

NUCLEAR REGULATORY COMMISSION

ORIGINAL

Title: Advisory Committee on Reactor Safeguards
Combined Thermal-Hydraulic Phenomena/
Future Plant Designs: Subcommittee Meeting
OPEN SESSION

PROCESS USING ADAMS
TEMPLATE: ACRS/ACNW-005

Docket Number: (not applicable)

Location: Rockville, Maryland

Date: Thursday, February 14, 2002

Work Order No.: NRC-232

Pages 376-447/485-729

Closed session:
pages 448-484

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

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

TROY

1 UNITED STATES OF AMERICA
2 NUCLEAR REGULATORY COMMISSION

3 + + + + +

4 ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
5 (ACRS)

6 COMBINED THERMAL-HYDRAULIC PHENOMENA/
7 FUTURE PLANT DESIGN: SUBCOMMITTEE MEETING

8 + + + + +

9 ROCKVILLE, MARYLAND

10 + + + + +

11 THURSDAY,

12 FEBRUARY 14, 2002

13 + + + + +

14 The Subcommittee met at the Nuclear
15 Regulatory Commission, Two White Flint North, T2B3,
16 11545 Rockville Pike, Rockville, at 8:30 a.m., Graham
17 B. Wallis, Chairman, presiding.

18 COMMITTEE MEMBERS PRESENT:

19 GRAHAM B. WALLIS, Co-Chairman

20 THOMAS S. KRESS, Co-Chairman

21 DANA A. POWERS, Member

22 VIRGIL SCHROCK, Consultant

23 WILLIAM J. SHACK, Member

24 JOHN D. SIEBER, Member

25
NEAL R. GROSS

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

STAFF PRESENT:

PAUL A. BOEHNERT
MAGGALEAN W. WESTON
MEDHAT EL-ZEFTAWY

ALSO PRESENT:

JOE WILLIAMS
DALE SPENCER
BOB KERESTES
HAROLD CROCKET
FRAN BOLGER
TIM BYAM
LARRY WESTBROOK
JASON POST
KENT SCOTT
ISRAEL NIR
BILL BURCHILL
KEITH JURY
TAD MARSH
JON HOPKINS
GEORGE THOMAS
TONY ULSYS
RICHARD LOBEL
DAN PAPPONE
ED THROM
ZEENA ABDULLAHI

NEAL R. GROSS

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

1 ALSO PRESENT (Continued):

2 JARED WERMIEL

3 MOHAMMAD SCHUABI

4 DAVID SHUM

5 ANDRZEJ DROZD

6 JIM LYON

7 LARRY BURKHART

8 JERRY WILSON

9 GOUTAM BAGCHI

10 DAVID TERAQ

11 RICHARD ORE

12 MIKE CORLETTI

13 STEVE BAJOREK

14 MARINO DI MARZO

15 WILLIAM BROWN

16 KATSU OHKAWA

17

18

19

20

21

22

23

24

25

NEAL R. GROSS

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

(202) 234-4433

www.nealrgross.com

C-O-N-T-E-N-T-S

PAGE

Presentation of AmerGen	381
Discussion of Large Transient Testing, Larry Westbrook	389
Evaluation of Risk Impact of EPU on Clinton, Bill Burchill	405
EPU Project Implementation, Larry Westbrook .	437
Conclusion, Keith Jury	486
NRC Staff Presentation	
Ted Marsh	488
Jon Hopkins	489
George Thomas	493
Richard Lobel	499
Review of Phase 2 Pre-application of Westinghouse AP 1000 Plant Design:	
Andrzej Drozd	528
Jerry Wilson	533
David Terao	551
Westinghouse Presentation:	
Richard Ore	581
Mike Corletti	596
Presentation by Andrzej Drozd	598

NEAL R. GROSS

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

(202) 234-4433

www.nealrgross.com

C-O-N-T-E-N-T-S

Discussion of Scaling:

Steve Bajorek 600

Marino di Marzo 633

Westinghouse Presentation:

William Brown 702

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

(202) 234-4433

www.nealrgross.com

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

(8:33 a.m.)

CO-CHAIRMAN WALLIS: The meeting will please come to order.

This is the second day of the meeting of the ACRS combined Subcommittee on Thermal-Hydraulic Phenomena and Future Plant Designs.

We will continue to hear from the AmerGen Company about the application for extended power to operate at the Clinton Power Station, Unit 1. And then we'll take a break at about ten o'clock, and then we'll hear from staff.

MR. BYAM: Good morning. I'm Tim Byam with AmerGen, and we're prepared at this point to answer the one question we took away with us yesterday.

I'd like to turn it over to Joe Williams.

MR. WILLIAMS: Thank you.

Joe Williams, Exelon Nuclear.

Yesterday during the flow accelerated corrosion presentation we stated that the highest wear rate location predicted for the power upright flow accelerated corrosion calculations was 70 mLs per year versus a 38 mLs per year predicted for pre-EPU conditions.

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 The question was asked what the actual
2 measured wear rate has been at that location. Bob
3 Kerestes of AmerGen will provide a response.

4 MR. KERESTES: Good morning. My name is
5 Bob Kerestes, and we did some checking and the actual
6 wear rate is 20 mLs per year. We have looked at this
7 area three times in the past. So we have a good
8 baseline from which to start.

9 MEMBER POWERS: Does that imply that the
10 post EPU corrosion rate will be 52 mLs per year?

11 MR. KERESTES: I don't think you can
12 necessarily say that it's going to, you know, double
13 or be uniform, and that's why we have an
14 erosion/corrosion, flow accelerator corrosion program
15 that we look at, and we will continue to monitor this
16 area.

17 MEMBER POWERS: Could it be 88 mLs per
18 year?

19 MR. KERESTES: Again, you know, we will
20 continue to monitor this and look at it, and it's
21 going to change, and we need to look at it closely.

22 MR. WILLIAMS: We believe the calculation,
23 the prediction is conservative. We can provide
24 additional information from our flow accelerator
25 corrosion specialist.

NEAL R. GROSS

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

1 MEMBER POWERS: Well, I mean, it looks
2 like it's 100 percent at certain -- when the air range
3 is equal to the major value.

4 MR. WILLIAMS: Harold?

5 MR. CROCKET: Harold Crocket.

6 In addition to what Bob just said, we do
7 have inspections ongoing. This particular line has
8 replacements scheduled for refueling outage ten, which
9 will be two cycles from now. So we do have scheduled
10 replacements, and as he stated, it is in our program,
11 as are the other lines in the steam cycle.

12 MEMBER SHACK: What kind of a line is it?

13 MR. CROCKET: It's scavaging steam goes
14 from the moisture separator reheater to the heaters.

15 CO-CHAIRMAN WALLIS: It's just pure steam
16 going through there?

17 MR. CROCKET: The quality of the steam is
18 a mix. I don't remember the exact numbers.

19 CO-CHAIRMAN WALLIS: So they are all
20 droplets in there. So this is probably why the wear
21 is so high.

22 MR. CROCKET: Yes, sir. And these lines
23 throughout the industry are noted for being fairly
24 high wear.

25 MR. BOEHNERT: You're indicating that I

NEAL R. GROSS

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

1 guess eventually these lines are going to be -- all of
2 them are going to be changed out

3 MR. CROCKET: Normally we would upgrade
4 this type of line to a chromolly or stainless, usually
5 chromolly. But we don't automatically upgrade unless
6 we see a significant amount of wear either in a sister
7 train or that type of thing. Normally we would
8 inspect first.

9 MR. BOEHNERT: Sure.

10 CO-CHAIRMAN WALLIS: Anymore questions
11 about this issue?

12 MEMBER POWERS: Well, I guess the next
13 question, I mean, what you're concerned about is some
14 sort of a surrey event where we get surprised and
15 suddenly we fry workers and things like that. With
16 this kind of uncertainty in the calculation, of
17 course, the next thing you ask is: are there areas
18 where CHECKWORKS predicts there's no problem and, in
19 fact, there is a problem?

20 CO-CHAIRMAN WALLIS: Well, is CHECKWORKS
21 always conservative?

22 MEMBER POWERS: Yeah, I mean, that's what
23 you're asking.

24 CO-CHAIRMAN WALLIS: What kind of
25 uncertainty are we talking about?

NEAL R. GROSS

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

1 MR. CROCKET: CHECKWORKS, part of the
2 planned operation of the code is that you do
3 ultrasonic inspections to refine the analysis, and you
4 input your actual measured wear from your UT exams
5 back into the program, and it has what's called a line
6 correction factor that refines those predicted wear
7 rates.

8 So, yes, they acknowledge that the code is
9 just a tool.

10 MEMBER POWERS: Well, I mean, the
11 challenge you face is that where you do those UT
12 inspections is where the code tells you you ought to
13 do the UT inspections; is that correct?

14 MR. CROCKET: The code is one tool that we
15 use. The industry interaction has been really
16 excellent in the realm of fact, and EPRI sponsors
17 meetings twice a year. We talk about where everybody
18 is working and what's the right solution, either
19 material upgrade or changes to the piping system
20 itself, if you need a larger diameter line to cut back
21 the velocity or whatever, whatever is appropriate for
22 the specific location.

23 CO-CHAIRMAN WALLIS: With this particular
24 line now, you've changed the steam conditions. You've
25 got more pressure drop from the boiler to the turbine,

NEAL R. GROSS

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

1 a different kind of wetness, different pots in the
2 cycle. It might well be the steam scavaging line
3 would see significant change in dryness fraction. So
4 it's not clear that it's all that predictable what's
5 going to happen.

6 MR. BOEHNERT: Dana, I don't --

7 CO-CHAIRMAN WALLIS: Is that a true
8 statement I've made or do you take issue with that?

9 MR. WILLIAMS: We believe it is
10 predictable by the CHECKWORKS methodology, correct?

11 MR. CROCKET: The code has largely proven
12 very reliable, and there have been few occasions that
13 they have upgraded the analysis, but they always are
14 looking at refinements and periodically have new
15 releases of the code to acknowledge certain things
16 either in chemistry or different -- where the industry
17 is learning about.

18 MEMBER POWERS: CHECKWORKS seems to get
19 used broadly within the United States. I notice the
20 Taiwanese developing alternatives to CHECKWORKS. Has
21 anybody looked at those to see if they're more useful,
22 less useful?

23 MR. CROCKET: There is one site in the
24 domestic utilities that does not use CHECKWORKS, and
25 that site uses three analysis. So it's proven very

NEAL R. GROSS

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

1 reliable, and there are other foreign utilities that
2 also use CHECKWORKS, and we have not seen a reason to
3 switch over from an industry perspective.

4 CO-CHAIRMAN WALLIS: Does CHECKWORKS put
5 in something about the flow regime when you have
6 droplets in the steam?

7 MR. CROCKET: It recognizes steam quality.

8 CO-CHAIRMAN WALLIS: It does? It has some
9 way of handling that?

10 MR. CROCKET: Yes, sir.

11 MEMBER SIEBER: That's provided you know
12 what it is.

13 CO-CHAIRMAN WALLIS: Mostly you know where
14 the drops are. When you have a bend --

15 MEMBER SIEBER: That's right.

16 CO-CHAIRMAN WALLIS: -- you get subterfuge
17 and they come off --

18 MEMBER SIEBER: Yeah, it heats up the end
19 of the bend.

20 MR. BOEHNERT: Several years ago, well, I
21 guess it was four or five years ago, Fort Calhoun blew
22 out a pipe, and they were using CHECKWORKS. In fact,
23 we had Mr. Checks in here to talk about it.

24 MEMBER SIEBER: Yes, yes.

25 MR. BOEHNERT: And his allegation was or

NEAL R. GROSS

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

1 he said if you use the code properly, it works right.
2 And as I recall, Fort Calhoun, I don't believe they
3 were using the code, what they should have done
4 because they went back and looked at the code again,
5 and the code, indeed, predicted that area that blew
6 out was a problem, and they had missed it the way they
7 were applying the code.

8 So the code has been shown to be quite
9 reliable when it's properly used.

10 MEMBER SIEBER: Yeah, there's another way
11 that you can get into trouble, which is usually you
12 don't analyze the whole plant. You, you know, start
13 with the very large pipes and go down to some level.
14 Unfortunately, erosion/corrosion will eat away any
15 pipe, and a lot of the smaller lines are just as
16 susceptible as the large ones, which leads to the
17 question of how far down in pipe size do you go to do
18 analysis for Clinton.

19 MR. CROCKET: We do all susceptible piping
20 that's in our program, and if the information is not
21 there for the analysis, we do inspections that are
22 commensurate with that.

23 But there is no size restriction that we
24 don't go beyond. We have one inch, two inch, socket
25 weld fittings that we do exams on and replacements,

NEAL R. GROSS

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

1 and it's all in the program if it's in the steam
2 cycle.

3 MEMBER SIEBER: Okay. Thank you.

4 CO-CHAIRMAN WALLIS: Are we finished with
5 this issue now?

6 Return to the original plan?

7 MR. WILLIAMS: Yes, sir, and thank you,
8 Dr. Wallis.

9 I would like to introduce Larry Westbrook.

10 MR. WESTBROOK: Good morning. My name is
11 Larry Westbrook of AmerGen. I am the Clinton Power
12 Station senior reactor operator, leading the EPU power
13 ascension testing team.

14 I will be discussing large transient
15 testing.

16 First, allow me to provide some background
17 related to large transient testing. ELTR1 specifies
18 that large transient tests be performed. One
19 specified test is closure of all main steam isolation
20 valves at 110 percent of original licensed thermal
21 power.

22 The second specified test is a generator
23 load rejection at 115 percent original licensed
24 thermal power. AmerGen has taken exception to these
25 tests as an unnecessary challenge to the plant.

NEAL R. GROSS

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

1 General Electric has concluded that large
2 transient tests are no longer necessary when reactor
3 steam dome pressure is unchanged. Supporting this
4 conclusion are the following.

5 Clinton Power Station reactor steam dome
6 pressure remains the same following power up-rate.
7 Large transient tests will provide no significant ne
8 information, and existing modeling code adequately
9 predicts plant response.

10 Next, I would like to present AmerGen's
11 methodology for exempting large transient testing.
12 First, we have reviewed industry power up-rate
13 experience and determined that similar plants have
14 demonstrated acceptable performance following large
15 transients. kkL performed planned transient testing
16 at up-rated conditions with acceptable results.

17 Also, an unplanned generator load
18 rejection at Hatch at up-rated power levels showed
19 that the plant responded as expected.

20 Second, performance of plant structures,
21 systems and components, at Clinton Power Station has
22 been evaluated at EPU conditions and determined to be
23 acceptable.

24 Also, surveillance testing will confirm
25 that plant structures, systems, components maintain

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 their required performance capability.

2 In conclusion, large transient testing
3 will provide no new significant information. This is
4 supported by the following.

5 Plant response to large transients at
6 extended power up-rate conditions will not change
7 significantly as demonstrated by acceptable transient
8 modeling code results and operating experience at
9 similar up-rated plants.

10 Based on evaluation and existing
11 surveillance testing, Clinton Power Station structure,
12 systems, and components will perform as designed.
13 Therefore, large transient testing is not required at
14 Clinton Power Station.

15 MEMBER POWERS: Can you show us an example
16 of the plant response to transients before and after
17 the upgrade?

18 MR. WILLIAMS: I think your question is
19 getting at the details of the transient.

20 MEMBER POWERS: You can just point to it
21 in the documentation if it's in there.

22 MR. WILLIAMS: I believe it is. G.

23 MR. WESTBROOK: Could you repeat the
24 question, please?

25 MEMBER POWERS: A key element in this

NEAL R. GROSS

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

1 conclusion slide is the plant response to these
2 transients as a result of EPU not changed
3 significantly based on modeling, and I was just asking
4 is there some demonstration of that equivalency of
5 response.

6 CO-CHAIRMAN WALLIS: That's about the only
7 conclusion that can be tested. Statements such as
8 plant components will perform as designed is a
9 statement of faith. What you really mean is that you
10 think there's a high probability that they will
11 perform as designed.

12 And the same thing about tests will not
13 provide new significant information. You've got a
14 couple of tests already. One more, that's not a very
15 big base of tests. So, again, these are probablistic
16 statements. You think it's not going to provide new
17 information.

18 It will provide new information. You just
19 don't think the information is going to be very
20 useful.

21 MR. WESTBROOK: That's correct. I don't
22 think that the information that would be provided will
23 be significant or --

24 CO-CHAIRMAN WALLIS: But if it were to
25 result in a failure or something, that would be

NEAL R. GROSS

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

1 extraordinarily useful information.

2 MEMBER POWERS: Without a doubt.

3 CO-CHAIRMAN WALLIS: So something is
4 happening here about assessment of the likelihood that
5 the plant will perform as designed.

6 MR. WILLIAMS: G.E.?

7 MR. NIR: Israel Nir, G.E.

8 What I would like to add is that typically
9 the actual events at the plant will turn out to be
10 very benign, and we have discussed this with you in
11 other occasions. There are control systems in place
12 and protection systems that actuate specifically to
13 address this large transient, and the end result is
14 that typically we see a very small increase in neutron
15 flux, you know, a pretty minor change in peak
16 pressure.

17 And that has been demonstrated
18 analytically, and that is what is expected from an
19 actual event.

20 Now, to actually test the type of things,
21 I think, that you may have in mind, you really need to
22 impose some restrictions or come up with a sequence
23 that may represent some risk to the plant, and it is
24 just not advisable, such as, for example, have the
25 bypass, turbine bypass inactivated.

NEAL R. GROSS

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

1 So this type of sequences will not occur
2 during the actual plant events, and they will result
3 in a very benign event.

4 MEMBER SHACK: The prediction is made that
5 you've done these calculations and comparisons for kkH
6 and kkL. I mean, all you have to do is essentially
7 show the comparison presumably.

