficult. As a
3 regulator you can't dictate that to somebody, but we
4 would hope the industry would kind of grasp that
5 concept and maybe figure out how to factor it into
6 their document also.

7 A mutual gain on that, because there is a
8 spectrum of facilities out there with a spectrum of
9 tools available. And how do you give that guy who's
10 put a big investment in the maximum return, and that's
11 really your question, versus writing a guidance
12 document to the median level? It's a fair comment.
13 Tony, you've got the comment.

14 MR. PIETRANGELO: We'll wait our turn.

15 MR. GILLESPIE: Okay.

16 CHAIRMAN APOSTOLAKIS: Well, are there any
17 more questions for the staff?

18 MR. REED: I guess I'd just like to say on
19 this last slide, it kind of rolls everything up, I
20 would simply mention that, probably said already, I
21 think we've said everything here, but if the Committee
22 has major issues, then we'd like to have a letter, and
23 we certainly appreciate the Committee's input, and
24 it's obviously a great deal of expertise in the PRA on
25 this Committee, so appreciate that.

NEAL R. GROSS

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

1 MR. GILLESPIE: And I hate to say it, this
2 being March and our rule due in July means we probably
3 need a letter in June. So it gives us about 30 days
4 to get you something for potentially an April or May
5 meeting.

6 MEMBER POWERS: We're not that slow.

7 MR. GILLESPIE: No, but we may -- just in
8 counting back, if we're trying to get something to the
9 Commission and we need a letter by July, I'm not sure
10 that we might not have to have something to you so
11 that you can read and review it for a June meeting.
12 Which may mean, I don't know, a May Subcommittee
13 meeting.

14 So, anyway, we're going to be back again.
15 I'm anticipating, George, that we'll probably have
16 another Subcommittee meeting and full Committee
17 meeting.

18 CHAIRMAN APOSTOLAKIS: Yes. That would be
19 good. When you say that the staff requests a letter,
20 you mean now, this letter you are --

21 MR. REED: Yes. The letter I'm asking for
22 right now if there are major issues that -- I'd like
23 to be able to --

24 MR. GILLESPIE: Yes. We're going to have
25 to come back again for a second letter. So the

NEAL R. GROSS

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

1 context of this letter is we're really having a
2 dialogue now and we're looking for suggestions, advice
3 and anything you want to give us. We'll be back again
4 for another letter.

5 CHAIRMAN APOSTOLAKIS: The two letters
6 that I mentioned that we have already written they
7 still stand.

8 MR. GILLESPIE: Yes.

9 CHAIRMAN APOSTOLAKIS: Okay?

10 MEMBER SHACK: Just coming back to your
11 degradation problem for a minute, isn't part of that
12 an artificial thing where you insist on -- or at least
13 the guidance sort of gives all components the same
14 increase in failure rate. If you really went through
15 and you said, you know, "A valve and a steam tunnel,
16 if I don't have the special treatment, it's failure
17 rate may go up X a valve sitting out in a benign
18 containment environment."

19 MR. GILLESPIE: Well, exactly, and that's
20 why --

21 MEMBER SHACK: And it seems to me that
22 that might be a sensible place to begin to attack that
23 kind of a problem. I think we're going to have to go
24 to sensitivity analyses, but I'm not sure that -- you
25 know, the broad X approach that's been chosen at the

NEAL R. GROSS

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

1 moment really, I think, penalizes the industry to a
2 certain extent.

3 MR. GILLESPIE: And that's something we
4 just really started coming to grips with, because it's
5 kind of an overriding consideration for all those
6 paragraphs we've got in the rule for monitoring and
7 conditioning and all those different things. So it's
8 kind of an -- there's a sentence in there someplace
9 that we might not have right now that says, "Consider
10 this when you're doing these things."

11 We're not saying hide a monitor, but
12 clearly monitoring of these components, whether it's
13 needed or not in that decision, the intent is to
14 maintain the credibility of the decision process that
15 you made when you made your decision on what you
16 needed to do or the decision that it was RISC-3. How
17 do we sustain the credibility of the decision process,
18 both in the beginning and as an ongoing basis? We're
19 wrestling with that right now. Because you would
20 penalize people. If you make a blanket statement,
21 it's like, well, we're going back to the old way of
22 doing things. So we want to leave some flexibility in
23 there.

24 MEMBER SHACK: Okay.

25 MR. GILLESPIE: Thank you. I think that's

NEAL R. GROSS

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

1 it for the staff.

2 CHAIRMAN APOSTOLAKIS: Thank you very
3 much. Tony? Welcome.

4 MR. PIETRANGELO: Good afternoon. I'm
5 joined by Adrian Haymar and Biff Bradley from NEI. We
6 wanted to -- we were primarily going to talk about the
7 categorization guides today, and I know you had a
8 Subcommittee meeting where you got a pretty extensive
9 presentation on that guidance. We're not going to
10 redo that today, obviously.

11 What we did want to talk about, though,
12 and I think Tim set it up quite well, this is a work
13 in progress. We have your comments, we have the
14 staff's comments. We think we have a comprehensive
15 guidance document for this categorization. Before we
16 began the pilot categorization effort that began last
17 fall, I think we had a critical time last July with
18 the staff to make sure there were no show stoppers in
19 the guidance that would preclude the pilots from
20 trying to demonstrate the usefulness of NEI 00-04. We
21 got to that point. I'm sure there's additional
22 comments that can be incorporated.

23 I think Tim captured the issues we're
24 working on quite well, in terms of addressing the late
25 containment failure and the IDP guidance. I think the

NEAL R. GROSS

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

1 peer review piece is a separate issue. Quite frankly,
2 that applies to all the PRA applications. We have an
3 entirely separate effort dealing with that. We met
4 with the Office of Research last month on the guidance
5 to endorse both the ASME standard as well as our peer
6 review guidance, so that's going in parallel with
7 this. Certainly, this is one of the most important
8 applications that exercises all elements of the PRA.

9 One thing I do want to point out where we
10 are in kind of our stage of development here, and this
11 issue has come up and we've talked about the ASME
12 standard and PRA quality, in general, this is an
13 evolutionary process. I think if we get too hung up
14 with the level of precision about where we are today,
15 I mean that stops progress. That's why we've been, I
16 think, pretty adamant from the outset on here that
17 there's a need for NRC staff review of any Option 2
18 application.

19 We didn't buy the Appendix T concept of
20 you raise your right hand and swear that you meet all
21 the stuff that's detailed in Appendix T and then the
22 staff doesn't have to review it. We're not in the
23 stage of development with PRA and the comfort level
24 yet to do that. And we were glad to see the staff
25 pull that out of 50.69, because, again, that's a nice

NEAL R. GROSS

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

1 goal to shoot for maybe in five or ten years when we
2 do have added confidence in the studies, but we're not
3 there yet.

4 So if Gareth or Mike or any other NRC
5 staff reviewer has a particular question about what
6 the licensee did in the Option 2 application, they can
7 ask the question in the process. We still intend to
8 define a template, just like we did -- we're using
9 risk-informed ISI as a model for this, a template of
10 what the licensee would submit as part of an Option 2
11 application.

12 So I think the process -- that's another
13 part of the process. We've tried to follow 1.174.
14 That has worked quite well. I think some of what I
15 gathered from the discussion this morning, George, is
16 that we're starting reopen some of the things that
17 were discussed when 1.174 was developed. And I think
18 in the context of an application, that's not the time
19 to do it. It should be done independently of the
20 application.

21 We think sensitivity studies were one of
22 the things that 1.174 said you could do to address
23 areas where you have uncertainties. And that's what
24 we're doing. So we're trying to follow the guidance
25 that's out there that's been successful, and not try

NEAL R. GROSS

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

1 to reinvent that, with the Option 2 guidance.

2 Your Committee spent a lot of time on
3 1.174. All those issues were debated quite
4 thoroughly. And to reopen that as we go through this
5 process again, I'm not sure is the most --

6 CHAIRMAN APOSTOLAKIS: Well, and I would
7 have to be convinced that I'm reopening issues. I'll
8 go and read 1.174 again, but lets go on.

9 MR. PIETRANGELO: Okay. The other thing
10 we wanted to briefly chat about today is the
11 treatment, and Frank teed up some of those issues. I
12 mean to us we've been talking about treatment I think
13 going back to graded QA now for almost ten years. And
14 it continues to bewilder us that the focus of the
15 reviews are on the low safety significant SSCs.
16 That's not what risk-informed regulations are all
17 about. That's what we see all the hand wringing about
18 just about in every application we get into. And it's
19 like each application, before we get to the end of it,
20 it seems like the entire regulatory process has to be
21 dumped into this one application, and we forget about
22 all the other things that are at play out there.

23 Besides the revised oversight process,
24 there's requirements in the rule that the licensee has
25 to meet, all right? And they're subject to inspection

NEAL R. GROSS

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

1 and enforcement. And if they don't do what they said
2 they were going to do, then that's willful non-
3 compliance, and the staff knows very well how to deal
4 with willful non-compliances.

5 So I mean we have to remember there's
6 whole other regulatory construct around Option 2 that
7 doesn't go away. And we just started hearing about
8 these known degradation -- failure mechanisms and
9 degradations. Well, we know what those are. They
10 don't go away when we go to Option 2. If a valve or
11 any other piece of equipment goes into the
12 preventative maintenance program, you don't forget
13 about all the other stuff that happened to it. All
14 that operational experience is still there.

15 And so NRC can audit the implementation of
16 Option 2. They can audit the performance monitoring
17 that goes on with Option 2. Most of it's already
18 captured in the maintenance rule.

19 And the other thing, you know, the
20 industry has experience with categorization, even
21 before the maintenance rule with some of the MOVs and
22 a graded QA application. So we've been doing
23 categorization for a long time. Let's demystify
24 what's going on here. I mean this is not going to
25 hinge on some number in the PRA as the one thing going

NEAL R. GROSS

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

1 up or down. I mean to even suggest that that's
2 happening through this is absurd, okay? The Expert
3 Panel there's guidance in our document now that talks
4 about the requirements for the Expert Panel, that's
5 similar to the folks that are around the table here,
6 okay?