8 MR. NIR: Right, and we have -- in other
9 occasions we have shown this Committee -- excuse me --
10 last year we have shown you some comparisons for kkL.
11 kkL happened to be a plant that has 100 percent bypass
12 capability, and again, the comparisons are good, and
13 they effects are very benign.

14 MEMBER SCHROCK: I guess I continue to be
15 puzzled by what prompted G.E. to require the testing
16 in the ELTR originally. What has changed that changed
17 the G.E. position?

18 MR. NIR: I would say two elements. One,
19 it was a new program. It was, you know, a major step
20 forward. We had to consider the entire licensing
21 process, and that at the time appeared to be the right
22 thing to do.

23 The other thing is that we included in the
24 ALTR allowance for increasing dome pressure of up to
25 75 psi. That is not the case here. There's no

NEAL R. GROSS

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

1 increase in pressure.

2 Based on our experience, and now that we
3 have performed analysis for a large number of EPU's and
4 actually implemented a few, our position is that if
5 the dome pressure is not increasing, we don't see the
6 value for these large transients. Our judgment is
7 that, again, there is no significant information that
8 can be extracted from them.

9 MEMBER POWERS: I guess I'm still
10 struggling to understand the basis of the second point
11 here. I mean, the statement is made that we've
12 modeled before and after and it looks the same. Does
13 it? I mean, can you show me that this is the case?

14 MR. NIR: Yeah. That's, again -- I
15 believe that we already shared some of this information
16 with the committee, but we can -- we can definitely
17 review it with you and show you some comparisons.

18 CO-CHAIRMAN WALLIS: Can you find it this
19 morning?

20 MR. NIR: This morning? Yes.

21 MR. POST: This is Jason Post.

22 For example, I have an ATWS comparison.
23 It's not exactly what we're after, but I mean, I have
24 that that we could show them if that's --

25 MEMBER POWERS: I mean, you looked at

NEAL R. GROSS

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

1 something in order to write the sentence down on the
2 viewgraph. If that is an adequate demonstration of
3 the truth of the second point, then let's see it.

4 MR. BOLGER: This Fran Bolger from G.E.

5 When we presented a few weeks ago, I
6 presented for a AAOO licensing evaluation a low
7 rejection type transient before and after EPU. Would
8 you like to see that comparison?

9 MEMBER POWERS: Well, is it done for the
10 Clinton plant?

11 MR. BOLGER: No, it's not.

12 MEMBER POWERS: Well, then it's not very
13 useful, is it, to support this statement?

14 MR. BOLGER: The plants have shown a very
15 small change of their flux response to a low rejection
16 type event. All the plants that we've analyzed have
17 shown a similar type, very small change.

18 Yesterday when we presented the results of
19 the transient analysis, the decrease in the calculated
20 operating limit was presented to you. If that were
21 looked at in more detail, it would show that there's
22 a reduction in the integral flux peak before and after
23 power up-rate, and as was stated yesterday, that was
24 primarily due to change in the fuel characteristic and
25 not due to the power up-rate.

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 CO-CHAIRMAN WALLIS: I think we have seen
2 these figures before, but I'm trying to just get a
3 picture in my mind. I think a blue and a red curve or
4 something with these.

5 MEMBER POWERS: I simply don't recall any
6 pictures for Clinton

7 CO-CHAIRMAN WALLIS: Oh, I don't know for
8 Clinton.

9 MEMBER POWERS: Well, I mean, we're
10 talking about Clinton here.

11 CO-CHAIRMAN WALLIS: He's saying Clinton
12 is very close to the other plants.

13 MEMBER POWERS: I mean the other ones we
14 were talking about, BWR-3, I think.

15 CO-CHAIRMAN WALLIS: That may well be
16 true. That may well be true.

17 Perhaps you could dig something out to
18 give us before the --

19 MEMBER POWERS: There must be something
20 that existed in order to write the second bullet down.

21 CO-CHAIRMAN WALLIS: Yes, that's right.
22 That's the only one which can really be tested by
23 evidence, isn't it, without doing the test?

24 MR. WILLIAMS: Yes, we will.

25 CO-CHAIRMAN WALLIS: Okay. Thank you.

NEAL R. GROSS

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

1 MR. BOLGER: Let me clarify the request.
2 Would you like to see the Leibestodt comparison?

3 CO-CHAIRMAN WALLIS: Like to see a Clinton
4 comparison that supports conclusion two or something
5 from a plant which you can show is very, very close to
6 Clinton for some reason.

7 MEMBER POWERS: The technical basis by
8 which conclusion number two was reached.

9 CO-CHAIRMAN WALLIS: And if you have a
10 code prediction for the same event, that would also
11 help to reinforce some of these statements. The
12 existing modeling code adequately predicts plant
13 response, but there you'd have to go to something like
14 Leibestodt. We've seen that before.

15 MEMBER POWERS: That's the first question.

16 CO-CHAIRMAN WALLIS: But if you happen to
17 have it, it might be useful to remind us of it.

18 With that request for information, are
19 there any other points that the Subcommittee wants to
20 raise?

21 (No response.)

22 CO-CHAIRMAN WALLIS: All right. So let's
23 move on then. We'll return to this question later.

24 MEMBER POWERS: We might share with
25 everyone that part of our challenge that we face here

NEAL R. GROSS

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

1 is that we have a member not present in the
2 Subcommittee meeting that disagrees with this
3 conclusion that transient testing is not correct, and
4 we were unable to persuade him of the wisdom of not
5 testing based on hand waving arguments.

6 So more hand waving arguments presumable
7 are not going -- we're not going to wear him down.

8 CO-CHAIRMAN WALLIS: Maybe he'll persuade
9 us this time.

10 MEMBER POWERS: And he might well persuade
11 us this time.

12 CO-CHAIRMAN WALLIS: Okay.

13 MR. WESTBROOK: The next topic I would
14 like to discuss is ATWS event response.

15 The Clinton Power Station extended power
16 up rate ATWS event response operator actions are
17 unchanged from pre-EPU conditions. For example,
18 reactor power and flow response to reactor
19 recirculation pump trip during an ATWS remains
20 unchanged from pre-EPU conditions. This is a result
21 of no change in the flow control line.

22 The symptomatic conditions for ATWS,
23 greater than five percent APRM power following a scram
24 initiation and shutdown criteria not met remain
25 unchanged for EPU conditions.

NEAL R. GROSS

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

1 The mitigating operator actions remain
2 unchanged for controlling reactor power, water level
3 and pressure. These mitigating operator actions
4 include standby liquid control initiation, lower
5 reactor water level, and alternate control rod
6 insertion.

7 CO-CHAIRMAN WALLIS: The first statement
8 there, I'm trying to figure out what you're saying.
9 The reactor power and flow is unchanged from what it
10 was pre-EPU. Is that what that says? You have the
11 same power before and after EPU?

12 MR. WESTBROOK: That's correct.

13 CO-CHAIRMAN WALLIS: That's a bit strange
14 if you've got a power up rate.

15 MR. WESTBROOK: That is following the
16 reactor reset. (phonetic) pump trip.

17 CO-CHAIRMAN WALLIS: Once you trip the
18 pump, the reactor power becomes the same as it was
19 pre-EPU?

20 MR. WESTBROOK: That's correct.

21 As a result of a plant specific analysis,
22 the minimum allowable standby liquid control boron
23 concentration was raised to insure that the rate of
24 negative reactivity addition during an ATWS remains
25 acceptable.

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 The table compares analytical results for
2 EPU ATWS versus original license thermal power ATWS
3 and design limits. This shows the small changes in
4 ATWS related peak parameters will occur due to EPU
5 conditions, and that the peak parameters will remain
6 within design limits.

7 The small magnitude of these parameter
8 changes and the fact that they remain below limits
9 supports the adequacy of existing operator actions to
10 mitigate an EPU ATWS event.

11 MR. BOEHNERT: How much did you have to
12 raise the concentration of boron?

13 MR. WESTBROOK: Actually we're not
14 changing the concentration that we maintain, but we
15 had a very low minimum level. It was 10.3 percent,
16 and we essentially made the minimum allowable 10.8
17 percent.

18 CO-CHAIRMAN WALLIS: Are these numbers
19 dependent on proper operator actions?

20 MR. WESTBROOK: Yes.

21 CO-CHAIRMAN WALLIS: And they have less
22 time with the power up rate than they had before?

23 MR. WESTBROOK: No, that's not correct.
24 They have the same time.

25 CO-CHAIRMAN WALLIS: The same time?

NEAL R. GROSS

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

1 MR. WESTBROOK: That's correct.

2 CO-CHAIRMAN WALLIS: So the operator
3 actions are all the same as before?

4 MR. WESTBROOK: That's correct.

5 CO-CHAIRMAN WALLIS: Do they have to take
6 action to avoid an instability region or something
7 like that?

8 MR. WESTBROOK: During an ATWS, they will
9 always observe for instabilities and take the actions
10 as directed by the EOPs.

11 CO-CHAIRMAN WALLIS: So they could get
12 into an instability region during an ATWS event.

13 MR. WESTBROOK: That's correct. However,
14 the EOPs are designed to compensate and to mitigate
15 those oscillations.

16 In conclusion, Clinton Power Station has
17 implemented an ATWS mitigation strategy consistent
18 with the BWR owners group emergency procedure
19 guidelines. Therefore, EOP operator actions remain
20 unchanged for EPU conditions.

21 MEMBER SHACK: Now, is it my memory that's
22 faulty that in the previous up rates we did see a
23 change in the operator response time for the ATWS so
24 that Clinton is different in that respect?

25 MR. SCOTT: This is Kent Scott from

NEAL R. GROSS

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

1 AmerGen, senior reactor operator.

2 I believe in the next presentation that
3 Bill Burchill gives us on probablistic risk
4 assessment, we'll see that the allowable times for
5 operator actions are somewhat reduced, but also the
6 key is that the magnitude of that reduction in time
7 has no impact on the actions that we take.

8 So we're taking the same actions. We're
9 doing them the same way, but as opposed to having 31
10 minutes to automatically depressurize the unit, now
11 we've got 28 minutes to do it. They're of a magnitude
12 where it's easy to do those actions. We can get those
13 done in that same period of time.

14 MEMBER SHACK: But when these calculations
15 are done, they're done assuming the operator does
16 something at a certain time, and that time is the same
17 for before and after the EPU.

18 MR. POST: This is Jason Post of G.E.

19 That's correct. The example operator
20 action time are injection of boron and initiating the
21 RHR suppression pool cooling, and we use exactly the
22 same operator response time in both cases.

23 MEMBER SHACK: What is that response time
24 that was used in the calculation?

25 MR. POST: For RHR, I believe it's 11

NEAL R. GROSS

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

1 minutes after the beginning of the event, and for
2 boron injection it's about two minutes after the
3 beginning of the event, and we use the same in both
4 pre-EPU and the EPU.

5 CO-CHAIRMAN WALLIS: So you expect the
6 action at 11 minutes, but the time available is 28 or
7 31, whichever?

8 MR. POST: The time available in the PRA
9 analysis --

10 CO-CHAIRMAN WALLIS: In order to success,
11 to be on the right path of succeed.

12 MR. POST: Right.

13 CO-CHAIRMAN WALLIS: So if the operator
14 waits for 35 minutes, then it might be off on some
15 other path.

16 MR. WESTBROOK: Next I would like to
17 introduce Mr. Bill Burchill, Exelon Nuclear.

18 CO-CHAIRMAN WALLIS: This is where we need
19 our PRA expert, keeping a reserve.

20 MEMBER POWERS: We have on the committee
21 the classic problem. We have not one PRA expert, but
22 two or three, and as in all things of this nature,
23 they simply disagree.

24 CO-CHAIRMAN WALLIS: Well, Bill is going
25 to explain it so that even we can understand it.

NEAL R. GROSS

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

1 MR. BURCHILL: Thank you, Dr. Wallis.

2 Good morning. My name is Bill Burchill.
3 I'm the Director of Risk Management for Exelon. Good
4 morning, and happy Valentine's Day. I hope you've all
5 bought your flowers. Your wives will be happy if
6 you've done that. Just a little reminder.

7 I'm here to present the results of the
8 evaluation of risk impact of the EPU on the Clinton
9 Power Station. This, as you know, is not a risk
10 informed submittal, but according to the ELTR-1, risk
11 evaluation will be done, and as you may also know, an
12 ELTR-2, a generic evaluation was performed.

13 That generic evaluation was for a smaller
14 power up rate than is being proposed here for Clinton,
15 and we have, therefore, done a plant specific
16 evaluation.

17 The presentation that I'll go through this
18 morning is very similar to one that we discussed a
19 couple of months ago for Dresden and Quad Cities, but
20 I'll point out that the Clinton Power Station
21 experienced much less impact in the risk area than did
22 Dresden and Quad. The numbers there were small
23 numbers. Here are even smaller. So we'll discuss
24 that.

25 The purpose of the evaluation is to use

NEAL R. GROSS

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

1 generally accepted risk metrics, core damage
2 frequency, and large early release frequency to
3 measure the risk impact of the changes being proposed
4 for the plant.

5 We've done quantitative evaluations using
6 the full power internal events, PRA model, and we've
7 done quantitative evaluations of individual effects
8 where we had other quantifying tools. Where we did
9 not, we did qualitative evaluations, particularly in
10 the area of external events and shutdown operation.

11 We've identified revisions to the PRA that
12 would be made to represent the plant following the
13 EPU. These revisions were represented in sensitivity
14 studies. During our risk evaluation, they will be
15 folded into the PRA at its next scheduled update.

16 The subjects that I'll cover are
17 essentially the same as I discussed with you a few
18 months ago, the quantitative, the qualitative, and
19 then a summary of the risk impact.

20 The methods that we used were to identify
21 the plant configuration changes due to the EPU. This
22 involved examining all of the hardware changes,
23 procedures changes, operating condition changes, and
24 set point changes.

25 The principal change, of course, here is

NEAL R. GROSS

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

1 the power level. As a number of speakers before have
2 noted, there is really very little change to this plan
3 in terms of actual hardware and operation other than
4 the power level. Most of those changes are out in the
5 balance of plant or in the switchyard.

6 The primary components' pumping equipment
7 and so forth that we have available for mitigating
8 core damage essentially are remaining unchanged in the
9 EPU state. So there's no change to RCH RHR high
10 pressure core spray, low pressure core spray, ECCS.
11 NPH limits remain the same, and the service water
12 remains the same.

13 The only change that I'm actually aware of
14 is that there is a change out of impellers in the
15 TBBCW, but that has very little impact, and no impact
16 at all on dependencies.

17 We used the most recently updated PRA
18 model. As the staff noted in their SER, the Clinton
19 PRA has had a lot of attention over the years since
20 its initial development in the IPE days. They seem to
21 update more frequently than most that I'm familiar
22 with, and the most recent was in December of 2000.

23 I will point out that that update was
24 motivated by the fact that we were about to submit a
25 license amendment request to extend the emergency

NEAL R. GROSS

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

1 diesel generator allowed outage time, and that has, in
2 fact, been approved by the staff.

3 When I first encountered this PRA, it was
4 about the time that we merged our companies, and I
5 wasn't particularly satisfied with what I found. So
6 we made a number of improvements to that PRA in order
7 to support that EDG AOT LAR.

8 CO-CHAIRMAN KRESS: Has your PRA been
9 through the industry peer review?

10 MR. BURCHILL: Yes. In fact, the industry
11 peer review was in August of 2000, and in fact, that
12 was just before our merger. I had a member of my
13 staff on that peer review team, and so that was my
14 first real detailed look at the PRA.

15 And the peer review results were what
16 really drove our changing the PRA in late 2000 in
17 order to support that earlier LAR.

18 We've also examined all of the elements of
19 the comments made by the peer review team, and we've
20 tabulated those for staff review relative to the EPU.
21 It turns out particularly with the changes that we
22 made for the EDG AOT extension there were no remaining
23 significant elements for this particular application.

24 As you know, in a PRA we use realistic
25 models. We've talked just a moment ago about operator

NEAL R. GROSS

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

1 response times. I'll come back to that, but we use
2 realistic limits on thermal hydraulics, and we credit
3 all available systems, and likewise we compare to
4 realistic success criteria and limits.

5 MEMBER POWERS: When you think in terms of
6 realistic models, what do you do with the frequency of
7 a pipe break brought on with flow assisted corrosion?

8 MR. BURCHILL: Well, the frequency of pipe
9 breaks is represented by industry data of an empirical
10 nature. We do not do explicit analytical modeling of
11 fact in a predictive way. We look at industry
12 experience in like situations, and then we use that in
13 an actuarial fashion in order to predict those passive
14 component failures.

15 MEMBER POWERS: I guess what I'm asking
16 here is we're coming along. We're making a change to
17 this plan. One of the pieces of information coming to
18 us is that we have predictions that some piping
19 systems are more susceptible to corrosion and a more
20 rapid rate.

21 One would presume then that the
22 probabilities that the pipe would rupture unexpectedly
23 must go up. I can't imagine it doesn't.

24 MR. BURCHILL: Theoretically, yes.

25 MEMBER POWERS: I guess what I'm asking

NEAL R. GROSS

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

1 is: how is that piece of information reflected in the
2 PRA analysis for the Clinton plant?

3 MR. BURCHILL: There is no change in those
4 rupture frequencies within the PRA model to reflect
5 what you're saying for two reasons.

6 On is that, again, the PRA model is
7 looking at a time average, you know, annual average,
8 and it's not a point prediction. So what we're
9 looking at is what's the overall impact for the
10 remaining operating life of the plant.

11 The second is that the FAC program, I
12 think, as we've mentioned earlier, does monitor these
13 pipes and well before they would be expected to
14 rupture with any probability of significance they
15 would be repaired or replaced.

16 So that's taken into account, you know,
17 industry-wide in the database that we use for the
18 actuarial data on pipe rupture frequency.

19 So the simple answer is there's no change
20 made, but I think there's a good rationale for not
21 making that change.