7 So, again, to get tied up in the level of
8 detail and the PRA calculations and all that, we want
9 to do a good technical job, I'm not here to say
10 otherwise, but unless it has an impact on the result,
11 then we can spend an awful lot of time in the noise
12 level of this and not get to the fundamental purpose
13 of it, which is we've been categorizing SSCs for a
14 long time, we have a very comprehensive process we're
15 trying to develop and get the staff to endorse, and
16 your endorsement, and give the best guidance we can to
17 the licensees who wish to go into Option 2.

18 And the short answer to your question that
19 you posed at the end, if they don't have a sound
20 technical basis from which to defend moving the thing
21 down from RISC-1 to RISC-3, they're not going to do
22 it, because they're going to be subject to the NRC's
23 review, and if you don't have an argument, you can't
24 just wave your hands at it and say, "Now, it's RISC-
25 3." There's an extensive process to go through, both

NEAL R. GROSS

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

1 PRA and other studies done, as well as the Expert
2 Panel review, and that will be subject to the staff's
3 review also. We have to put faith in that process.

4 And even afterwards in implementation, if
5 there's new information that comes to the table,
6 there's mechanisms to treat that, just like there is
7 with any other regulation. And how do you know we're
8 implementing a(4) from day to day, how do you know
9 we're doing 50.59 right from day to day? So that
10 whole rest of the regulatory process is there to bring
11 those up again within this context. I mean we've all
12 been in this business a long time, and to wring our
13 hands over that kind of stuff at this point just seems
14 to me to be a waste of time.

15 I'm being very candid with you this
16 morning. We've been working on this for a long time,
17 progress has been slow. We've got the last pilot on
18 categorization next week. We'll be rolling that into
19 the next draft of our guidance. We're way ahead of
20 where we are normally on a rulemaking with regard to
21 the development of guidance. In most cases, the
22 guidance document isn't even developed until the final
23 rule is done.

24 (Laughter.)

25 We're way ahead of the game on this one.

NEAL R. GROSS

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

1 It's even been piloted already to a certain extent.
2 So remember where we are in the context there. That's
3 all I'm asking.

4 And we've been listening to the questions
5 back there and we could point out places in the
6 guidance to try to address your questions, but I'll
7 ask Adrian and Biff if they want to add anything to
8 that.

9 MEMBER POWERS: In thinking about things
10 to add, I guess this philosophical issue that George
11 brings up on rigor in the use of PRA, I'd be
12 interested in your comments on that. You've already
13 addressed it somewhat. But I guess what I'm
14 interested in is the desirability of having a nice
15 rigorous treatment with respect to PRA, understanding
16 that the PRAs that we have today bear faint
17 resemblance to the PRAs we'll have in ten years or 20
18 years.

19 MR. PIETRANGELO: Right. We want them to
20 be rigorous, we want it to be a repeatable
21 application, we want to have some stability in the
22 process. We're all for rigor, okay? But if you don't
23 have the study for a particular scope element of the
24 PRA, then you've got to use another means. You're not
25 even going to be an Option 2 potential applicant --

NEAL R. GROSS

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

1 MEMBER POWERS: Because you're too far
2 away, yes.

3 MR. PIETRANGELO: -- right, if you're too
4 far away from that. I mean no one's going to submit
5 themselves to the gauntlet of review here if they
6 don't think they've got a good technical basis from
7 which to do the categorization.

8 MEMBER POWERS: But doesn't everybody
9 think that because of the IPEEEs?

10 MR. PIETRANGELO: No. I don't think
11 everybody thinks that. Not to the extent we're
12 talking about here in Option 2. I think for purposes
13 of the maintenance rule when we were trying to
14 establish the level of monitoring that was done, I
15 think the answer to your question was yes. For this
16 purpose, I think this is much more rigorous, and I
17 think we're finding out from the pilots, not only more
18 rigorous but more costly to do and resource-intensive.
19 So unless you're really serious about it, you're not
20 going to do it.

21 CHAIRMAN APOSTOLAKIS: Anything else?
22 Thank you.

23 MR. PIETRANGELO: Thank you, George.

24 CHAIRMAN APOSTOLAKIS: I always appreciate
25 Tony's way of -- elliptical way of making a point. I

NEAL R. GROSS

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

1 would like to thank the staff as well. And we will
2 reconvene at 1:25.

3 (Whereupon, the foregoing matter went off
4 the record at 12:27 p.m. and went back on
5 the record at 1:27 p.m.)

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

A-F-T-E-R-N-O-O-N S-E-S-S-I-O-N

1:27 p.m.

CHAIRMAN APOSTOLAKIS: We're back in session. The next item is the Arkansas Nuclear One, Unit 2 Core Power Uprate. The ACRS cognizant member is Mr. Sieber. Jack, it's yours.

MEMBER SIEBER Thank you, Mr. Chairman. The application and the SER that we're going to discuss this afternoon differs from the previous power uprates that we've had in that this is the first pressurized water reactor that has applied for an uprate in power greater than our cutoff limit, which has been five percent. And so this will be the first PWR that we have undertaken to examine. On the other hand, the staff has done previous uprates of lesser increases in power in the past.

Interestingly enough, the Arkansas One, Unit 2 is a combustion engineering plant, and in the process of deciding what guidance the applicant would use in order to make sure that they have covered all the aspects that are recommended or necessary to do a power uprate, they ended up going to a Westinghouse document, which was published in 1983, and it's WCAP 10263, and that was the basis for the applicant's process of coming up with the analysis and studies

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 necessary to do the power uprates. And on the other
2 hand, in 1997, the staff did a uprate SER for the
3 Farley Plant, and the Farley uprate was also based on
4 the WCAP that I discussed and mentioned.

5 And so there is a sort of de facto
6 template out there for the staff to write its SER and
7 applicants to do the analysis for a power uprate for
8 a PWR. Even though the Plant's combustion
9 engineering, there are plenty of similarities between
10 the combustion engineering plants and Westinghouse
11 plants so that these documents are generally
12 applicable.

13 What I'd like to do now is to introduce
14 Mr. Craig Anderson from Entergy, and he is Vice
15 President of Operations, and he will guide us through
16 Entergy's presentation on the power uprate.

17 MR. ANDERSON: Okay, sir. Thank you very
18 much.

19 MEMBER SIEBER Sure.

20 MR. ANDERSON: Again, I'm Craig Anderson.
21 I'm the Site Vice President for Entergy at Arkansas
22 Nuclear One. We've got several other presenters here
23 I would like to introduce, and if you all would raise
24 your hand in the back. Bryan Daiber is the Senior
25 Staff Engineer that will present a lot of the

NEAL R. GROSS

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

1 technical information today. Rich Swanson is the
2 Senior Reactor Operator that we brought. I think the
3 operational aspects of a power uprate are very
4 important, and we felt like we needed to discuss
5 those. Dale James, the Manager of Engineering
6 Programs and Joe Kowalewski, the Director of
7 Engineering. We also have other folks here, members
8 of our staff, that might address questions that might
9 come up. And also Westinghouse folks here to address
10 any questions that they might help us with.

11 One of the thoughts might be, well, you're
12 combustion engineering in NSSS, you've got
13 Westinghouse here. If you recall, Westinghouse
14 acquired combustion engineering a few years back, and
15 these folks were previously on the combustion
16 engineering staff, so we've got good technical
17 expertise here to try and address those questions.

18 Over the next hour, we will discuss the
19 results of years of work to both analyze our Plant
20 and, where necessary, to install modifications to
21 support a safe power uprate of the Unit. You'll see
22 that we were careful to maintain the operating and
23 design margins, and just as importantly to us, to
24 minimize new challenges to the operators. We
25 certainly don't want a power uprated plant that's not

NEAL R. GROSS

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

1 reliable or that presents difficulties to the
2 operators.

3 Where we weren't comfortable with our
4 margins we modified our Plant, and we will talk about
5 several of those modifications during our
6 presentation. We, of course, used accepted
7 methodologies and we've, in all cases, demonstrated
8 compliance with regulatory and safety limits.

9 A little bit about the project before I
10 turn it over to Bryan. Our goal is a seven and a half
11 percent uprate. That's where we've completed our
12 analysis to support that uprate. And it essentially
13 was a balance on the financials between the investment
14 that you make in the Plant and the return you get from
15 the investment, and, of course, that without adversely
16 impacting the available design and operating margins.

17 I think one of the things that's important
18 to point out, the majority of the modifications that
19 were needed to support power uprate have already been
20 made. They were installed during the last refueling
21 outage in the fall of 2000. And we've operated this
22 operating cycle, which ends next month, with those
23 modifications, and the modifications have performed
24 quite well.

25 The most significant modification was

NEAL R. GROSS

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

1 steam generator replacement. Steam generator
2 replacement, while it was not driven primarily by
3 power uprate, it was driven by the degradation of
4 alloy 600 tubing. We took advantage of the need to
5 replace the steam generators and increased the heat
6 transfer area, both to support power uprate and also
7 give us some more margin.

8 The rest of the mods, most of them, in the
9 balance of Plant will be installed in the spring, and
10 we will complete all the necessary work for the power
11 uprate, including the start-up testing following the
12 outage to support the power uprate.

13 So we believe we're prepared for the
14 uprate. We've done a thorough review of the equipment
15 and our analysis and our procedures, and that's been
16 completed. We have been and are continuing to train
17 our operators on the uprated Plant to make sure that
18 they are ready, and we believe our people and
19 equipment are ready.

20 And let me turn it over to Bryan Daiber
21 who will go through the technical portion of our
22 evaluation. Bryan?

23 MR. DAIBER: Make sure the microphone's
24 working here. I'm Bryan Daiber. I'm the Safety
25 Analysis Lead. I was the Safety Analysis Lead for

NEAL R. GROSS

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

1 both the RSG and the power uprate projects. I will be
2 going through several of the presentations today. The
3 first one I'm going to go over are the plant
4 modifications for considerations of power uprate.

5 For ANO2, we've been considering power
6 uprate for the past four cycles. We were obviously
7 considering steam generator replacement due to
8 degradation of the alloy 600 tubes in those. In
9 preparation for that, we were trying to move the
10 copper from the secondary side system, so we replaced
11 the condensers and other major components to do that.
12 And in doing those replacements, we kept power uprate
13 in mind in the design of all those components we've
14 replaced over the past four cycles.