22 The other comment I'd make is the areas
23 we're talking about, extraction, steam lines, and so
24 forth, you know, really have very little impact.
25 You're down the dependency chain in terms of systems

NEAL R. GROSS

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

1 that would respond to a potential core damage event.
2 You're down the dependency chain about three levels.

3 So I don't think you' ever actually find
4 a place to insert that information in the PRA.

5 MEMBER POWERS: I guess I will concede to
6 you that I have a poor example here, but --

7 MR. BURCHILL: Well, we'll work with it.

8 MEMBER POWERS: -- I'm going to pursue
9 that poor example because I don't believe your answer,
10 and that is that if I have a line that is corroding
11 more quickly, unless I have a monitoring program that
12 is accelerated parallel to that more quickly eroding
13 thing, even if I look at an annual average, I must
14 have a higher rupture frequency with that loss.

15 MR. BURCHILL: At the instant you're
16 talking about, yes, you would.

17 MEMBER POWERS: And your annual average,
18 I must have a higher value.

19 MR. BURCHILL: We could debate that. I
20 agree that it will be higher until that line is
21 replaced. Once the line is replaced, the rupture
22 frequency, I think you'll agree, goes significantly
23 down.

24 MEMBER POWERS: If I replace the line in
25 July, from January to December, that average I must

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 have a high rupture frequency.

2 MR. BURCHILL: Well, it will certainly
3 have a higher rupture frequency from January to July.
4 From July to December if we've replaced it with pipe
5 that's not susceptible, I would think the rupture
6 frequency would go down.

7 So I don't know whether the net would be
8 plus or minus.

9 MEMBER POWERS: Okay. Suppose I replace
10 it in November?

11 MR. BURCHILL: I think we're in agreement.

12 MEMBER POWERS: There must be something in
13 the PRA to reflect this additional information.
14 You're telling me there's nothing. What I come down
15 to is this. I mean, what I think I'm seeing in all of
16 these PRA analyses is that we change nothing, and we
17 find that the CDF doesn't change. This is not a
18 remarkable finding to me.

19 MR. BURCHILL: Hopefully I'll persuade you
20 otherwise through showing you the things that we
21 actually did change.

22 I think the more substantive part of the
23 answer is the question of what the impact would be of
24 this line rupture in terms of actually interrupting
25 any of our --

NEAL R. GROSS

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

1 MEMBER POWERS: I really am using NMA as
2 an example. I'll agree we're working --

3 MR. BURCHILL: We're down here.

4 MEMBER POWERS: -- in subsidiary systems
5 that actually I'm surprised your answer was we don't
6 even model that at PRA, but I'm using it as an example
7 because clearly other things. It must be that
8 probably if you are rupturing, the core shroud must go
9 higher. It must be higher.

10 Do you reflect that in the RPA? I think
11 you don't.

12 MR. BURCHILL: Well, actually, as you're
13 well aware, we've had a recent occasion to experience
14 some jet pumping failures in another area, and we did,
15 in fact, explicitly represent that in the PRA and do
16 a fairly detailed analysis of its impact.

17 In this particular case, the impact could
18 be put in the PRA. It's certainly true that we do not
19 explicitly represent these lines. It would come in
20 through the initiating event frequency, you know, on
21 the secondary side, you know, loss of feedwater or
22 something of that nature that would be created by a
23 rupture of an extraction steam line.

24 MEMBER POWERS: Yes.

25 MR. BURCHILL: Shall I proceed, sir?

NEAL R. GROSS

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

1 CO-CHAIRMAN WALLIS: Please do.

2 MR. BURCHILL: We did compare the results
3 of our analysis with the guidelines provided by
4 RegGuide 1.174. As you know, this RegGuide is for
5 permanent plant changes, for evaluating risk informed
6 submittals, but it is a generally accepted guideline
7 against which to benchmark results. So we did use
8 that.

9 The next slide shows how we went about the
10 review a little bit more detailed. We evaluated each
11 of the individual PRA technical elements. These, of
12 course, are the same elements that are evaluated by a
13 PRA certification team.

14 We didn't find any change in the
15 initiating event frequencies. There was nothing that
16 was indicated in the power up rate because of the lack
17 of major equipment changes that would create a change
18 in initiative events, and likewise the same is true
19 for the success criteria.

20 The main place where there were changes
21 were in the operator response times, and I will show
22 you the examples of the more significant impacts in
23 that area, but, again, even these changes were small
24 compared to the required coping time for the
25 operators.

NEAL R. GROSS

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

1 MEMBER SHACK: Of course, a lot of those
2 elements were where you've got your two grades in your
3 PRA peer review.

4 MR. BURCHILL: Well, that's a good point,
5 and I'm happy you could bring that observation up. I
6 mentioned my pleasure with this PRA when I first
7 encountered it.

8 The grades on this PRA were somewhat lower
9 than the ones that I discussed with you before on the
10 Dresden and Quad situations, but they were a mix of
11 twos and threes, actually a slight majority of threes,
12 and some of the areas that they pointed out that they
13 were uncomfortable with were the ones that we attended
14 to in late 2000 prior to making that EDG AOT
15 submittal.

16 So I'm keenly aware of what you're talking
17 about in that PRA. I don't think that those detract,
18 and, again, we gave the staff a detailed tabulation on
19 this, from this particular application, but, you know,
20 I can go into whatever detail you like on that.

21 We also did quite a number of MAP runs to
22 support this evaluation. The MAP code, as you know,
23 is a best estimate code for severe accident, thermal
24 hydraulics and, in fact, releases. The reason that we
25 did that is that this is a fairly substantial change

NEAL R. GROSS

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

1 in the thermal power of the core, and therefore, the
2 decay heat level is higher post trip and the heat up
3 and the boil down rates are considerably higher.

4 So we did a number of MAP runs in order to
5 support this evaluation.

6 CO-CHAIRMAN WALLIS: This is for the
7 containment, the MAP runs?

8 MR. BURCHILL: They are -- the MAP goes
9 from the core all the way out.

10 CO-CHAIRMAN WALLIS: It is in the core,
11 too?

12 MR. BURCHILL: Yes.

13 The next slide shows the evaluation of
14 effects in the operating conditions, and the following
15 slide will talk about systems. I'll preface this by
16 saying we found no new accident types in the
17 evaluation. We didn't find any significant changes to
18 accident scenarios, going back to the previous
19 discussions on operator response. We found no new
20 operator responses required, nor were the sequencing
21 of operator responses changed.

22 The only thing we did find in that area
23 was that there is a higher demand on the time of
24 operator actions in certain situations.

25 We found no change in system dependencies.

NEAL R. GROSS

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

1 In other words, the front line systems are supported
2 by the same support systems and essentially the plant
3 is wired and hooked up the same way that it was
4 before.

5 And the risk evaluation revealed no
6 vulnerabilities produced by the EU.

7 The principal effect in the operating area
8 is the increased heat loads, the reduced time to
9 boiling in both the core and the suppression pool, and
10 of course, at least theoretically reduce the time to
11 core damage.

12 This produces a reduced time for equipment
13 response and operator actions, and in each case where
14 those operator actions were shortened and were felt to
15 be of significance, we evaluated explicitly the
16 analytical impact of that on the core damage
17 frequency.

18 The Atlas does produce increased power
19 levels and peak pressure. In this particular case, I
20 think the committee asked me this question a few
21 months ago on the other plants. ATWS only contributes
22 about four percent of the total core damage on this
23 plant. So it's a significantly smaller fraction than
24 we talked about before, and therefore, changes in this
25 area would likewise have a small impact.

NEAL R. GROSS

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

1 The biggest difference between this and a
2 previous discussion is that although the feedwater
3 flow is increased, there's no change in the normally
4 operating number of feedwater pumps or condensate
5 booster pumps. So we still have the same two turbine
6 driven feedwater pumps and three condensate pumps and
7 condensate booster pumps that are in the pre-EPU
8 condition.

9 MEMBER POWERS: And these pumps are
10 working harder?

11 MR. BURCHILL: These pumps are --
12 certainly they're working harder because you've got
13 more flow coming out of them, yeah.

14 MEMBER POWERS: And so does their failure
15 probability go up?

16 MR. BURCHILL: The failure probability
17 could go up, and the way we evaluated that, we did not
18 do an explicit model of that, but we did a sensitivity
19 study where we raised those failure probabilities by
20 ten percent. Well, the initiating event frequencies
21 associated with them.

22 MEMBER POWERS: So now the flow in is up
23 by 20 percent. So you increased the failure
24 probability by ten percent.

25 MR. BURCHILL: Of the initiating event,

NEAL R. GROSS

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

1 right.

2 MEMBER POWERS: Right, and what was the
3 rationale there?

4 MR. BURCHILL: yeah, the rationale was we
5 used -- actually I think we did this more analytically
6 than is justified -- but we used a bathtub type curve
7 for the burn-in, and I think we increased the failure
8 rate in the first year by 50 percent, and then the
9 second year, I think it was 25, and then we tailed it
10 down. And then the average came out to be the ten
11 percent, yeah.

12 CO-CHAIRMAN KRESS: In your MAP analysis,
13 do fission products enter in it any way other than
14 decay heat level?

15 MR. BURCHILL: There's a source term
16 represented, correct.

17 CO-CHAIRMAN KRESS: To determine its
18 effect on containment?

19 MR. BURCHILL: Right, and so that was
20 scaled up, but it was a simple scaling.

21 CO-CHAIRMAN KRESS: So it was just by the
22 power ratio?

23 MR. BURCHILL: Right, correct.

24 CO-CHAIRMAN KRESS: And that adds a heat
25 load to the containment.

NEAL R. GROSS

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

1 MR. BURCHILL: Oh, absolutely.

2 CO-CHAIRMAN KRESS: And that's why.

3 MR. BURCHILL: Yeah, everything, you know,
4 starting in the reactor assembly with the boil down
5 rate of the coolant out to the wet well, out to the
6 suppression pool, everything, you know, the boil down
7 rates, you know, go down. The times set shortened.

8 CO-CHAIRMAN KRESS: What sort of fission
9 product release model is in MAP? We've never reviewed
10 that as a committee.

11 MR. BURCHILL: I'm not going to be able to
12 answer that question. We can get back to you on that.
13 I mean, I'm not a fission products person. So I don't
14 know explicitly how to even answer what the model is.

15 The next slide addresses the question of
16 system effects. As I mentioned, there were no changes
17 in systemic PRA success criteria. Systemic criteria
18 though is associated with the number of pumps, the
19 number of buses, the number of instrument air systems,
20 and so forth. All of those remain the same.

21 The one area that would be of interest
22 here would be in the over pressure protection and the
23 depressurization capability, but the number of safety
24 valves and relief valves that were required in each of
25 these cases, as has been previously discussed,

NEAL R. GROSS

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

1 remained unchanged in the EPU state. So that didn't
2 change at all in the PRA model.

3 The changes that were made in the BOP and
4 in the AC switchyard were not represented explicitly,
5 but rather, again, were represented by sensitivity
6 studies in which we raised the failure rates to
7 represent a burn-in period of those new components.

8 The set point changes also produce a
9 negligible impact, and we did evaluate those
10 explicitly in the PRA model. Again, there were no
11 changes to the equipment itself, but some changes to
12 set points.

13 The next slide is really the heart of the
14 changes that were made. There were 45 operator
15 actions that were evaluated for impact. Twenty-eight
16 of these were chosen because of their importance in
17 the PRA, in other words, their importance with respect
18 to contributing to core damage frequency, and 17 were
19 chose because they were the operator actions that had
20 to be taken in under a half an hour. So we judged
21 those to be time critical and evaluated them
22 explicitly.

23 The remaining operator actions that were
24 not evaluated, if you sum up all of their
25 contributions to core damage frequency, it was less

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 than a half a percent. So we've captured 95 or 99.5
2 percent of the operator actions that contribute to
3 core damage.

4 The first one which has been discussed at
5 every one of these EPU, you know, applications, of
6 course, is the failure to initiate ADS. That normally
7 comes up fairly high on the list, and it requires a
8 shortening of time from about -- and, again, remember
9 this is realistic analysis now with best estimate
10 parameters -- a shortening of time from about 32
11 minutes to 28 minutes.

12 So there is some change in the human error
13 probability, and that does contribute to about a three
14 percent increase in the core damage frequency, a
15 fairly substantial increase in relative terms, but a
16 very small increase, of course, in terms of the
17 overall PRA result.

18 The next one is an interesting one. This
19 is the failure to restart a feedwater pump following
20 a failure to initially depressurize the reactor
21 pressure vessel. This is what's called a dependent
22 failure.

23 In the reference case in the submittal, we
24 were assuming that the plant would implement an auto
25 start on the motor driven auxiliary feed pump, and in

NEAL R. GROSS

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

1 fact, that meant that this situation, this contributor
2 got better. So that the risk actually went down by
3 about one and a half percent.

4 We did do a sensitivity study, however, in
5 the submittal that showed what would be the effect if
6 we did not implement the auto restart feature, and
7 that gave the result that you see on the slide, which
8 is a plus, about one and a half percent.

9 And it turns out that at this time, that
10 auto restart feature is not being implemented at least
11 initially. So the result that you'll be seeing here
12 will look like a slightly different figure than you've
13 read several times in the staff SER, and the reason is
14 the swing in this contribution from this particular
15 human error probability.

16 The next two have to do with the slick
17 operation by the operator, injecting boron post ATWS.
18 As you know, there's an early and late period for
19 that. The early period in this plant's case is
20 measured by the necessity to inject boron to avoid hot
21 well depletion, hot well inventory depletion in the
22 late period. If you miss that one, you're next trying
23 to save the suppression pool, and so you want to
24 inject in time to avoid loss of unacceptable
25 inventory from the suppression pool.

NEAL R. GROSS

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

1 In the analyses we do, we do a set of MAP
2 runs, and we do these parametrically so we can see what
3 the impact is of various operator action times. This
4 early time, which these next two actions deal with,
5 decreased from in the case of a two pump injection,
6 from 12 to nine minutes. In the case of one pump
7 injection, the second one of these pair on the slide
8 decreased from nine to six minutes.

9 So, again, we modeled the effective --

10 CO-CHAIRMAN WALLIS: Well, that's
11 different from the 31 minutes we were told earlier.

12 MR. BURCHILL: Well, we're talking early
13 injection here.

14 CO-CHAIRMAN WALLIS: That was for
15 something else.

16 MR. BURCHILL: That's right, and this is
17 just for early injection. The reason I bring this one
18 up in detail is this is comparable to the two minutes
19 you discussed earlier. Two minutes is a licensing
20 number, but if you look realistically at what time is
21 actually available to the operator, in the worst of
22 cases only one pump operation, there's at least six
23 minute available.

24 And depending upon, you know, the exact
25 sequence of the event, it could be as much as nine

NEAL R. GROSS

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

1 minutes, and I'll let the operators speak to this
2 question with respect to their response time if you
3 wish, but clearly, you know, these are response times
4 that are well reasonable.

5 MEMBER POWERS: I mean, what's intriguing
6 to me in this area is you calculate some probability
7 that the operator will do things in six minutes or
8 nine minutes, depending on what he has, and those
9 numbers, I hesitate to guess off the top of my head,
10 but I suspect you calculate like ten to the minus
11 third or something like that.

12 MR. BURCHILL: On that order.

13 MEMBER POWERS: And things like that.

14 And then we speak to the operators, and we
15 haven't on this particular incident, but I'm just
16 guessing that if I asked them, "How long does it take
17 you to do this?" he says, "Well, about 30 seconds."

18 "What's the probability that you'll fail
19 to do this?"

20 And he says, "Not a snowball's chance in
21 hell that I'll forget to do this."

22 MR. BURCHILL: That would be pretty close.

23 MEMBER POWERS: "And I'm tested on this
24 every two weeks, and it's beaten into my head. I
25 dream about it at night and things like that. So

NEAL R. GROSS

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

1 there's just no chance."

2 And I come back and see, you know, you
3 have this discrepancy, and we talk about realistic
4 models in PRA, and how do we factor -- how would one
5 go about trying to factor in what we learn from the
6 operator testing and whatnot and what we calculate
7 when we go through Swain or something like that?

8 MR. BURCHILL: Well, yeah. I'm not sure
9 I understand the discrepancy you're describing because
10 what the operator will tell you is that he's tested on
11 this frequently in the simulator, and that he does it
12 really fast.

13 And actually, these are sometimes measured
14 time-wise, but the really important thing is that
15 they're responding to symptoms, and the timing isn't
16 really the deal. It's whether or not they respond to
17 the symptoms adequately.

18 Now, the way that the PRA models is this
19 is using human error probability models, that a big
20 EPRI program you may recall about ten years ago or 15
21 did a lot of measurements in simulators and
22 determined, you know, what was the error rate that was
23 occurring with various types of actions, either
24 cognitive or skill based, you know, type of actions.

25 And so the numbers I'm talking about are

NEAL R. GROSS

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

1 based on that, and I don't think there's a real big
2 discrepancy. If I say that the error rate is on the
3 order of ten to the minus three, I think that
4 correlates pretty closely with the operator saying,
5 you know, "No way will I miss this, you know."
6 Because at some point he might miss it, and that's
7 what that ten to the minus three number is meant to
8 represent.

9 But I think that you --

10 MEMBER POWERS: I think what you're saying
11 is that, in fact, everyone is pretty bad at guessing
12 what a ten to the minus third probability is.

13 MR. BURCHILL: Oh, absolutely, absolutely.

14 MEMBER POWERS: One chance in 1,000 is
15 just zero to most of us.

16 MR. BURCHILL: Guessing it, guessing it,
17 right.

18 MEMBER POWERS: To most of us it's zero.
19 I mean, there's just no chance this will ever happen.

20 MR. BURCHILL: I will say, I mean, and
21 there are certainly practitioners in my peer group
22 that would say this is all voodoo anyway, but the fact
23 is that it's come a long way since Swain wrote his
24 handbook, and there are some very sophisticated models
25 today. I won't try to defend the absolute numbers,

NEAL R. GROSS

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

1 but I think the relative numbers, and the
2 understanding of the cause and effect relationship
3 between various performance shaping factors and their
4 impact on the actual probabilities is pretty good. I
5 mean, I think we have a reasonable handle on that.