15 So we have replaced many of the
16 components, many of the major modifications have
17 already been implemented, and we've operated with
18 those for at least one cycle on most of the major
19 components. And as I mentioned, we did keep that in
20 mind, the power uprate was considered for those
21 modifications.

22 On this slide, we list many of the
23 modifications, balance of plant, and other
24 modifications needed to support power uprate
25 conditions. Many of the major modifications, like I

NEAL R. GROSS

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

1 said, have already been installed and have
2 accommodated for power uprate conditions. Rather than
3 go over these balance of plant type modifications, I'd
4 rather focus in on three key areas, the highlighted
5 ones in blue here: the replacement steam generators,
6 the containment uprate considerations and the fuel
7 core design considerations that we implemented for
8 power uprate itself.

9 The first key modification, the steam
10 generators. We did replace steam generators last
11 outage. There were degradation concerns with the
12 alloy 600 tubes. When we replaced these steam
13 generators, we replaced them with steam generators
14 that were specifically designed for the power uprate
15 condition. In light of that, when we designed these
16 generators, we did increase the tube sheet diameter by
17 four inches to accommodate greater number of tubes in
18 the steam generator. We also increased the surface
19 area and the number of tubes in the generator by going
20 from three-quarter-inch diameter tubes to eleven-
21 sixteenths diameter tubes. The net effect of these
22 changes allowed us to gain 25 percent surface area on
23 the tubing material in the new steam generators.

24 The result of that also resulted in an
25 increase in the primary side volume. Now this is key.

NEAL R. GROSS

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

1 The increase in primary side volume did cause a
2 challenge to the containment building pressure. As a
3 result of that, we did have to look at the building
4 pressure considerations. The volume, we essentially
5 went from 1,600 cubic feet to 1,839 cubic feet per
6 steam generator. That increase in volume obviously
7 resulted in an increase in mass of energy available to
8 blow down to containment for our LOCA analysis.

9 In comparing that to the effects of power
10 uprate, for power uprate considerations on the
11 containment analysis, power uprate results in a
12 slightly higher increase in T_{av} , and we're also
13 proposing to increase T_{cold} by two degrees. Both of
14 these effects essentially increase the energy content
15 in the RCS available for the blowdown, but it does
16 decrease the mass available. So really the net effect
17 is the increase in volume had a much bigger impact on
18 the containment pressure considerations than the power
19 uprate considerations.

20 The other thing on the new steam
21 generators, the secondary side volume also went up as
22 a result of the change. To offset that change in
23 secondary side volume, we didn't modify the steam
24 generators. The new steam generators have an integral
25 flow restricting nozzle in them. This integral flow

NEAL R. GROSS

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

1 restricting nozzle, in combination with high
2 containment pressure actuation signal, the containment
3 spray actuation signal, was sent to isolate main steam
4 and main feed. The combination of those two
5 modifications essentially reduced the peak building
6 pressures associated with the higher power steam line
7 break considerations. As a result, the hot zero power
8 steam line break is actually the most limiting.

9 MEMBER SIEBER Did you not increase the
10 sprayed area of containment also?

11 MR. DAIBER: No, we did not -- the sprayed
12 area of containment by the containment spray system
13 stayed the same.

14 MEMBER SIEBER All right.

15 MR. DAIBER: So we have designed a new
16 steam generator to accommodate power uprate
17 conditions.

18 The second key design consideration that
19 we made to accommodate power uprate was, as we
20 mentioned, we did uprate the containment design
21 pressure. We went from a design of 54 pounds to 59
22 pounds. We accommodate this increase in design
23 pressure by recognizing the fact that the Unit 2
24 containment is very similar to the Unit 1 containment,
25 although not identical. And the Unit 1 containment is

NEAL R. GROSS

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

1 already designed to 59 pounds.

2 There was a detailed finite element
3 analysis done to verify the structural capabilities of
4 the containment. That detailed finite element
5 analysis did credit additional tendons. We didn't
6 install additional tendons, but there were -- as part
7 of uprate, but during original construction,
8 additional tendons were put into the containment to
9 account for surveillance considerations and
10 construction considerations that weren't originally
11 credited in the original structural analysis. We did
12 credit those in this analysis to accommodate the
13 increase in design pressure.

14 Not only did we verify that the structure
15 itself was capable of operating at the higher design
16 pressure, we also verified the equipment inside
17 containment was also able to accommodate the higher
18 design pressure. The containment was tested at 68
19 pounds to verify its capabilities. All of this work
20 was done obviously as part of the replacement steam
21 generator project and has already been approved by
22 License Amendment 225.

23 The third key change or consideration with
24 respect to power uprate deals with the fuel core
25 design itself. At ANO2, we are currently using a

NEAL R. GROSS

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

1 Gadolinia integral burnable poison. We are going to
2 switch that integral burnable poison from Gadolinia to
3 Erbium. Now, back in Cycle 13, Cycle 16 being the next
4 core design and it's our operated core design, but
5 back in Cycle 13, we started replacing the poison
6 schims before c-schims with integral burnable poisons,
7 and Gadolinia was the burnable poison of choice at the
8 time. By replacing those schims with these integral
9 burnable poisons, we have effectively gained almost
10 four percent additional pins available in assemblies
11 for additional fuel considerations.