6 MEMBER POWERS: Yeah. I mean, I think I
7 agree with that. I also have to inject that I applaud
8 your use of sensitivity analyses on those things where
9 it's difficult to find data. We talked about that
10 earlier yesterday.

11 MR. BURCHILL: Well, I wouldn't be able to
12 defend it with you if I did, you know.

13 MEMBER POWERS: Well, but I mean, that's
14 the appropriate thing to do. You've got to go find
15 out is there an effect because all you're trying to do
16 is see if there's a magnifier.

17 MR. BURCHILL: Right.

18 MEMBER POWERS: I mean if I change things
19 by ten percent and the core damage frequency goes up
20 by 85 percent, I get nervous about that.

21 MR. BURCHILL: Right, right.

22 MEMBER POWERS: And if it goes up by six
23 percent, then I'm not so nervous about my number.

24 MR. BURCHILL: Right.

25 MEMBER POWERS: That's all.

NEAL R. GROSS

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

1 CO-CHAIRMAN WALLIS: Okay. Should we
2 leave this slide now?

3 MR. BURCHILL: We can leave this slide.
4 Let's leave this slide.

5 MEMBER POWERS: Is it grating on your
6 nerves?

7 CO-CHAIRMAN WALLIS: No, I think we've
8 covered the important items on it.

9 MR. BURCHILL: Yes. The full power
10 internal events model in this particular case does
11 include explicit representation of internal flooding
12 in both the base case and, as you would expect, in the
13 EPU case. This is a very small contribution, on the
14 order of five percent to the total core damage
15 frequency.

16 We didn't find any new initiating events
17 or increases in initiating event frequencies, and so
18 we found that there really is a negligible effect of
19 internal flooding on core damage.

20 The Level II is the actual containment
21 response and release evaluation, Large in this case or
22 LERF is used as the measure of merit here, and large
23 is defined as a greater than ten percent release of
24 the cesium and iodine inventory in the core, and early
25 is defined as releases in under six hours.

NEAL R. GROSS

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

1 The methodology used here was an explicit
2 calculation as opposed to the simplified calculation
3 I mentioned to you a couple of months ago. This has
4 explicit PRA model with containment event trees.

5 We did do a binning of the end states for
6 the core damage and then put those as the initiating
7 event frequencies into the containment event trees to
8 calculate the containment response.

9 There were very minor changes in the human
10 error probabilities here, largely because we're
11 talking very long times, you know, on the order of
12 hours for response in this case, and these are mainly
13 conditional probabilities for either repair or
14 recovery, particularly for earlier actions that were
15 not successful.

16 The next to the last bullet should say
17 that the EPU has no impact on the containment event
18 trees. I apologize. That was a carryover, the minor
19 impact. There actually were no structural changes to
20 the event trees here, and we found that the LERF is
21 directly proportional, as you would expect, to the
22 core damage frequency impact, which we'll show on the
23 next slide.

24 This is a summary then of the numerical
25 results from the full power internal events model

NEAL R. GROSS

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

1 evaluation. These are similar to results that have
2 been reported in previous EPU risk studies. The pre-
3 EPU PRA has about a 1.4 times ten to the minus five
4 core damage frequency per year, and the LERF is about
5 1.4 E to the minus seven, two orders of magnitude
6 lower, and the reason for that, of course, is that
7 we're not using a simplified model. We are using an
8 explicit model of containment response.

9 The EPU has a very small impact on both,
10 about six percent. Again, I'll remind you that in the
11 SER if you've been reading that, it reports a
12 reference case of about three percent. The difference
13 here is the swing on that auto start and the motor
14 driven feed pump.

15 The absolute numbers are that the core
16 damage frequency changed by nine E minus seven per
17 year, and this puts it below the RegGuide 1.174
18 criterion of ten to the minus six for being classified
19 as a very small risk impact.

20 Likewise the LERF was eight E minus nine
21 per year, which is well below the RegGuide 1.174
22 criteria of ten to the minus seventh, to be classified
23 as a very small risk impact.

24 The other important thing is the
25 composition of initiating events contributing to core

NEAL R. GROSS

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

1 damage did not change. We did answer an RAI from the
2 staff that displayed the explicit spectrum of the core
3 damage due to individual initiating events, and there
4 was only very slight change, some up, some down. But
5 essentially the pie chart looked identical.

6 CO-CHAIRMAN WALLIS: Could you explain,
7 Bill, on this SER, there's something about sensitivity
8 number four and talking there about 23 percent
9 increase in base CBF.

10 MR. BURCHILL: Sensitivity number four was
11 the combination of sensitivities one through three,
12 where we increased those initiating event frequencies
13 by 20 percent, and we increased the operator error
14 rates by 20 percent, which was a very high increase,
15 and to be frank with you, I can't remember what the
16 third one was.

17 But we combined all of them. In all total
18 they gave a 23 percent impact, which I think, you
19 know, referring back to Dr. Powers' remark, if this
20 had been an 85 or 90 percent impact, we would have
21 probably paid very close attention. At 23, percent
22 giving the bounding nature of that sensitivity, it was
23 felt not to be significant.

24 We did look at uncertainties. This is the
25 following slide. We examined this through the

NEAL R. GROSS

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

1 traditional use of risk importance measures. We did
2 do explicit sensitivity studies, the ones I just
3 mentioned, and we did compare this PRA's results to
4 those reported in NUREG 1150.

5 We didn't find any sources of uncertainty
6 beyond those already identified by NUREG 1150, and if
7 you took the NUREG 1150 outer bound on uncertainty,
8 which is on the order of a factor of five or six
9 overall, the results here would still be in the small
10 risk range in the RegGuide 1.174 risk MAP as compared
11 to the very small risk.

12 CO-CHAIRMAN KRESS: Excuse me. How did
13 you examine uncertainties used in risk importance
14 measures again?

15 MR. BURCHILL: In risk importance
16 measures, what you do is you look at the change from
17 the pre-EPU state to the post EPU state and see
18 what --

19 CO-CHAIRMAN KRESS: Change in what is
20 important?

21 MR. BURCHILL: Yes, what is important,
22 right. And then you can look at whether or not if you
23 find an important piece of equipment. Is there
24 anything that's changed about the dependency structure
25 of supporting that piece of equipment?

NEAL R. GROSS

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

1 Basically you're looking at whether or not
2 there's anything about the PRA in going from the pre-
3 EPU state to the post EPU state that would actually
4 change the impact on that importance for those pieces
5 of equipment.

6 CO-CHAIRMAN KRESS: Yeah, I was having
7 trouble relating that to uncertainty, but I can see
8 it's a nice thing to have done.

9 MR. BURCHILL: Okay. The next three areas
10 are in the qualitative evaluation area. We started,
11 of course, with the IPEEE. It concluded that none of
12 the external events had risk significance.

13 We explicitly evaluated the fire risk. We
14 do have a fire PRA for this plant. It gives a base
15 CDF for the plant of about 3.3×10^{-6} per year,
16 which is about an order of magnitude lower than the
17 internal events frequency.

18 We looked at the dominant scenarios.
19 These are primarily loss of inventory control or loss
20 of decay heat removal, and we found no change in the
21 risk profile produced by the EPU; a minor impact on
22 decay heat removal scenarios because of the human
23 error probabilities, but again, most of these are out
24 late in time.

25 We didn't find any new initiating events,

NEAL R. GROSS

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

1 nor any increases in fire ignition frequencies. So we
2 judged that the EPU has a negligible impact.

3 In the seismic area, a point to make here
4 is that the IPEEE is based on seismic margin analysis.
5 That analysis did not reveal any outliers or
6 vulnerabilities in this plant. We looked at the
7 seismic margin report, found no reason to believe that
8 the seismic qualifications of the SSCs would be
9 changed, and as was previously discussed, there's
10 really negligible impact to the increase in stored
11 energy on blow-down loads so --

12 CO-CHAIRMAN WALLIS: Do you have an
13 increase in power? We have presumably great
14 occurrence in part of the electrical system. Is this,
15 in fact, a fire initiation risk, circuit breakers and
16 things?

17 MR. BURCHILL: The only place that I'm
18 aware that that would be an issue, I think we're
19 making changes to the equipment. These are mostly out
20 in breakers in the switch yard, if I remember, and
21 those were the ones that we covered with the
22 sensitivity study.

23 Is that sufficient?

24 Okay. The EPU has the word "negligible"
25 that's also appropriate here for the seismic risk. We

NEAL R. GROSS

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

1 could not find any impact here.

2 In the shutdown risk area, we do not have
3 a shutdown PRA, but, again, we can evaluate what would
4 be the impact by principally being guided by the
5 operator actions required for the dominant sequences
6 that contribute to risk in the shutdown states. The
7 shorter times for boiling, the decrease in inventory,
8 decrease in the inventory loss time does shorten the
9 time for operator response, and it also, of course,
10 delays the time when alternative decay heat removal
11 systems, such as the spent fuel cooling system or the
12 reactor water clean-up system could be used.

13 But the times that we're talking about are
14 measured in hours or even days. So the impact here is
15 essentially negligible, and is managed through the use
16 of a configuration risk management program.

17 So, in summary, we did evaluate the impact
18 using standard PRA methods, both quantitative and
19 qualitative. The risk impact is a very small percent
20 of the current plant risk, on the order of six
21 percent.

22 That risk was compared for both CDF and
23 LERF to the guidelines provided for a permanent plant
24 change in RegGuide 1.174 and found to be in the very
25 small risk region, and the risk impacts from external

NEAL R. GROSS

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

1 events and shutdown conditions were found through
2 examination of the dominant sequences in judgment to
3 be negligible.

4 Again, as I will say, as I said a couple
5 of months ago, the staff review in this area was, in
6 our opinion, quite thorough, especially that this is
7 not a risk informed submittal. We had quite a lot of
8 dialogue with the staff, although not quite as much as
9 we did on the previous submittal, but they did ask, I
10 think, quite relevant questions relative to our
11 submittal.

12 So if there are no further questions, I
13 will turn this back to Larry Westbrook, who will
14 discuss the project implementation.

15 MR. WESTBROOK: Thank you, Bill.

16 Good morning, again. I am Larry Westbrook
17 with AmerGen, and as Bill mentioned, I will be
18 discussing the EPU project implementation regarding
19 operator training and EPU testing.

20 EPU training consists of classroom
21 presentations and simulator scenarios. Classroom
22 material was presented in licensed operator
23 requalification training covering the following
24 topics:

25 Technical specifications and updated

NEAL R. GROSS

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

1 safety analysis report changes;

2 Plant limits and operating conditions
3 changes, such as core thermal power and generator
4 limits;

5 Design changes associated with EPU;

6 The extended power up rate power to flow
7 MAP operating procedure revisions;

8 And Exelon and industry power up rate
9 experience.

10 Simulator training is being provided to
11 operating crews --

12 CO-CHAIRMAN WALLIS: Could I ask you here
13 now? Classroom training is presumably a two-way
14 thing. I mean, you tell them things and they ask
15 questions.

16 MR. WESTBROOK: Yes.

17 CO-CHAIRMAN WALLIS: Were there any
18 particular questions they raised that you remember?

19 MR. WESTBROOK: I'm trying to think of
20 particular questions. The questions generally that
21 were asked --

22 CO-CHAIRMAN WALLIS: Did they have any
23 particular concerns?

24 MR. SCOTT: Larry, if I could help you out
25 here, again, I'm Kent Scott from AmerGen, senior

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 reactor operator.

2 One of the concerns that I heard with the
3 guys in training is focused around how we're going to
4 operate the generator now. You know, we're going to
5 be limited by the secondary balance of plant side. So
6 there was a lot of concerns with respect to, okay, how
7 do the limits on our generator change, explaining the
8 increase in hydrogen pressure from 60 to 75 pounds.
9 I think that was the most focus that I had saw, and I
10 think that was supported a lot by showing the
11 operators in the simulator the difference in response.

12 Here's the plant at a higher feed flow.
13 Here's the plant at a higher steam flow. Here's a
14 transient. It looks the same.

15 And they kind of took that away and
16 focused in on, okay, what's going to be different. So
17 the balance of plant inside the generator was the
18 thing that I saw most from them.

19 MR. WESTBROOK: Okay. Simulator training
20 is being provided to the operating crews covering the
21 following: EPU full power conditions, and as Kent
22 stated, that involved the generator limits and the
23 plant response.

24 Normal operations scenarios, such as
25 raising reactor power along constant rod line and

NEAL R. GROSS

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

1 dynamic scenarios that were selected to highlight both
2 similarities and differences in plant response at EPU
3 versus current power levels; these scenarios included
4 a feedwater pump trip, a reactor recirculation pump
5 trip, and ATWS.

6 Operator requalification training is being
7 covered in two cycles of classroom and simulator
8 training. The first cycle of training has been
9 completed, and the second cycle is currently in
10 progress.

11 CO-CHAIRMAN WALLIS: I would guess that
12 there's no real significant change, and the way that
13 they diagnose events is very much the same as before.

14 MR. WESTBROOK: That's correct.

15 CO-CHAIRMAN WALLIS: In terms of the same
16 -- it's just slight qualitative differences in the
17 response.

18 MR. WESTBROOK: That is correct. A slight
19 difference in response. The way we operate the plant
20 is essentially the same. If they're -- the most
21 significant difference, if you will, is that to
22 maximize Clinton's output will be BOP limited. They
23 will be looking at and maximizing the output by
24 focusing on the generator limits, and we won't be as
25 bounded by our license power level because we'll have

NEAL R. GROSS

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

1 a margin to the license power level. Of course, we
2 won't be monitoring that.

3 CO-CHAIRMAN WALLIS: It's like driving an
4 automobile with a slightly different gear box or
5 something. I mean, it's not as if many things have
6 changed. It's just you're going to have a slightly
7 different response.

8 MR. WESTBROOK: That's correct.

9 Also, just in time, simulator training
10 specific to EPU testing will be conducted prior to
11 power ascension.

12 CO-CHAIRMAN WALLIS: Just in time. The
13 day before?

14 MR. WESTBROOK: The day before, a couple
15 of days before so that this training, as I stated, is
16 specific to the power ascension. It may be specific
17 to certain testing done during the power ascension,
18 and it may be specific to the crew that will be
19 performing the testing.

20 MR. SCOTT: And again, this is Kent Scott
21 from AmerGen.

22 That's a typical process that we do prior
23 to any start-up, is we have the crew that's going to
24 start up the reactor take them over there the day
25 before.

NEAL R. GROSS

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

(202) 234-4433

www.nealrgross.com

1 MR. WESTBROOK: Next I would like to
2 provide an overview of the start-up test program.

3 The start-up test program employs a
4 careful and deliberate approach to upgrade power
5 levels. The program has incorporated previous
6 successful Exelon power up rate experience.

7 The La Salle EPU test director is the
8 Clinton Power Station project manager. Also the
9 Dresden Quad Cities test procedure developer is also
10 developing the Clinton test procedure.

11 Beginning at 90 percent original licensed
12 thermal power, steady state data collection and
13 testing will be conducted. Once 100 percent original
14 licensed thermal power is reached, reactor power will
15 be raised in two percent increments along a constant
16 rod line to maximum achievable power level.

17 Beginning at approximately 70 percent of
18 original licensed thermal power dynamic testing will
19 be conducted. These dynamic tests include pressure
20 control system stability tests, feedwater level
21 control system stability tests, and turbine valve
22 surveillances.

23 This slide shows the testing to be
24 performed at each power level.

25 In conclusion, the operator training to

NEAL R. GROSS

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

1 prepare for EPU is extensive and utilizes both --

2 CO-CHAIRMAN WALLIS: I don't understand
3 what you mean by testing of core performance, let's
4 say. Are you just recording how it's performing?
5 You're not performing any sort of transient tests.

6 MR. WESTBROOK: That's correct. Core
7 performance is no transience test. It's monitoring
8 with our 3D Monocore system that all of our thermal
9 limits and our inspect and that we are operating on
10 the power --

11 CO-CHAIRMAN WALLIS: This isn't so much
12 testing. It's just monitoring that things are
13 behaving as expected.

14 MR. WESTBROOK: Part of the testing is
15 data collection and analysis and a static, and then
16 some of the tests, such as pressure control system
17 stability, feedwater level control system stability,
18 those are the dynamic tests.

19 CO-CHAIRMAN WALLIS: Now, presumably you
20 have guidelines here. I mean, you've got something
21 like piping vibration data. These folks are recording
22 piping vibration data. There must be some procedures
23 written down about what they do if the vibration steps
24 out of line beyond some magnitude or something. All
25 of these must be things to look for --

NEAL R. GROSS

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

1 MR. WESTBROOK: That's correct.

2 CO-CHAIRMAN WALLIS: -- or guidelines
3 about what to do.

4 MR. WESTBROOK: The test procedures being
5 developed by or from the General Electric task report
6 which selected the tests that need to be performed --

7 CO-CHAIRMAN WALLIS: All of those checked
8 things, you've got to check that the vibration has not
9 increased beyond something.

10 MR. WESTBROOK: Right.

11 CO-CHAIRMAN WALLIS: And so on and so
12 forth.

13 MR. WESTBROOK: This test has a Level 2
14 and a Level 1 criteria. Certainly exceeding the Level
15 2 criteria requires evaluation, and exceeding Level 1
16 criteria would certainly be more extensive actions
17 required. Those criteria are being built into the
18 test procedure.

19 MEMBER SIEBER: You've run these tests
20 before. So you have a database --

21 MR. WESTBROOK: Yes.

22 MEMBER SIEBER: -- of what the vibration
23 levels are. So you're really looking for deviations
24 from that as you go beyond the old 100 percent power
25 level; is that correct?