12 The Gadolinia burnable poison is a much
13 more potent poison, and the typical assembly will have
14 about eight weight percent Gadolinia versus about two
15 weight percent for Erbium. The Gadolinia within an
16 assembly that has Gadolinia pins, they'll be somewhere
17 between four and eight pins, or four and 12 pins per
18 assembly. Whereas with Erbium, we'll have somewhere
19 between 30 to 100 Erbium pins per assembly.

20 The Erbium is current approved methodology.
21 There are many plants within the CE fleet already
22 using the Erbium core designs. There's essentially
23 over 159,000 Erbium pins already in operation, 64,000
24 of which have already been discharged. As I
25 mentioned, the Erbium is a more dilute poison, it

NEAL R. GROSS

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

1 allows us to have better power control and gives us
2 better peaking control within the assembly itself.
3 And that helps us out just during normal operation
4 conditions and also as a result of any transient
5 conditions that would occur. It also allows us to
6 have a better control over the moderate temperature
7 coefficient.

8 MEMBER POWERS: What was the attraction of
9 selecting Erbia as the poison?

10 MR. DAIBER: Again, within the assembly
11 itself, the Erbia allows for a much more equal power
12 distribution within the assembly.

13 MEMBER POWERS: Well, I understand that.
14 That's based on the number of pins that you put in
15 there.

16 MR. DAIBER: Pins and the amount of the
17 poison. Erbia's more at two percent, whereas
18 Gadolinia's more at six to eight percent.

19 MEMBER POWERS: But you could have just as
20 well have put two percent Gadolinia and put more pins
21 in and done the same thing, couldn't you have?

22 MR. DAIBER: Jeff?

23 MR. BROIDA: Use a microphone and identify
24 yourself, please.

25 MR. DAIBER: I'll let Jeff Brown from

NEAL R. GROSS

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

1 Westinghouse speak to that question.

2 MR. BROWN: Jeff Brown, from Westinghouse.
3 Another major difference is the cross-section of
4 Erbia. It has about 200 barns cross-section for Erbia
5 compared to, I believe, about 10,000 barns for
6 Gadolinia. Gadolinia, on a per atom basis, is much
7 more stronger thing, and it depresses the local power
8 distribution almost like you had a small control rod
9 there. Whereas Erbia, you know -- so even in a two
10 weight percent concentration, the Gad would have a
11 similar effect as it does not.

12 MEMBER POWERS: Oh, okay. So you're just
13 avoiding the high cross-section --

14 MR. BROWN: Yes.

15 MEMBER POWERS: Sure, I understand.

16 MR. DAIBER: I'd like to make two major
17 points here with these comparisons of the core
18 designs. The most -- the first issue, which we've
19 already talked about is that going to the Erbia
20 burnable poison allows us to do the flatter power
21 control within the assembly itself. Also, the number
22 of assemblies we're putting in for Cycle 16 it's a
23 larger reload. Eighty new fresh assemblies are going
24 into the Cycle 16 core design. By doing that, we also
25 control the peaking factors, the radial peaking factor

NEAL R. GROSS

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

1 is going down by over seven and a half percent for the
2 uprated core designs. That gives us a flatter power
3 distribution within the whole core itself.

4 The other important point I'm trying to
5 make on this slide is the energy content. The energy
6 content for Cycle 16 is actually bounded by the energy
7 content that we've already implemented under our
8 current power rating conditions in Cycle 14. The
9 Cycle 14 length was 557 EFPD. For Cycle 16, the EFPD
10 is 485. When converted to a comparable power of
11 2,815, it's more like 521 EFPD. So it's actually
12 lower energy content. That also can be noticed by the
13 cycle burn-up value. The cycle burn-up for Cycle 14
14 was 19,770 megawatt days per ton, whereas for Cycle
15 16, it's 18,825 megawatt days per ton.

16 I'd like to make two clarifications from
17 the Subcommittee presentation. There was a question
18 asked at the Subcommittee about the fuel zoning. For
19 Gadolinia fuel assemblies, we typically have three
20 zones of U235 considerations. I believe we may have
21 mentioned only one in the Subcommittee presentations.
22 With the Erbia, there are essentially two zones of
23 zoning in the Erbia designs.

24 The other question that came up at the
25 Subcommittee meeting was with respect to the cycle

NEAL R. GROSS

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

1 burn-ups, and we've just discussed the cycle burn-ups
2 for the different core designs. Yes?

3 MEMBER BONACA: I had a question, but I
4 couldn't find the answer here. You must have changed
5 your Delta T, T hot to cold.

6 MR. DAIBER: Yes. Our RCS flow stays the
7 same, so the T hot goes up.

8 MEMBER BONACA: Yes. Have you changed
9 your pressurizer program?

10 MR. DAIBER: The pressurizer --

11 MEMBER BONACA: Program.

12 MR. DAIBER: Yes. The pressurizer level
13 control system was reviewed and verified and updated
14 as necessary to account for the Tav increase.

15 MEMBER BONACA: Because some of the early
16 CE five percent power increases didn't, and they used
17 to lose pressurizer level when they were SCRAMing. So
18 you did look at that.