NEAL R. GROSS

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

1 MR. WESTBROOK: These tests are similar to
2 the original start-up tests.

3 MEMBER SIEBER: Right.

4 MR. WESTBROOK: As far as the criteria,
5 we're taking what's established in the task report and
6 insuring in the course that they are consistent with
7 the original start-up test.

8 MEMBER SIEBER: Right.

9 MR. WESTBROOK: In conclusion, the
10 operator training to prepare EPU is extensive and
11 utilizes both classroom and simulator environments.
12 The testing plan is incremental and comprehensive and
13 is a careful and deliberate approach to up-rated power
14 levels.

15 Therefore, project implementation will
16 insure that EPU is implemented as designed and plant
17 response is as expected.

18 CO-CHAIRMAN WALLIS: When you're doing
19 this power uprating by two percent, do you have extra
20 people in the control room?

21 MR. WESTBROOK: The actual people in the
22 control room will be very minimal. Clinton Power
23 Station's control room is physically very small. A
24 lot of the data collection will be taken off the
25 process computer and analyzed outside the control

NEAL R. GROSS

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

1 room.

2 CO-CHAIRMAN WALLIS: So there are other
3 people who are engineers sitting somewhere else
4 monitoring what's going on?

5 MR. WESTBROOK: That's correct.

6 MR. WILLIAMS: Are there any more
7 questions for Larry?

8 (No response.)

9 MR. WILLIAMS: Thank you, Larry.

10 Prior to concluding, we are prepared to
11 answer the follow-up questions on the large transient
12 testing.

13 Tim.

14 MR. SPENCER: Good morning. Dale Spencer,
15 Exelon Nuclear.

16 We would like to address the earlier
17 question regarding analysis of the plant response to
18 transience. We have provided the staff with the
19 results of these analyses, but in response to today's
20 question, we have a couple of things we pulled
21 together.

22 A couple of points here. General Electric
23 has asked that the session be closed. Again, this is
24 some proprietary information.

25 The other thing, if you'd please excuse

NEAL R. GROSS

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

1 us, we pulled it together at the last minute. We have
2 to change computers and get a couple of flemsies up
3 there so that we have the right information, but
4 pardon us for just a minute.

5 And we would ask the Chairman that we
6 treat this as a closed session also.

7 CO-CHAIRMAN WALLIS: Okay.

8 (Whereupon, from 9:57 a.m. to 10:05 a.m.,
9 the Subcommittee meeting was recessed for closed
10 session.)

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

NEAL R. GROSS

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

(202) 234-4433

www.nealrgross.com

1 MR. BOEHNERT: Okay. Let's go back to
2 open session.

3 CO-CHAIRMAN WALLIS: We're ready to
4 conclude.

5 MR. SPENCER: Yes, Dale Spencer, Exelon
6 Nuclear.

7 At this time I believe the ACRS had one
8 pending question for Bill Burchill, and he's prepared.

9 MR. BURCHILL: This is Bill Burchill,
10 Exelon.

11 I wanted to answer Dr. Kress' question
12 about the radiological release model which is in the
13 MAP program. I knew it would have some catchy name,
14 and I couldn't remember what it was, but it's based on
15 IDCOR data. It was actually a model developed by
16 EPRI. It's called the IDCOR EPRI steam oxidation
17 model, and it does detail a phenomenological
18 evaluation of both the release and then the various
19 partitioning mechanisms as you go out from the fuel
20 through the coolant, through the steel boundaries of,
21 you know, the reactor assembly, and on out through the
22 containment.

23 So it is a detailed model for radiological
24 release. Does that answer your question?

25 Right. It's the old Cubachasie (phonetic)

NEAL R. GROSS

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

1 model, right.

2 MR. BOEHNERT: Dale, what version of MAP
3 are you using now?

4 MR. BOLGER: This was all done with MAP
5 3B. We are now converting fleet-wide to MAP 4, which
6 we'll have in place this year, but all of these
7 results were on 3B, and in this area, there is some
8 enhancements in MAP 4, but basically the fundamentals
9 are the same.

10 MR. WILLIAMS: If there are no more
11 questions, we would like to introduce Keith Jury to
12 conclude.

13 MR. JURY: Thank you.

14 Good morning. My name is Keith Jury, and
15 I'm the Director of Licensing for the Midwest Region.

16 We had to have one licensing guy to talk
17 here. So I guess I'm the token.

18 Dr. Wallis and the other committee
19 members, on behalf of Exelon and AmerGen, we'd like to
20 thank you for the opportunity to come here and give
21 this presentation. As always, we appreciate the
22 insights that we get from you all individually and
23 collectively.

24 It's clear at least to me that the team,
25 including G.E. and Sargent Lundy have done a very

NEAL R. GROSS

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

(202) 234-4433

www.nealrgross.com

1 thorough job on this project.

2 I would like to apologize for the fact that
3 we weren't able to answer all of your questions
4 immediately and had to huddle, but I think that given
5 the fact that the team has taken not only the lessons
6 learned from our fleet, but the industry as a whole
7 and have incorporated into this project, that it
8 speaks to the thoroughness of the effort.

9 I'd like to bring up the fact that, you
10 know, I think as time has evolved here and as we've
11 gone through these up rates, for this up rate, we use
12 the most up to date and accepted analytical methods
13 and believe that we've demonstrated that the up rate
14 will have a minimal impact on the plant from not only
15 the plant perspective, but the system integrity, and
16 as Bill so eloquently pointed out, from a risk
17 perspective as well.

18 As such, we've concluded that the up rate
19 in the plant operation at the up rated conditions is
20 acceptable and clearly safe at these conditions.

21 And with that, I'd like to thank you again
22 for your time, and that completes our portion of the
23 presentation.

24 Thank you.

25 CO-CHAIRMAN WALLIS: Well, thank you.

NEAL R. GROSS

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

1 I believe we're ready to have a break, and
2 so we will break, and we will come back here at 20
3 minutes past ten.

4 (Whereupon, the foregoing matter went off
5 the record at 10:10 a.m. and went back on
6 the record at 10:23 a.m.)

7 CO-CHAIRMAN WALLIS: We'll come back in
8 session, and now we're going to hear from the NRC
9 staff, and we're looking forward to that.

10 MR. MARSH: Yes, I have a few opening
11 comments. Good morning, Mr. Chairman. This is Ted
12 Marsh, and I'm still the Deputy Director of Licensing.

13 And in the interest --

14 MEMBER POWERS: We're working on that.

15 MR. MARSH: Yeah, I know you are. In what
16 sense I don't know.

17 (Laughter.)

18 MEMBER POWERS: EDO, EDO.

19 MR. MARSH: EDO. Thank you, thank you.
20 I appreciate that.

21 I did want to point out that the agenda
22 has us talking a little bit this morning about our
23 efforts to improve safety evaluation quality, and we
24 did talk about that yesterday, and we also have the
25 letter to you. So I'm not going to go through that

NEAL R. GROSS

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

1 anymore, unless you'd like.

2 Let me just begin by introducing Jon
3 Hopkins, who is the project manager for Clinton, who
4 will be going through the presentation format and
5 introducing the speakers.

6 Jon.

7 MR. HOPKINS: Okay. Thank you.

8 As Ted said, I'm Jon Hopkins, NRC project
9 manager for Clinton.

10 And next slide.

11 I'll start with an overview. Clinton's
12 BWR-6 Mark 3, it's the first one to apply for extended
13 power up rate. This will be a 20 percent power up
14 rate. Even after the up rate, which will be to 3473
15 megawatts thermal, Grand Gulf will have greater power
16 level and Perry will be slightly greater power level.
17 It's a constant reactor dome operating pressure, and
18 to achieve the 20 percent up rate, there are many
19 balance of plant modifications that need to be done,
20 and in large part because of that, this has two-part
21 implementation.

22 The refueling outage that begins is it
23 scheduled to start the end of March, early April with
24 start-up in May, and they expect to achieve roughly
25 seven percent when they start up this time.

NEAL R. GROSS

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

1 They will also have roughly two-thirds
2 G.E. 14 fuel when they start up this time, and then
3 the next refueling outage is scheduled for early 2004,
4 where they'll make the rest of the modifications and
5 achieve the rest of the power.

6 This application mostly follows the
7 licensing topical reports, the LTR-1 and 2. It was
8 submitted in June of last year, and as I stated, the
9 refueling outage starts the end of March, early April.
10 So we'll be going to full committee in March, and we
11 will be looking for a letter from the full committee.

12 There are some exceptions to ELTR-1, too.
13 It states four of them. The first one is large
14 transient testing. That exception is similar to
15 Dresden and Quad Cities, and we found it acceptable
16 for them not to do large transient testing.

17 The other three exceptions are in the
18 reactor systems review area, and they'll be talked
19 about by the next presenter.

20 Mainly I'll mention that the other three
21 exceptions in the reactor system area dealing with
22 stability, transience and ECCS performance. It's hard
23 to discuss those without getting into proprietary
24 information. Our presentation is, you know,
25 scheduled for an open presentation and everything.

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 Questions, we may have to go into closed session based
2 on --

3 CO-CHAIRMAN WALLIS: I think if things
4 become proprietary, what you should do is stall them,
5 and then at the end of the session we'll have
6 discussion of the proprietary items if we need them.

7 MR. HOPKINS: Yes.

8 CO-CHAIRMAN WALLIS: Will that be okay?

9 MR. HOPKINS: Yes, I'm fine with that. I
10 just wanted to mention it.

11 This is a non-risk informed submittal, but
12 as you just had the presentation, there were
13 substantial risk evaluations performed. I won't
14 mention anything more about that.

15 Experience. This plant is owned by
16 AmerGen now, which is 50 percent Exelon, and so they
17 have plant up rate experience specifically with the
18 Dresden-Quad extended power up rate.

19 The staff, of course, has that experience
20 plus Duane Arnold and Hatch and Monticello in boilers.

21 CO-CHAIRMAN WALLIS: Has Dresden and Quad
22 Cities actually implemented an up rate?

23 MR. HOPKINS: I know -- I'm sorry --
24 Dresden 2 has.

25 CO-CHAIRMAN WALLIS: Dresden 2 has

NEAL R. GROSS

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

1 influence at the up rate.

2 MR. HOPKINS: Yes. To continue from our
3 review to finalize my review of the application, we
4 have one license condition at this time. It deals
5 with the feedwater nozzle. That, again was discussed
6 by the licensee yesterday.

7 They are doing additional analyses of the
8 cumulative usage factor in there, and they have to
9 submit them to the staff. We feel that this is not a
10 significant item, that we can make it a license
11 condition and resolve the issue easily during the next
12 fueling cycle. We don't anticipate that this should
13 stop them from starting up.

14 Also, one other item. The staff is going
15 to perform or, in fact, is performing confirmatory
16 containment analyses. We just received data from
17 General Electric to allow us to go do that. The
18 confirmatory analysis is similar to that performed at
19 Duane Arnold, and I expect we'll have that done fairly
20 soon.

21 MR. BOEHNERT: Who is doing that analysis,
22 Jon.

23 MR. HOPKINS: Well, our plant systems
24 branch.

25 MR. BOEHNERT: Oh, it's in house?

NEAL R. GROSS

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

1 MR. HOPKINS: Yes.

2 MR. BOEHNERT: Okay.

3 MR. HOPKINS: We have no other items other
4 than those two I mentioned, the license condition and
5 the confirmatory analysis.

6 With that I'd like to introduce our first
7 presenter, who is George Thomas, and he will discuss
8 reactor systems review.

9 MR. THOMAS: Yeah, my name is George
10 Thomas. I'm from the Reactor Systems Branch.

11 Our review scope, mostly in the standard
12 review plan, Chapter 4, 5, 6. There is a small
13 portion of nine, and most of 15. And our review is
14 mostly about the fuel and the reactor systems, and we
15 review high pressure core spray, low pressure core
16 spray, RCA system, CID system, and the standby control
17 system.

18 Also we review reactor ore pressure,
19 transients, LOCA, dose, and stability. So this is our
20 scope.

21 As Jon told, you know, basically for all
22 the ELTR 492, for most of the EPU evaluation, but the
23 tech. deviations under -- they're in the areas of
24 transient analysis, LOCA analysis, and the stability
25 analysis.

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 Typically they sum it (phonetic) during
2 the obligation, equilibrium, quote, analysis for the
3 transients and the LOCA, but this obligation, they
4 already are very limited analysis for the transients,
5 LOCA.

6 MR. NIR: This is G.E.? I think you're
7 getting into proprietary information which has to do
8 with scope, and I would like to strike this from the
9 record if possible.

10 And, again, we can get into this
11 discussion in the closed session if necessary.

12 MR. BOEHNERT: I know no way to strike the
13 record.

14 CO-CHAIRMAN WALLIS: I don't understand
15 what. He hasn't said anything yet which is
16 proprietary, has he?

17 MR. NIR: It's G.E.'s position that he's
18 discussing now some proprietary information, the basis
19 for the analysis and the scope, which we consider
20 proprietary.

21 MR. BOEHNERT: I'm sorry.

22 CO-CHAIRMAN WALLIS: Well, he hasn't
23 really discussed anything yet, has he?

24 MR. BOEHNERT: Yeah, that's --

25 CO-CHAIRMAN WALLIS: Can we move on? Are

NEAL R. GROSS

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

1 you clear on what he's objecting to?

2 MR. THOMAS: I'm not going into details.
3 I'm only just telling, you know, they did only a very
4 limited analysis. It was not done typically like
5 before. That's all I'm telling, you know. I'm not
6 telling the details now.

7 MR. BOEHNERT: Let me make a comment here
8 for the record.

9 There's been some controversy over the
10 scope of what is G.E. holding proprietary here, and we
11 need to get this straightened out between the staff
12 and ourselves because this is becoming a problem.

13 I don't want to say any more right now,
14 but I think this has to be straightened out because it
15 seems that it's become quite broad, and it's impacting
16 how we're doing business here.

17 CO-CHAIRMAN WALLIS: The fact that there
18 are exceptions for transient analysis, LOCA analysis,
19 and stability analysis is actually in the SER, isn't
20 it?

21 MR. THOMAS: Right, right.

22 CO-CHAIRMAN WALLIS: Which is a public
23 document.

24 MR. THOMAS: IT is in the SER.

25 MR. HOPKINS: Excuse me. The SER is the

NEAL R. GROSS

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

1 draft safety evaluation, which we have sent to the
2 licensee for their comments on proprietary aspects.
3 So, in fact, it is not a public document yet.

4 Now, I will state that this slide was
5 developed, and we feel this slide is entirely
6 nonproprietary.

7 MR. NIR: We agree.

8 MR. HOPKINS: So we feel that you can say
9 that those exceptions -- that that's public.

10 MR. NIR: We agree.

11 CO-CHAIRMAN WALLIS: Okay.

12 MR. BOEHNERT: They agree. Okay. Then we
13 don't have a problem.

14 MR. HOPKINS: So far, right.

15 CO-CHAIRMAN WALLIS: Well, you're going to
16 be watched like a hawk by G.E. now. So --

17 (Laughter.)

18 MR. THOMAS: Okay. As part of our review,
19 we went to D obviously some time in September of last
20 year, and four of us went there for a week, and we
21 reviewed their design record files and the past report
22 and all of the recommendation.

23 The focus of our audit was all these
24 deviations. So most of the time we sent there was on
25 all these three deviations. So the first was about

NEAL R. GROSS

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

1 the transient analysis. With the summit (phonetic) of
2 the EPU obligation, they only analyze only two
3 transients. So when the (unintelligible) was done
4 with the equilibrium core.

5 So all other transients will be analyzed
6 as part of the reload analysis, and then --

7 MR. NIR: This is Israel Nir, G.E.

8 This is proprietary information.

9 CO-CHAIRMAN WALLIS: It sounds rather
10 extraordinary that it's proprietary.

11 MR. NIR: Well, it is proprietary just to
12 -- this has commercial implication just General
13 Electric. The fact that we do or do not do certain
14 analysis is based on significant experience, power
15 operator experience, and this is information that is
16 commercially sensitive, and we would like not to share
17 it publicly, and we would like --

18 CO-CHAIRMAN WALLIS: How much of your
19 presentation is going to run into this problem? Maybe
20 we should just close the meeting and get on with it.

21 MR. NIR: We have no proprietary issues
22 with the slides as they presented. We -- the words
23 that are written here are not proprietary. We have an
24 issue with some of the verbal information.

25 CO-CHAIRMAN WALLIS: So he has said

NEAL R. GROSS

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

1 something which is slightly different from the slide,
2 which is a problem?

3 MR. BOEHNERT: Jon, do you want to
4 comment?

5 MR. HOPKINS: It might be easier if we
6 close this session.

7 MR. BOEHNERT: Okay. That's fine. We can
8 close the session. We'll close the session. We'll do
9 that, but I want to put on the record that we're going
10 to have to decide, you know, where to draw the line
11 here because you guys in the end make the decision on
12 what is proprietary. We just go along with it
13 basically, but I can close the session on the proviso
14 that if you later decide this is not proprietary,
15 we'll release the information.

16 CO-CHAIRMAN WALLIS: Well, let's close the
17 session and see if anybody leaves.

18 (Laughter.)

19 MR. BOEHNERT: So again, anyone who should
20 not be here to hear G.E. proprietary information,
21 please leave the room. We're going to close the
22 session and go into closed session.

23 (Whereupon, from 10:37 a.m. until **, the
24 Subcommittee meeting was recessed for
25 closed session.)

NEAL R. GROSS

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

1 MR. BOEHNERT: And if they jump up again,
2 I guess we'll see what happens.

3 CO-CHAIRMAN WALLIS: Yes, if you jump up
4 again, you'll have to have good reason to do so.

5 Please go ahead.

6 MR. LOBEL: Good morning. My name is
7 Richard Lobel. I'm with the Plant Systems Branch in
8 the NRR, and I'd like to talk about the balance of
9 plant review that we did in containment.

10 This review of plant systems covers a
11 broad area. The standard review plan, there are some
12 sections in Chapter 3 that we look at having to do
13 with high and medium energy line breaks. We look at
14 Section 6.2 on containment and 6.5 on combustible
15 gases, and a large part of the SRP Chapter 9 that
16 deals with heating and ventilation systems, the spent
17 fuel pool and other miscellaneous topics.

18 The next two slides are just some examples
19 of some of the topics that a balance of plant reviewer
20 would look at, or reviewers, and that were looked at
21 for the Clinton power up rate. I won't go through
22 reading them all.

23 The containment systems review followed
24 the power up rate topical report. I listed the codes
25 that were used by G.E. in the calculations for the

NEAL R. GROSS

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

1 containment, and they're standard G.E. codes that have
2 been used on other containment calculations that are
3 used frequently. M3CPT and Super Hex are used pretty
4 much on every containment, G.E. containment
5 calculation, and LAMB code was used for this review.
6 It was also used for the Dresden-Quad Cities power up
7 rate. The LAMB code provides the mass and energy into
8 the containment. M3CPT is for the short-term
9 response, and Super Hex calculates the long-term
10 pressure and temperature in the containment.

11 CO-CHAIRMAN WALLIS: This is a more
12 realistic flow-down compared with one which was less
13 realistic?

14 MR. LOBEL: It's conservative. The
15 calculations are conservative.

16 CO-CHAIRMAN WALLIS: Which ones, the ones
17 which are less realistic? I'm not quite sure what you
18 mean by a more realistic flow-down.

19 MR. LOBEL: Oh, more realistic.

20 CO-CHAIRMAN WALLIS: More realistic than
21 what?

22 MR. LOBEL: Oh, oh, I'm sorry. LAMB is
23 less conservative, more realistic than M3CPT.

24 MR. PAPPONE: This is Dan Pappone of
25 General Electric.

NEAL R. GROSS

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

1 The M3CPT break flow model that we're
2 using is a simple hand calculation with critical flux,
3 and then the LAMB code is actually a reactor model.
4 So that's where we're getting more realistic break
5 flow rates.

6 CO-CHAIRMAN WALLIS: It's a hand
7 calculation because you're using somebody's simple
8 method?

9 MR. PAPPONE: That's right. We're looking
10 at pressure and enthalpy for the up stream source for
11 the break, the break area and critical flow look up in
12 a table.

13 CO-CHAIRMAN WALLIS: Whose model are you
14 using?

15 MR. PAPPONE: That's in the M3CPT
16 approach.

17 CO-CHAIRMAN WALLIS: Whose model is it?

18 MR. PAPPONE: It's G.E.'s. Oh, both of
19 them were actually using the Moody-Slip.

20 CO-CHAIRMAN WALLIS: Using Moody.

21 MR. PAPPONE: Right.

22 CO-CHAIRMAN WALLIS: Which may give you a
23 reasonable answer, but it's not realistic.

24 MR. PAPPONE: Right. It's on the
25 conservative side and over predicts the break flow.

NEAL R. GROSS

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

1 MR. LOBEL: I think the more realistic
2 refers to the LAMB model.

3 MR. PAPPONE: That's right.

4 MR. LOBEL: Correct me if I'm wrong. Is
5 a more detailed model of the vessel and the core.

6 MR. PAPPONE: That's right.

7 MR. LOBEL: Go on?

8 CO-CHAIRMAN WALLIS: Well, they're all
9 approved codes. So --

10 MR. LOBEL: Well, they're approved up to
11 a point that they're used all the time. We haven't
12 written an SER on the LAMB code for containment use.
13 It is an Appendix K code and has been approved by the
14 staff for local calculations.

15 Super Hex hasn't been approved. There was
16 a 1993 letter to G.E. that talks about the staff's
17 intention with Super Hex, and what it says is that we
18 don't intend to do a detailed review of Super Hex
19 because it has the capability to vary the input, and
20 we didn't see the worth of a detailed review of the
21 code.

22 So what we ask is that a licensee that
23 uses Super Hex compare a Super Hex calculation with an
24 existing FSAR calculation just to verify that it can
25 reproduce containment response that it's been

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 previously approved.

2 And it also brings in the next bullet of
3 the confirmatory analysis. One of the reasons for
4 doing the confirmatory analysis is that these codes,
5 in general, haven't been approved by the staff, and so
6 that gives us -- that provides an impetus to us try to
7 do an independent calculation with a staff code that
8 we understand and compare it

9 CO-CHAIRMAN WALLIS: It says "is
10 performed."

11 MR. LOBEL: Pardon?

12 CO-CHAIRMAN WALLIS: It says "is
13 performed," and that means right now they're doing
14 this?

15 MR. LOBEL: It's underway, yeah. We've
16 just received, I understand, the last of the G.E.
17 data. The calculation is being done in our branch,
18 not by a contractor this time, and some preliminary
19 work has already been done in setting up the model.

20 CO-CHAIRMAN WALLIS: hat happens when you
21 get the results? Is that after you've issued the SER?

22 MR. LOBEL: It may be because we're
23 looking at this as a confirmatory calculation.

24 CO-CHAIRMAN WALLIS: That's strange.

25 MR. LOBEL: Well --

NEAL R. GROSS

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

1 CO-CHAIRMAN WALLIS: It's a kind of "new
2 speak." I know. I understand, but it's very strange
3 that you do the test.

4 What are you going to learn from it if
5 you've already given out the SER?

6 MR. LOBEL: If we find a significant
7 problem, we can always deal with that problem.

8 CO-CHAIRMAN WALLIS: It would be very good
9 if you could do these things in a slightly more
10 anticipatory mode.

11 MR. LOBEL: I agree.

12 CO-CHAIRMAN WALLIS: So that the results
13 were available before you wrote an SER.

14 MR. BOEHNERT: So this is not an open
15 issue, Rich?

16 MR. LOBEL: No, it's not considered an
17 open issue.

18 MR. MARSH: Mr. Chairman, let me clarify.
19 Rich, maybe you could help.

20 Do we anticipate having the results by the
21 full committee meeting?

22 MR. LOBEL: We're going to try very hard
23 to have the results by the full committee meeting, but
24 since it's a calculation and we may need to go back to
25 General Electric or the licensee for some more

NEAL R. GROSS

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

1 information, and we're not sure how it's going to turn
2 out, I'd rather not make that promise, but --

3 CO-CHAIRMAN WALLIS: And also if you rush
4 it --

5 MR. LOBEL: -- it should be done by then.

6 CO-CHAIRMAN WALLIS: -- the chance of
7 making some error is increased.

8 MR. LOBEL: Right.

9 CO-CHAIRMAN WALLIS: Are you using your
10 own codes or are you using the G.E. codes?

11 MR. LOBEL: We're using Contain 2R code.

12 CO-CHAIRMAN WALLIS: You're using a
13 different code altogether.

14 MR. LOBEL: Yeah. We're using Contain 2,
15 which is the latest version of the NRC code, and we're
16 trying to follow the guidance that we've received from
17 research from a previous user need.

18 We made a request to research to give us
19 guidance on how to use the contain code, which is
20 essentially trying to reproduce the physics that
21 really occur, how to use that in a design basis
22 analysis, and they've prepared reports for us for the
23 different types of containments, and this is going to
24 be the first time we've tried to use the Mark III
25 guidance that they've given us.

NEAL R. GROSS

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

1 We did follow the guidance we got from
2 research for the Duane Arnold calculation, and we
3 compared very well with the G.E. results.

4 CO-CHAIRMAN WALLIS: So this has been done
5 before. They've run Contain for Duane Arnold? I
6 forget now what happened.

7 MR. LOBEL: We had very good agreement.
8 We were within a degree and less than a psi, if I
9 remember right, with Duane Arnold.

10 CO-CHAIRMAN WALLIS: It was a different
11 shaped containment.

12 MR. LOBEL: Right, and that's why we're
13 repeating the process.

14 CO-CHAIRMAN WALLIS: Okay.

15 MR. LOBEL: And another reason this isn't
16 an open issue is because we've asked questions about
17 the containment response and why the results that G.E.
18 got or the licensee got are what they are, and we
19 think we understand what's going on.

20 So we're doing the calculation as a
21 confirmatory, not as an open item.

22 CO-CHAIRMAN WALLIS: It's not an open
23 item.

24 MR. LOBEL: No.

25 CO-CHAIRMAN WALLIS: I thought you had

NEAL R. GROSS

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

1 said it was.

2 MR. MARSH: No, it's not.

3 MR. SCHUABI: Dr. Wallis, just to clarify,
4 this is Mohammad Schuabi.

5 We have reviewed the licensee submittal in
6 this area, and we find it acceptable. So we don't
7 have a need for this confirmatory calculation, but we
8 are doing it anyway. That's why it's being presented
9 this way.

10 It's a little awkward. It's not the way
11 we normally do --

12 CO-CHAIRMAN WALLIS: I would not encourage
13 you to kill it just because you don't think you have
14 a need. Please complete it.

15 MEMBER POWERS: When you do these
16 calculations of the pressures and dry wells and wet
17 wells and places like that, do you consider the dry
18 well to wet well bypass?

19 MR. LOBEL: Ed, do you want to answer?

20 This is Ed Throm for the staff.

21 MR. THROM: My name is Ed Throm. I'm with
22 the Plant Systems Branch. I'm kind of the resource
23 that became available to Plant Systems to do this type
24 of work. My background is more in the LOCA area, but
25 I have experience running codes.

NEAL R. GROSS

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

1 As Rich pointed out, we had researchers
2 set up models for evaluating containment response, and
3 we plan to use that. What we've basically done is
4 looked at the Grand Gulf III model, and we are upgrade
5 -- as a matter of fact, I've upgraded that model to
6 Clinton, and at this point what I've done is
7 benchmarked the current USAR calculation for the
8 recirculation line break, and I missed it by a PSI and
9 one degree.

10 So we have --

11 MEMBER POWERS: Boy, you must have been
12 embarrassed, huh?

13 MR. THROM: Absolutely.

14 (Laughter.)

15 MR. THROM: And I'm trying to figure out
16 what the problem is. So it builds up the confidence
17 in the fact that the analysis techniques are comparing
18 well, and this is why I think it's really
19 confirmatory.

20 The other question, of course, is the
21 long-term suppression pool, and that presents more of
22 a challenge to do a calculation in a specific time
23 frame. That's why we don't want to commit to having
24 the complete set of confirmatory calculations done
25 within a certain time frame.

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 Anyone who runs these codes knows that you
2 run into unanticipated numerical problems somewhere
3 along the line. You've got to find the inertia factor
4 or what's potentially leading to the problem and
5 resolve it.

6 But the intent is basically to use the
7 modeling criteria that research established and
8 develop guidelines for doing design basis
9 calculations, and to basically mimic or reproduce the
10 efforts that we've done on Duane Arnold for Clinton
11 just to make sure that we're not missing anything in
12 the Mark III performance.

13 MEMBER POWERS: My recollection on the
14 Grand Gulf model is a substantial bypass flow from the
15 dry well into containment. It does not go through the
16 wet well.

17 MR. THROM: That's right.

18 MEMBER POWERS: And you take that into
19 account in the calculation, or do you shut that down?

20 MR. THROM: It's in the model as it is
21 right now, as I understand it.

22 MEMBER POWERS: Could you remind me of the
23 magnitude or do you remember?

24 MR. THROM: Do you mean area-wise?

25 MEMBER POWERS: Maybe area.

NEAL R. GROSS

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

1 MR. THROM: Well, I think the area is on
2 the order of 40 -- in Clinton, I think it's about 42,
3 43 square feet.

4 MEMBER POWERS: For the bypass --

5 MR. THROM: I guess I'm --

6 MEMBER POWERS: As I recall, it was like
7 1,000 CFM bypass flow.

8 CO-CHAIRMAN WALLIS: Forty-two square
9 feet.

10 MR. THROM: Well, I can't answer your
11 question today. As I said, you know, we're using the
12 models. I will look into that in terms of the way
13 things are being considered, but as you pointed out,
14 you know, as a resource, this work is just starting.

15 As I said, I've been able to benchmark
16 against the USAR calculation for the recirc. line
17 break. We did receive the hard part of the data from
18 G.E. and the applicant on Monday, which is all of the
19 mass and energies that are necessary to perform this
20 calculation.

21 I think I have all the data I need, but
22 there might be a couple of geometrical inputs, some
23 flow areas that I might have to go back to the
24 licensee to get. Sometimes what you think is in the
25 USAR isn't quite there.

NEAL R. GROSS

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

1 There's no challenging information that's
2 needed.

3 MR. LOBEL: The bypass flow area, the K
4 over squared A number that's in the tech. specs. is
5 determined from small break calculations and not the
6 large break because a smaller break turns out to be
7 limiting for that because you get flow for a longer
8 time.

9 We can get back to you on the question.

10 MEMBER POWERS: Yeah, because the reason
11 I asked is because it's not clear what's conservative,
12 to include it or not include it. I mean, if you were
13 interested in special temperature, then you want to
14 cut the bypass flow out. If you're interested in
15 containment pressure, maybe you want to turn it on.
16 I don't know.

17 MR. LOBEL: Well, that's another reason
18 why we tried to do our own calculations, because we
19 can run sensitivities on things like that, and that
20 might be a good problem to run.

21 We did that. Yesterday I was talking
22 about Arkansas. We did quite a bit of sensitivity
23 calculations with the Arkansas, independent
24 confirmatory calculations.

25 CO-CHAIRMAN WALLIS: As I remember the

NEAL R. GROSS

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

1 table we saw from yesterday, these criteria are met
2 pretty well, except the dry well temperature briefly
3 being above 330. Is that the one?

4 MR. THROM: Yeah, that's correct.

5 MR. LOBEL: And that was just for a short
6 time so that it really --

7 CO-CHAIRMAN WALLIS: Most of the other
8 criteria seemed to be met by reasonable margin. Is
9 that true?

10 MR. LOBEL: Yeah, yeah, and the changes
11 actually weren't that great. I have a slide that
12 talks -- in fact, it's the next slide or the slide
13 after -- talks about the actual numbers.

14 Yeah, that's true. Where are we? Well,
15 I think we've talked about that.

16 The next slide says what you just said.

17 CO-CHAIRMAN WALLIS: And you're not
18 concerned about this brief temperature exceeding
19 criteria?

20 MR. LOBEL: The SER says that -- we've
21 looked at that, and that it's brief enough so that the
22 temperature of the containment structure won't be
23 changed, won't exceed its limit even though the
24 atmosphere is slightly above the design temperature.

25 MEMBER POWERS: Is the concern over the

NEAL R. GROSS

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

1 dry well temperature one of the structure or is it of
2 the penetrations and the penetration seals?

3 MR. LOBEL: I believe the limit -- I don't
4 know for sure. Maybe G.E. can answer that or
5 licensee.

6 MR. PAPPONE: This is Dan Pappone with
7 G.E.

8 The real concern is the equipment. If the
9 dry well structure penetration seals, relief valves,
10 solenoids, things like that, and what we get from the
11 long-term containment analysis or short and long-term
12 containment analysis is an EQ envelope, environmental
13 qualification envelope that then is used for
14 qualifying all of the equipment there.

15 And that's where we're looking at the
16 short term of this excursion above the 330. It was
17 only for half a second, I believe, and that's where
18 making the judgment that the response time, you know,
19 to actually heat up the components that we're
20 concerned about is so short.

21 Remember they're starting out at, say, 150
22 degree temperature, the initial dry well temperature.
23 So there's a long time lag before they would reach
24 that 330 degree temperature limit, and this is such a
25 short pulse before we drop back down.

NEAL R. GROSS

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

1 CO-CHAIRMAN WALLIS: Okay.

2 MR. LOBEL: Okay. We also look at NPSH of
3 the ECCS pumps and spray pumps, and there wasn't any
4 change to the design temperature. Calculations were
5 done at the design temperature so that the power up
6 rate didn't affect those.

7 And Clinton does not take credit for over
8 pressure. So that wasn't an issue.

9 Just briefly, some of the other
10 significant systems that we looked at I'll mention.
11 The ultimate heat sync was originally designed for two
12 units, and so there's plenty of margin for --

13 CO-CHAIRMAN WALLIS: It was also built for
14 two units, not just designed? It was actually built
15 for two units?

16 MR. LOBEL: Built and hopefully designed
17 and built.

18 MR. HOPKINS: Yes, the slide should say
19 megawatt electric.

20 MR. LOBEL: Oh, yeah.

21 CO-CHAIRMAN WALLIS: Yes, it's a pretty
22 small pump.

23 MR. LOBEL: Yeah, right. The component
24 cooling water system is an important safety system.
25 The only loads that increase with power is a small

NEAL R. GROSS

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

1 change to the reactor coolant pumps, and the spent
2 fuel pool loads, and the temperature increase is
3 small, I think, just a couple of degrees.

4 The spent fuel pool --

5 CO-CHAIRMAN WALLIS: This is sealed
6 cooling or something?

7 MR. LOBEL: Yeah, for the reactor coolant
8 pumps, recirculation pumps.

9 The spent fuel pool cooling, the peak
10 temperature is less than 120 degrees with the ultimate
11 heat sync at its tech. spec. number of 95 degrees, and
12 one train of cooling. For a normal off load, which is
13 a portion of the core for Clinton, the guidance is
14 that the limit has to be met, assuming a single
15 failure with one train, and the Clinton calculations
16 show they do that.

17 An abnormal off load for Clinton would be
18 a full core off load, and the peak temperature is less
19 than 140 degrees, with the ultimate heat sync
20 temperature at 95 degrees, and since it's an abnormal
21 off load, they can take credit for both trains of
22 cooling.