19 MR. DAIBER: Yes, we did look at that.

20 With that, I'd like to move on to the next
21 agenda item, which deals with compliance with
22 regulatory requirements, and in particular they deal
23 with the Plant margins. We did review the ANO2 design
24 to make sure it could accommodate the power uprate
25 conditions. We did obviously look at all the balance

NEAL R. GROSS

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

1 of plants, and we made modifications as necessary on
2 the balance of plant to ensure that it could
3 accommodate power uprate within its design
4 considerations.

5 We also looked at the NSSS, the nuclear
6 steam supply system, which is a CE-manufactured
7 product, and we verified that all the design
8 components there could also withstand the
9 considerations on the power uprate conditions. We
10 also looked at the control systems, the pressurized
11 level control, feedwater control system and all the
12 control systems and made sure that they also could
13 accommodate power uprate. And as we discussed, steam
14 generators containment and the fuel design were also
15 considered, along with all the safety systems.

16 In the review of any of these systems, in
17 any place where we felt margin was not being
18 maintained as a result of the power uprated
19 conditions, modifications were implemented or will be
20 implemented in the next outage to ensure that all the
21 components could operate satisfactorily at uprated
22 conditions. And for the control systems, appropriate
23 set point changes have been made for those systems.

24 MEMBER SIEBER I'd like to go back to RSC
25 flow.

NEAL R. GROSS

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

1 MR. DAIBER: Yes.

2 MEMBER SIEBER During the Subcommittee
3 meeting, it was stated that the replacement of steam
4 generators had a lower DP --

5 MR. DAIBER: Yes.

6 MEMBER SIEBER -- on the primary side than
7 the original ones.

8 MR. DAIBER: That is correct.

9 MEMBER SIEBER That would increase RCS
10 flow instead of having it stay the same, right?

11 MR. DAIBER: That is correct.

12 MEMBER SIEBER And that's why your Delta
13 T change was not as much as you would ordinarily
14 calculate from a seven and a half power increase?

15 MR. DAIBER: There are several things that
16 went on. Obviously, with the old steam generators we
17 had plugged those quite a bit, and flow -- the delta
18 P had gone up, and flow had gone down. When we
19 installed the new steam generators, we designed those
20 to essentially restore the delta P of the steam
21 generator essentially comparable to the unplugged
22 original steam generators. So flow went back up as a
23 result of that, but it was more due to the plugging --
24 the removal of the plugging restrictions.

25 MEMBER SIEBER Now, it would seem right

NEAL R. GROSS

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

1 now with the new steam generators that you have a --
2 you take into account the fact that I690 has a cooler
3 heat transfer coefficient, so that takes away surface?

4 MR. DAIBER: That's true.

5 MEMBER SIEBER Looks like you have a plug
6 of about ten percent. Is that correct?

7 MR. DAIBER: When we did all of our work,
8 we did it with a ten percent consideration, so all of
9 the efforts that we undertook, we assumed a ten
10 percent plugging consideration.

11 MEMBER SIEBER And so that -- if I add the
12 eight percent and the ten percent and the seven and a
13 half percent increase in power, that accounts for all
14 the additional surface that's in there.

15 MR. DAIBER: Essentially, yes.

16 MEMBER SIEBER Okay. Thank you. Now, I
17 have one other question, going back to containment.
18 What was the containment test pressure?

19 MR. DAIBER: Sixty-eight psig.

20 MEMBER SIEBER Sixty-eight.

21 MR. DAIBER: Yes, 68.

22 MEMBER SIEBER That's 110 percent of the
23 design. Okay. Thank you.

24 MR. DAIBER: Hundred and fifteen percent.

25 Right, 115 percent.

NEAL R. GROSS

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

1 One other point I'd like to make is that
2 when analyzed the safety analysis and control system
3 considerations, we are a CE NSSS Plant, and we
4 utilized many of the CE Westinghouse methodologies for
5 performing the safety analysis, core design
6 considerations. These methodologies that we utilized,
7 that Westinghouse utilizes are the same methods used
8 by other CE plants of higher power rating than where
9 ANO2 is projected to go.

10 As we've discussed, we did install new
11 steam generators. Those steam generators were
12 specifically designed to accommodate power uprate to
13 ensure adequate margin was accommodated in those steam
14 generators. Containment was uprated from 54 to 59
15 pounds. We installed integral flow restricting nozzle
16 in the CSAS actuation to accommodate the secondary
17 side inventory associated with that. We did have to
18 modify the containment cooling fans. The horsepower
19 requirements in the cooling fans went up above the
20 motor rating at the 59 pound consideration. To
21 accommodate that, we reduced the pitch, we lowered the
22 flow a little bit, brought the horsepower requirements
23 back down within design considerations. To offset
24 that effect, our tech specs only required us to have
25 one containment cooling fan per train. We upped that

NEAL R. GROSS

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

1 to two containment cooling fans per train to offset
2 that.

3 MEMBER KRESS: How did you increase your
4 design pressure?

5 MR. DAIBER: The design pressure on the
6 containment, again, we went back and we looked at the
7 -- did a finite element analysis on the structural
8 containment design itself and verified that the
9 structure could maintain additional pressure
10 associated with that.