23 CO-CHAIRMAN WALLIS: This is an average
24 temperature in the pool? This is one 40 degrees?

25 MR. LOBEL: Yes.

NEAL R. GROSS

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

1 CO-CHAIRMAN WALLIS: The pool mixes
2 rapidly enough that you don't get concerned about
3 variations around the pool?

4 MR. LOBEL: I don't think that's a
5 problem. Is there somebody else that can answer?

6 I think that's been looked at and --

7 CO-CHAIRMAN WALLIS: I think it would have
8 to be.

9 MR. LOBEL: -- the decision has been made
10 that it's not an issue. I can't quite where, but I
11 remember reading something at one time that that's
12 been looked at.

13 MR. SHUM: David Shum from Plant Systems
14 Branch.

15 Could you repeat that question, please?
16 I couldn't hear.

17 CO-CHAIRMAN WALLIS: Well, we're talking
18 here about an average pooled temperature. I'm just
19 asking how much does the temperature vary from, say,
20 the region of the fuel to the remote region of the
21 pool.

22 MR. SHUM: Well, we didn't look at the
23 temperature at the fuel. From the fuel pool cooling
24 standpoint, we look at the average in the --

25 CO-CHAIRMAN WALLIS: Do you assume the

NEAL R. GROSS

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

1 average is good enough?

2 MR. SHUM: Un-huh, but from another plants
3 we always look at it, and we have no problem before.

4 MR. LOBEL: My recollection is that that's
5 been looked at, studied, and the mixing in the pool
6 from natural circulation is enough that the
7 temperature is uniform. But I'll take it as an issue
8 if you'd like to try to find out where that's
9 addressed.

10 CO-CHAIRMAN WALLIS: It would be nice if
11 someone knew definitely. Yeah, maybe you could find
12 out.

13 MR. SHUM: Yes, we will be able to find
14 that out.

15 MR. LOBEL: Okay. In conclusion, the
16 balance of plant containment systems for Clinton
17 comply with NRC regulations and guidance at EPU
18 conditions.

19 CO-CHAIRMAN WALLIS: And this is the end?

20 MR. LOBEL: The end.

21 CO-CHAIRMAN WALLIS: Any closing
22 statement?

23 MR. MARSH: I have a closing statement
24 unless, Jon, do you have anything you want to conclude
25 with up there? No?

NEAL R. GROSS

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

(202) 234-4433

www.nealrgross.com

1 MR. HOPKINS: I just wanted to say this
2 was the end of the staff presentation, and it would
3 just be questions and if there are questions on other
4 topics. This was the end of our presentation.

5 MR. MARSH: I've got some closing
6 comments, Mr. Chairman, unless you'd like to.

7 Okay. Thank you.

8 I'd like to thank the committee for the
9 time and the opportunity to present to you both
10 Arkansas and Clinton's incentive power up rate. I
11 want to emphasize again that the staff has undertaken
12 extensive reviews of these applications, and all areas
13 affected by the power up rates have been reviewed and
14 evaluated.

15 The staff has critically examined
16 methodologies and their application for these two
17 cases. We've concluded that all of the analytical
18 codes, methodologies used for licensing analyses are
19 acceptable for these applications. The results of the
20 deterministic analyses have demonstrated that the
21 proposed increases in power for Arkansas and Clinton
22 plants are acceptable and meet the regulatory
23 requirements.

24 Now, this concludes the presentation.

25 Now, we, of course, would be glad to answer any

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 questions, but I've got a couple other thoughts I'd
2 like to leave with you.

3 Based --

4 CO-CHAIRMAN WALLIS: These are going to
5 the full committee?

6 MR. MARSH: next month.

7 CO-CHAIRMAN WALLIS: Next month?

8 MR. MARSH: Right.

9 CO-CHAIRMAN WALLIS: Both of these?

10 MR. MARSH: Both of them, right. So
11 any --

12 CO-CHAIRMAN WALLIS: And both the
13 applicant and the staff will have considerably less
14 time.

15 MR. MARSH: Yes, sir, right.

16 CO-CHAIRMAN WALLIS: And therefore, you
17 have to bear that in mind regarding your presentation.

18 MR. MARSH: Yes, sir. Any guidance you'd
19 like to give us in terms of what you'd like us to
20 present would be great.

21 Let me add one more thing, if I can. Some
22 of the issues that came out in yesterday's
23 presentations we're going to respond to. There were
24 some to do items and things. We'd like to respond in
25 writing if you don't mind. We want to make sure that

NEAL R. GROSS

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

1 we answered those thoroughly and completely and
2 formally. Okay?

3 So we're going to be getting the
4 transcripts and making sure that we understand the
5 questions and respond in the right manner.

6 And as you say, we don't have a lot of
7 time for the full committee. So any -- we did talk
8 yesterday about a potential approach for the full
9 committee. What we talked about yesterday was, of
10 course, we don't have the time to go through all of
11 the issues, but you suggested picking a couple of key
12 topics in each one of these areas and demonstrating to
13 the full committee some depth of reviews and some
14 issues that we went through.

15 So perhaps we'll identify if it's
16 acceptable to you some key issues in each one of these
17 plants' reviews, and we will go through with some
18 detail to the full committee.

19 MEMBER POWERS: I think you need to be
20 more cautious with your ANO than you do with the
21 Clinton because this is effectively the third one.

22 MR. MARSH: Right.

23 MEMBER POWERS: One of these, I mean, it
24 may be a BWR-6 and so it's somewhat different.

25 MR. MARSH: Right.

NEAL R. GROSS

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

1 MEMBER POWERS: My thought here would be
2 saying that, look, this is yet another of the BWR up
3 rates. They've done it a little differently than
4 others. Here's the exceptions, and discuss the
5 disposition of your exceptions.

6 I think you're going to have to discuss
7 again the transient testing issue.

8 MR. MARSH: Okay.

9 MEMBER POWERS: I mean, I just think it's
10 unavoidable simply because we had added comments to
11 one of our letters, in which there's a dissent from
12 the majority opinion discussion.

13 That's my personal thought on this
14 subject. I don't think you need -- my point is I
15 don't think you need to be as careful with this one as
16 you do with the ANO just because it is a repetition.

17 And, by the way, I will thank you publicly
18 for allowing your staff to meet with us this morning,
19 and we could discuss BWR stability and the mathematics
20 there and not bore everyone else to death.

21 MR. MARSH: Good.

22 MEMBER POWERS: It was a very productive
23 meeting.

24 MR. MARSH: I'm glad it was helpful.

25 When you say "careful," are you suggesting

NEAL R. GROSS

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

1 that we spend more time discussing the Arkansas
2 application?

3 MEMBER POWERS: Oh, I think you have to.

4 MR. MARSH: Okay.

5 MEMBER POWERS: Because it's new and it's

6 --

7 MR. MARSH: It's the first of this type.

8 MEMBER POWERS: The type, sure, and
9 whatnot.

10 MR. MARSH: Okay. We'd be glad to do
11 that.

12 MEMBER POWERS: I mean, I personally don't
13 feel the need to be that cautious and careful with
14 Clinton. It seems to me that the focus there is
15 really on the exceptions issue because they're
16 different, and among the exceptions, of course, is
17 transient testing.

18 MR. MARSH: Right.

19 MEMBER POWERS: And I would try on the
20 transient testing to really go through your logic very
21 carefully just because we have a dissenting opinion.

22 MR. MARSH: We'd be glad to.

23 PARTICIPANT: We'll continue to.

24 MEMBER POWERS: Yeah, I mean, I don't know
25 that you're going to persuade him.

NEAL R. GROSS

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

1 MR. MARSH: But we could at least say it
2 to make sure that people understand our rationale for
3 it.

4 MR. MARSH: Sure, sure.

5 MEMBER SIEBER: Well, you want it on the
6 record also.

7 MR. MARSH: Yes.

8 MEMBER POWERS: And you want to give us
9 ammunition to beat him.

10 MR. MARSH: No, we don't.

11 MEMBER POWERS: Yes, you do. Trust me.
12 You do.

13 MR. MARSH: Whatever you say.

14 Well, Mr. Chairman, that concludes our
15 presentation.

16 CO-CHAIRMAN WALLIS: Thank you.

17 MR. MARSH: And we thank you very much
18 again.

19 CO-CHAIRMAN WALLIS: That's all right.
20 Anything else that the members wish to say at this
21 time?

22 (No response.)

23 CO-CHAIRMAN WALLIS: Well, thank you for
24 helping us to finish early.

25 We will not reconvene until one o'clock,

NEAL R. GROSS

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

1 and then we'll take up a completely different topic.

2 Thank you all for your contributions to
3 the meeting.

4 (Whereupon, at 11:38 a.m., the
5 Subcommittee meeting was recessed for lunch, to
6 reconvene at 1:00 p.m., the same day.)
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

NEAL R. GROSS

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

A-F-T-E-R-N-O-O-N S-E-S-S-I-O-N

(1:03 p.m.)

CO-CHAIRMAN KRESS: This meeting will now please come to order.

I think this is a new Subcommittee meeting from what we had this morning. This is combined Subcommittees on Thermal-Hydraulic Phenomena and Future Plant Designs.

I am Tom Kress, Chairman of the Future Plant Designs Subcommittee, and we have with us Graham Wallis, who is Chairman of the Thermal-Hydraulic Phenomena Subcommittee. We also have ACRS members Dana Powers and Bill Shack and Jack Sieber, and our ACRS consultant, Virgil Schrock.

The purpose of this meeting is to review the staff's review of Phase 2 of the pre-application review of Westinghouse AP 1000 plant design. The Subcommittee will gather information, analyze relevant issues and facts, and formulate proposed positions and actions as appropriate for deliberation by the full committee.

Mr. Medhat El-Zeftawy is the cognizant ACRS staff engineer for this meeting.

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

NEAL R. GROSS

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

(202) 234-4433

www.nealrgross.com

1 this meeting, previously published in the Federal
2 Register on January 29th, 2002.

3 A transcript of this meeting is being held
4 and will be made available as stated in the Federal
5 Register notice. Therefore, it's requested that
6 speakers first identify themselves, use the
7 microphone, and speak with sufficient clarity and
8 volume so that they can be readily heard and copied on
9 the transcripts.

10 We have received no written comments or
11 requests for time to make oral statements from members
12 of the public.

13 I have no introductory comments. It's a
14 self-introductory subject. Do any of the members wish
15 to make anything before we start? Any comments?

16 MEMBER POWERS: This is really just a 67
17 percent power up rate; is that --

18 CO-CHAIRMAN KRESS: That's basically what
19 it is, yeah. It's another power up rate review that
20 we're doing.

21 CO-CHAIRMAN WALLIS: It's for a
22 nonexisting reactor. So it's not quite the same
23 thing.

24 MEMBER POWERS: So it's in the imaginary
25 space.

NEAL R. GROSS

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

1 CO-CHAIRMAN KRESS: Well, we will now
2 proceed with the meeting, and I'll call upon Jim Lyon,
3 our friend from the past, to open the meeting for us.

4 MR. LYON: Thank you, Dr. Kress
5 I appreciate being here today.

6 MEMBER POWERS: Well, you didn't. You
7 left us.

8 MR. LYON: Well, you know.

9 MEMBER POWERS: Short exposures are okay.

10 MR. LYON: Short exposures. A very
11 helpful one and a very enlightening one.

12 As Dr. Kress alluded, we're going to talk
13 about Phase 2 of the AP 1000 design certification
14 review. This is the final portion of the pre-
15 application review, and I think just to get us going
16 I'd like to turn it over to the two project managers
17 that are working on this at this time.

18 First, Andrzej Drozd, who is the acting
19 project manager and has been helping us out since, I
20 guess, about October time frame.

21 And Larry Burkhart, who will be the
22 permanent project manager as Andrzej goes back to his
23 old duties where he's going to help us a lot doing the
24 review of this and other advanced reactors.

25 So with that I'll turn it over to Andrzej.

NEAL R. GROSS

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

1 MR. DROZD: Good afternoon. My name is
2 Andrzej Drozd, and for the last four months I had the
3 privilege to and pleasure to coordinate Phase 2 review
4 of AP 600 pre-application review.

5 In today and tomorrow's presentation, I
6 will give a quick background and the status of the
7 project, and then we'll turn into a technical panel to
8 discuss Phase 2 issues.

9 I will do the hopefully simple and
10 straightforward regulatory exemptions issues, and then
11 Jerry Wilson, Dave Terao and Goutam Bagchi will
12 address design acceptance criteria.

13 After that, testing of AP 600 and its
14 applicability to AP 1000 will be addressed by Steve
15 Bajorek, and then Walt Jensen and Ed Throm will
16 discuss with you and present to you the application of
17 safety analysis codes.

18 Just to recall, some time in December
19 1999, LC certified the AP 600 start-up plant design,
20 and just about the same time Westinghouse in various
21 forms expressed interest in doing power up rate, as
22 Dr. Power says, that is, to apply for a certificate of
23 a similar, if not identical, plan, but with the power
24 of about 1,000 megawatts output.

25 Needless to say, there were a lot of

NEAL R. GROSS

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

1 introductory discussions followed by a meeting in
2 April when staff and Westinghouse discussed what would
3 be the best way to approach certification review of
4 the new plant.

5 And the three-stage approach seems to be
6 the most appropriate. The Phase 1 would be or was
7 just identification of the issues to be reviewed in
8 Phase 2, and Phase 2 would be review of those issues
9 and potentially, depending on the results of Phase 2,
10 the full design certification review as a Phase 3.

11 In May 2000, Westinghouse requested the
12 NRC staff to proceed with Phase 1, and after several
13 discussions and letters and meetings, NRC has provided
14 six review issues and its estimated how much it would
15 take to review it.

16 Based on that suggestion, in August 2000,
17 Westinghouse asked NRC staff to proceed with Phase 2
18 and focus only on four issues, that is, applicability
19 of the test program, APC funded test program to the
20 new design, as well as applicability of safety
21 analysis code used for AP 600 to AP 1000.

22 They asked us to review proposed design
23 acceptance criteria approach, as suggested by
24 Westinghouse, and as well, applicability of certain
25 regulatory exemptions for AP 1000.

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 As I understand it, by the end of August
2 we made presentation to you for AP 1000. Therefore,
3 I don't have any specific presentation on the design
4 itself. However, I do have some back-up slides if
5 needed.

6 CO-CHAIRMAN KRESS: I think we're familiar
7 enough with the design at this point.

8 MR. DROZD: Thank you, Tom.

9 Briefly, status of the review. Phase 1
10 was complete in July 2000, and Phase 2 is being
11 completed as we speak. Technical review was done just
12 about a month ago, and as a result, we are writing two
13 SECY papers.

14 The Phase 2 issues were divided into two
15 packages sort of. One package is a policy oriented,
16 which is application of design acceptance criteria
17 approach to design certification, and more technically
18 oriented or utilization oriented testing of the codes.

19 Both papers went through internal
20 iteration, and final drafts are being reviewed and
21 concurred. Some were in our administrative space.

22 Today and tomorrow we'll present to you
23 the results of our Phase 2 review, and eventually in
24 about three weeks or in about a month, we'll make a
25 presentation to the full ACRS Committee explaining

NEAL R. GROSS

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

1 what we did and asking for the approval or
2 suggestions.

3 CO-CHAIRMAN KRESS: You'll want a letter
4 in the March meeting.

5 MR. DROZD: Or asking for a letter of
6 recommendations.

7 CO-CHAIRMAN KRESS: When do you go to the
8 commissioners with this?

9 MR. DROZD: The week after. The paper is
10 due to the Commission in March 28.

11 CO-CHAIRMAN KRESS: Okay.

12 MR. DROZD: And as we discussed with
13 Westinghouse our findings, there is a good chance that
14 Westinghouse will go ahead with full design
15 certification application some time the end of March,
16 beginning of April this year.

17 CO-CHAIRMAN KRESS: Does Westinghouse know
18 what's in these draft documents?

19 MR. DROZD: Yes.

20 CO-CHAIRMAN KRESS: You've already been in
21 discussion with them?

22 MR. DROZD: Not the letter of our
23 findings, but major points were conveyed to
24 Westinghouse, yes.

25 MR. BURKHART: We're still working out

NEAL R. GROSS

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

1 some of the what may be policy issues on design
2 acceptance criteria. There's been some late
3 developments.

4 In fact, we just received a letter today.

5 My name is Larry Burkhart. I'm the new
6 and it is hoped the permanent project manager for this
7 project.

8 So that aspect, the design acceptance
9 criteria, is kind of in an evolutionary phase. We're
10 towards the end of it where we still have a little bit
11 of work to do.

12 MR. DROZD: Well, if there's no more
13 questions regarding status of the project, let's turn
14 to the issues, Phase 2 issues.

15 One, the first one that I'd like to
16 address is regulatory exemptions. During AP 600
17 certification review, Westinghouse asked for several
18 regulatory exemptions, and three of them are being
19 suggested to be granted also for AP 1000.

20 The three are the exemptions regarding the
21 safety parameters display console, the auxiliary
22 feedwater system, as well as off-site power sources.

23 The rationale for granting those
24 exemptions for AP 600 are summarized right here for
25 the display console. The reason that the exemptions

NEAL R. GROSS

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

1 for this specific console, this specific part of the
2 design was that the safety parameter display console
3 was integrated or is to be integrated with the control
4 room design. Therefore, there was no need for a
5 stand-alone requirements for safety parameter display.

6 CO-CHAIRMAN KRESS: Then the control room
7 design is a COL item, put off until the COL or --

8 MR. DROZD: That is put up at the COL,
9 yes.

10 MR. WILSON: Dr. Kress, this is Jerry
11 Wilson.

12 We'll discuss that in the next
13 presentation.

14 CO-CHAIRMAN KRESS: Oh, okay. This is
15 just an overview of it, and you'll go into that a
16 little more. Okay.

17 MR. DROZD: The two other technical areas
18 that Westinghouse is seeking a regulatory exemptions
19 are auxiliary feedwater system, as well as off-site
20 power sources. Both of them are stemming from the
21 passive nature of safety system and passive nature of
22 safety injection systems.