11 MEMBER KRESS: So you reanalyzed it.

12 MR. DAIBER: Yes.

13 MEMBER KRESS: Okay.

14 MR. DAIBER: We did a reanalysis.

15 MEMBER KRESS: And you needed that for
16 five pounds?

17 MR. DAIBER: Not all of the five pounds.
18 The 59 pounds came more from the Unit 1 design
19 consideration.

20 MR. ADAMS: Let me address that. My name
21 is Doyle Adams. I was on the containment uprate
22 project itself, also the steam generator replacement,
23 and then was also the responsible engineer for the
24 mods and things that was done to the containment and
25 the repair and the testing of the containment when it

NEAL R. GROSS

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

1 came out.

2 The way we came up with the amount we
3 could actually go, which is only about five pounds,
4 it's about ten percent additional capacity -- Unit 1
5 is very, very similar. It only lacks in tendons in
6 some areas due to the design time that it was actually
7 come in. What happened when we went through and
8 developed a complete reanalysis of the containment
9 using the BECHTEL BSAP program they have, which is
10 used for San Onofre. It was designed for concrete
11 containment.

12 There was additional tendons put into the
13 containment, like we said a while ago. There was
14 three additional tendons in each grouping for the dome
15 and the hoop and the vertical tendons. There was
16 three additional ones for surveillance only. They
17 added an additional three tendons in each group to
18 take care of construction problems that you might go
19 into and then loss of wire with the surveillance
20 processes over the life of the containment itself.

21 So you have these 18 additional tendons
22 that were not accounted for in the original analysis,
23 and that's where this additional capacity came in.
24 You also have additional -- use very conservative
25 creep values for the concrete when it was originally

NEAL R. GROSS

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

1 done, and that allowed us to maintain more of our
2 compression in the concrete due to less loss of creep
3 in the concrete.

4 MR. DAIBER: So we have reviewed the Plant
5 as a whole and verified that the Plant with design
6 margin considerations can be operated at uprated
7 conditions.

8 With that, I'm going to move down to the
9 fifth agenda item, dealing with ECCS analysis. I'm
10 going to switch things up here a little bit. And for
11 the ECCS analysis, emergency core cooling system
12 analysis, we analyzed the ANO2, large break LOCA and
13 small break LOCA considerations using 10 CFR 50.46
14 Appendix K, approved methodologies. We used approved
15 methodologies, a combustion engineering, all
16 Westinghouse methodologies, to do that analysis for
17 power uprate considerations. These are in compliance
18 with Appendix K and hence have the conservatism
19 associated with Appendix K built into them. They are
20 not the best estimate methodologies that are
21 available.

22 We did -- in order to accommodate power
23 uprate, we did move to the 1999 evaluation model for
24 the large break LOCA considerations. That was
25 necessary to ensure that under uprated conditions we

NEAL R. GROSS

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

1 did not have to impose any additional operating
2 restrictions.

3 So we did use approved methodologies. The
4 large break LOCA methodology is documented in CENPD-
5 132, Supplement 4-P, Revision 1. The small break LOCA
6 methodology, for that we used the same methodology
7 that we were currently licensed to -- are currently
8 licensed to, which is referred to as the S2M. It's
9 documented in CENPD-137, Supplement 2-PA.

10 In performing these analyses, obviously we
11 got acceptable results. We stayed within the
12 acceptance criteria. The peak clad temperature for
13 the large break LOCA analysis went up from 2,029
14 degrees Fahrenheit, which was analyzed with the old
15 methodology, and it went up to 2,124 degrees with the
16 new methodology. The small break LOCA, the peak clad
17 temperature went up from 1,905 degrees to 2,090
18 degrees. We also verified that the maximum clad
19 oxidation, the maximum core-wide oxidation and
20 coolable geometry requirements were also maintained.

21 MEMBER SHACK: Did you do a full spectrum
22 of breaks or you analyzed your limiting breaks from
23 your previous?

24 MR. DAIBER: We did a spectrum of breaks.
25 We did a spectrum of large break LOCAs and a spectrum

NEAL R. GROSS

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

1 of small break LOCAs.

2 MEMBER SHACK: How did that spectrum
3 compare with your previous analyses?

4 MR. DAIBER: It was effectively the same
5 spectrum, a very similar spectrum. The break size
6 changed on the large break LOCA, so the spectrum
7 changed a little bit to accommodate that, to make sure
8 we bounded it on each side.

9 MEMBER BONACA: For the large break LOCA,
10 you say you used a new, approved methodology?

11 MR. DAIBER: That's correct.

12 MEMBER BONACA: Was it specifically for
13 this change, to support this modification?

14 MR. DAIBER: The large break LOCA
15 methodology was developed not for power uprate. It
16 was developed generically.

17 MEMBER BONACA: Okay.

18 MR. DAIBER: But it was implemented, and
19 it was necessary. The margin gained by going to the
20 1999 EM was necessary to ensure power uprate
21 conditions without any additional operational
22 restrictions.

23 MEMBER BONACA: Okay. So you were looking
24 for some margin there, and this new methodology gave
25 it to you.

NEAL R. GROSS

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