23 CO-CHAIRMAN KRESS: These are general
24 design criteria, these?

25 MR. DROZD: The off-site power deals with

NEAL R. GROSS

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

1 general design criteria, and aux. feedwater is -- I
2 don't remember -- 50, 30 something. I'm sorry. I
3 don't remember exactly which paragraph it is, but they
4 were discussed during AP 600 certification review, and
5 the issues are identical.

6 CO-CHAIRMAN KRESS: And the basis for
7 granting approval of these exemptions is that you feel
8 like the underlying purpose of the rule is met?

9 MR. DROZD: We feel that the new design
10 has identical safety system function as AP 600, and at
11 least the intention of the requirements are being met.
12 Therefore, we don't see any reason why not to grant
13 those exemptions.

14 CO-CHAIRMAN KRESS: It meets the intention
15 of the rule.

16 MR. DROZD: The intentions are being met,
17 yes.

18 CO-CHAIRMAN KRESS: Okay. We're going to
19 get into a lot of detail on this testing and codes --

20 MR. DROZD: Oh, definitely.

21 CO-CHAIRMAN KRESS: -- and the DAC and so
22 on. You're giving us the bottom line right now.

23 MR. DROZD: I'm giving a very high level
24 summary of our positions and findings.

25 CO-CHAIRMAN KRESS: Good.

NEAL R. GROSS

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

1 MEMBER POWERS: This is a high level
2 bottom line.

3 CO-CHAIRMAN KRESS: That's a little --

4 MEMBER POWERS: I will think about this.

5 (Laughter.)

6 MR. DROZD: Well, if there's no more
7 questions on the exemptions, let me give you the high
8 level bottom line position on the design acceptance
9 criteria. The standardization review, review of
10 standardized plans are laid out --

11 CO-CHAIRMAN KRESS: Somebody has fouled up
12 on viewgraphs, and they didn't give us that one.

13 CO-CHAIRMAN WALLIS: I have it.

14 CO-CHAIRMAN KRESS: It's not in my
15 package.

16 MEMBER SCHROCK: That's because you're
17 Chairman.

18 CO-CHAIRMAN KRESS: Well, I guess so.

19 MEMBER POWERS: You are supposed to know
20 all of this stuff.

21 CO-CHAIRMAN KRESS: I got two copies of
22 your other slide though, the next one. So I guess
23 that was -- okay.

24 MR. DROZD: It was a voluntary gift.

25 CO-CHAIRMAN KRESS: Okay. Now, you may

NEAL R. GROSS

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

1 proceed.

2 MR. DROZD: Thank you.

3 The ground rules for reviewing design
4 certificate applicants are set out in Part 52, and the
5 key words, the key approach in staff's view is the
6 completeness of the design that's being submitted for
7 review.

8 The design acceptance criteria approach
9 were developed and applied during ABWR system 80 plus
10 reviews, as well as AP 600.

11 CO-CHAIRMAN KRESS: Now, what exactly does
12 5247(a)(2) say? Does it ask --

13 MR. DROZD: That will be covered with --

14 CO-CHAIRMAN KRESS: That will be covered
15 later? Okay. We'll wait.

16 MR. DROZD: Just in a couple of minutes.

17 CO-CHAIRMAN KRESS: We'll wait a minute.

18 MR. DROZD: In a couple of minutes.

19 The bottom line position as of now, as of
20 today is that based on the experience that we had with
21 the previous design reviews, we don't see that
22 approach as the preferred way of regulating, in
23 general.

24 And we do agree that there are technical
25 areas that are affected by rapidly evolving

NEAL R. GROSS

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

1 technologies, like instrumentation and control or
2 human factors, control room design. Therefore, we do
3 see good basis for granting design acceptance criteria
4 approach, because of the nature of the evolving
5 technologies.

6 Other areas are less obvious to staff,
7 whether DEC should be applied or not. I'd like to
8 make a note that the DEC approach granted or used for
9 piping, for example, and radiation protection, that
10 was used in ABWR System 80 Plus, we don't think it
11 applies to the case of AP 1000, and the rationale for
12 that would be presented in just a couple of minutes.

13 Also, we strongly believe that the level
14 of design details submitted for AP 1000 certificate
15 should be equivalent, if not the same, as the one that
16 was submitted for AP 600.

17 And maybe before you ask anymore specific
18 questions, I turn over the issue to technical panel,
19 Jerry Wilson, Dave Terao, and Goutam Bagchi. They
20 will address all there is to know about DAC approach.

21 Gentlemen.

22 CO-CHAIRMAN KRESS: I see they got
23 together some of the people that reviewed AP 600 for
24 this.

25 MR. WILSON: Yes, sir.

NEAL R. GROSS

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

1 MR. DROZD: Sixty-seven percent up rated.

2 (Laughter.)

3 CO-CHAIRMAN KRESS: One third.

4 MR. WILSON: Mr. Chairman, I'm Jerry
5 Wilson with the new reactor licensing project office,
6 and I'm joined by my colleagues from the Division of
7 Engineering that will participate in this
8 presentation.

9 Now, as Andrzej introduced, we're here to
10 talk about the request from Westinghouse to use design
11 acceptance criteria, and by way of background to
12 understand our recommendation, I thought I'd give a
13 little review of how we got to this point.

14 Now, the origin of this issue comes from
15 when we were building plants, a lot of plants in the
16 '70s and '80s, and electric companies got construction
17 permits based on basically preliminary design
18 information, and they completed their design while
19 they were building the plant, which led to a lot of
20 problems that we're all familiar with.

21 And so when the Commission set out to
22 reform the licensing process and issue Part 52, a key
23 aspect of that was to require design information be
24 complete before construction was initiated.

25 So to resolve this problem, we have in

NEAL R. GROSS

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

1 Part 52 and also in the design certification process
2 in Part 52, a requirement to provide complete and
3 final design information.

4 And to get to your question you just
5 asked, if you looked at page 3 of our handout, you'll
6 see a summary of that requirement, and basically what
7 we're looking for is final design information
8 equivalent to what you would see in a final safety
9 analysis report for an operating license application
10 and for essentially complete design information.

11 CO-CHAIRMAN KRESS: Now, let me ask you
12 this. What would be the practical implications if you
13 granted this, the DAC on the piping, seismic loadings
14 for the -- what would be the practical implications
15 with respect to your completing your review and making
16 a safety decision?

17 MR. WILSON: I'm going to get into this a
18 little bit more, but to introduce the concept is that
19 what's being used is design acceptance criteria in
20 lieu of detailed design information, and so in those
21 particular areas where it is used, the staff and the
22 applicant agree on the approach to finalize the design
23 at a later date.

24 And what we're looking at is the
25 desirability to develop design acceptance criteria

NEAL R. GROSS

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

1 that would lead to an acceptable design when the
2 applicant who references that certification actually
3 completes it.

4 Now, picking up a legal aspect of this
5 deck or a subset of ITAAC and the way ITAAC is set up
6 in the regulations, an applicant is required to
7 complete these design information until after they had
8 gotten a combined license. So you could have a
9 situation where we would get back to where we were in
10 the past where an applicant was completing their
11 design information while reviewing the plan.

12 CO-CHAIRMAN KRESS: You'd have to review
13 it again then.

14 MR. WILSON: Yeah, we'd have to verify
15 that they did implement the design acceptance criteria
16 correctly and thereby coming out with an acceptable
17 design.

18 CO-CHAIRMAN KRESS: Yeah, okay. I
19 understand.

20 MR. WILSON: So when we issued Part 52, we
21 were initiating reviews of design certification
22 applications at that time, and the staff did a study
23 of this issue of what's appropriate and necessary
24 level of design information to support a design
25 certification application and gave SECY papers to the

NEAL R. GROSS

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

1 Commission on that subject.

2 If you skip ahead and look at Slide 4,
3 you'll see these papers listed here, but, in
4 particular, SECY 90-241 and SECY 90-377.

5 The result of that led to a staff
6 requirements memorandum that had a lot of important
7 guidance to the staff on how to perform the design
8 certification reviews, and in there the Commission
9 said with regard to level of detail, "We meant what we
10 said when we issued Part 52. Meet the requirement.
11 Meet the 5247(a)(2) on level of detail."

12 Furthermore, the amount of information
13 should be proportional to the safety significance of
14 a particular system. So more significant safety
15 systems you would expect to see, more design
16 discussion.

17 And finally, they said, "Don't use ITAAC
18 as a means of resolving this design information."

19 Now, after that --

20 MEMBER POWERS: I guess they made it
21 pretty clear then, didn't they?

22 MR. WILSON: Yeah. At this point G.E. as
23 the lead applicant came to the staff and expressed
24 some concerns they had with actually completing their
25 design, and they brought up two areas of concern.

NEAL R. GROSS

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

1 The first area of concern, as Andrzej
2 introduced, was rapidly evolving technology. They
3 were referring to the digital instrumentation and
4 control systems and also the human factors design
5 aspects of the control room.

6 And what they said is that these areas of
7 technology are rapidly evolving or concerned if we
8 completed that design at that point in time; that you
9 would be locking up a design that if implemented later
10 could be significantly out of date.

11 And the other area of concern that they
12 raised is G.E. claimed that they couldn't complete the
13 piping and radiation protection design information
14 because they needed as building, as procured
15 information to do that.

16 CO-CHAIRMAN KRESS: So in those two
17 general areas of a possible DAC criteria, it seems to
18 me like if you have those conditions, you disregard
19 bullet three about being able to reach a final
20 conclusion on any safety question?

21 MR. WILSON: Yes. What you'll see as I go
22 through this history is we didn't fully implement the
23 Commission's guidance in its SRM.

24 CO-CHAIRMAN KRESS: Right.

25 MR. WILSON: So because of that, we went

NEAL R. GROSS

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

1 back to the Commission with a new round of SECY
2 papers, and once again, if you jump ahead to slide
3 four, you'll see a number of SECYs issued in the '92
4 time period where we explained these issues to the
5 Commission and now we proposed to come up with design
6 acceptance criteria in lieu of design information.

7 And the result of all of that effort was
8 that the Commission allowed us to use design
9 acceptance criteria in lieu of detailed design
10 information in those first two applications in the
11 areas of rapidly evolving technology and the as built,
12 as procured area.

13 But they admonished us that use of DAC
14 should be limited and if in the future that staff
15 planned to use it anymore, we had to come back to the
16 Commission.

17 CO-CHAIRMAN KRESS: They didn't prohibit
18 it. They just said, "Be sure it's limited, and if
19 you're going to do anymore DACs, come back to us with
20 it first."

21 MR. WILSON: That's correct.

22 CO-CHAIRMAN KRESS: Okay.

23 MEMBER SIEBER: I presume they
24 specifically approved the areas that you identified,
25 right?

NEAL R. GROSS

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

1 MR. WILSON: Yes, and that's what I'm
2 going to show on the table in the next slide.

3 So what you see is that for ABWR and for
4 System 80 Plus, they used design acceptance criteria
5 for instrumentation and control and human factors,
6 radiation protection, and piping.

7 Now comes AP 600.

8 CO-CHAIRMAN KRESS: Now, he's a case where
9 piping was included in a DAC.

10 MR. WILSON: That's correct.

11 Now comes AP 600, and in AP 600,
12 Westinghouse continued to use the I and C and human
13 factors DAC, once again applying the rapidly evolving
14 technology criteria, but they did provide sufficient
15 design information for radiation protection and
16 piping.

17 CO-CHAIRMAN KRESS: Now, why was it deemed
18 that, for example, System 80 Plus couldn't provide
19 sufficient design information for piping whereas AP
20 600 could? What is different about the two?

21 MR. WILSON: Yeah, I'm going to ask you to
22 hold that thought for a minute, and I turn it over to
23 Mr. Terao and he's our piping expert and it would be
24 better if he answers that.

25 MEMBER SIEBER: I have a question about

NEAL R. GROSS

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

1 radiation protection. To me you can split that into
2 two broad areas. One is the physical features of the
3 plant, like shielding and ingress and egress pathways,
4 et cetera, and the other half of that or part of it is
5 all of this instrumentation, area monitors and
6 effluent monitors and things like that.

7 MR. WILSON: And what we're talking about
8 here is the aspect of the barriers, the shielding and
9 that sort of thing, protection, and really what
10 sources are you going to get from various components
11 and how that would affect the design aspects of the
12 shielding.

13 MEMBER SIEBER: And I take it that all
14 instruments fit into the instrument and control areas,
15 which would be another DAC.

16 MR. WILSON: I believe so.

17 MEMBER SIEBER: Okay.

18 MR. WILSON: So on AP 600 they will
19 provide that information. They didn't require design
20 acceptance criteria. From the staff's perspective
21 this was an improvement, and we came closer to meeting
22 the Commission's goals, and our regulations for
23 complete and final design information.

24 Now, we come to the pre-application review
25 for AP 1000, and as you've heard from us previously,

NEAL R. GROSS

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

1 Westinghouse has asked four questions of the staff,
2 and the one we're focusing on today is can you use
3 design acceptance criteria on AP 1000 in three areas,
4 piping structures and seismic analysis.

5 Well, when we went to look at this, we
6 looked at it both from a technical perspective and
7 from the policy perspective. First of all, the
8 question is, well, is it technically feasible to
9 develop design acceptance criteria when all three of
10 these design areas are not complete?

11 And then the other part of it is where are
12 we with regard to meeting the Commission's goals.

13 So what we concluded -- and I'm going to
14 turn it over here to Mr. Terao to talk about our
15 ability to develop, for example, a piping DAC when the
16 structural design and seismic analysis hasn't been
17 formed, hasn't been completed -- but let me back up
18 for a minute and say, first of all, in the rapidly
19 evolving technology, that decision was originally made
20 in the '92 time period, and so I went back to our
21 technical staff, and I said, well, a decade has gone
22 by. Does the basis for allowing the use of design
23 acceptance criteria for instrumentation and control
24 and human factors still apply?

25 And my technical experts said, yes, it

NEAL R. GROSS

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

1 does in those areas. So if Westinghouse requests
2 that, we are supporting the use of design acceptance
3 criteria in those areas.

4 However, from the standpoint of piping
5 structures and seismic, Westinghouse was able to
6 complete that at AP 600, we believe, for the reasons
7 that we started out down this path, that we should
8 have complete design information in those areas, and
9 so from a policy perspective, we would recommend that
10 Westinghouse should provide that information also for
11 AP 1000.

12 CO-CHAIRMAN KRESS: You don't happen to
13 have an example of one of these DACs? For example,
14 what do they look like? Are they just a set of
15 criteria that have to be met in terms of general
16 criteria?

17 MR. WILSON: Dr. Kress, I've met with you
18 so many times that I anticipated this question.

19 (Laughter.)

20 MEMBER POWERS: You were predictable?

21 CO-CHAIRMAN KRESS: I hate to be so
22 predictable.

23 MR. WILSON: Med, could you give me a hand
24 here?

25 I don't have a lot of copies, but I have

NEAL R. GROSS

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

1 some for the reporter and perhaps for the Chairman and
2 let Westinghouse have one.

3 What I've done is I've used human factors
4 as an example probably because I understand it the
5 least, but first of all, in order to understand how
6 design acceptance criteria is different, what I've
7 given you is a handout from some human factors
8 criteria, and there's two parts of it. The part I'm
9 going to really talk about is in Section 3.2 there.

10 First of all, let's talk about what a
11 regular ITAAC looks like. An ITAAC is a verification
12 process, and so if you went into the Tier 1
13 documentation for AP 600, for example, you would see
14 that ITAAC were organized by structures and systems.
15 Most of them are systems based ITAAC. There will be
16 a high level design description of the system, will
17 pick out key elements of the system key design
18 commitments. That will be in your left hand column,
19 and will then specify whether that verification is
20 going to take place by a test or analysis, physical
21 inspection or combination thereof.

22 So you can see in the first example here,
23 the design commitment has to do with the technical
24 support center. We're going to verify it with a
25 physical inspection, and we have our acceptance

NEAL R. GROSS

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

1 criteria.

2 This one is pretty straightforward. Most
3 ITAAC aren't quite that straightforward, but it's good
4 enough to give you the concept of what you would
5 normally find for a regular ITAAC.

6 Now, when it comes to design acceptance
7 criteria --

8 CO-CHAIRMAN KRESS: And ITAAC is for
9 something that's already designed?

10 MR. WILSON: That's right. That was the
11 idea.

12 CO-CHAIRMAN KRESS: And this is just a
13 verification.

14 MR. WILSON: You finish the design, and
15 then this ITAAC sets for the verification process
16 we're going to use to verify that they built it the
17 way they committed to do it.

18 CO-CHAIRMAN KRESS: Right.

19 MR. WILSON: Now, when it comes to a
20 situation where the design isn't complete, we need an
21 ITAAC that has a design process built into it, and
22 this is just kind of a flow chart of what I'm going to
23 go through, and I'm not going to show you all of it,
24 but the idea being that we set up a group to do the
25 human factors design. They do an analysis and design,

NEAL R. GROSS

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

1 and then they verify it at the end of the day.

2 And so if you looked at that ITAAC, you
3 would see a discussion of the process used to do human
4 factors design, and then we would get into the ITAAC
5 or in this particular case, DAC, and you would see
6 things like, okay, you have to perform a TAC analysis,
7 and it talks about what should be done in that task
8 analysis, and I'll skip ahead here, and you'll see
9 that -- make sure that that's done correctly. I'm
10 trying to find a good example here.

11 Once the design is complete, then they'll
12 see some more traditional verifications in the main
13 control room and key things you're looking for in
14 there, and acceptance criteria for that.

15 CO-CHAIRMAN KRESS: And I presume
16 something equivalent to this exists for piping DAC for
17 System 80 Plus?

18 MR. WILSON: Yeah. Now, if you looked at
19 the instrumentation and control DAC, you'd see it's
20 very similar to what I've just shown you from human
21 factors, and it even has a similar flow chart that I
22 had up earlier, and which I can't put my finger --
23 yeah, here we are.

24 So you'll see instrumentation and control
25 looks very similar to this. So that gives you an idea

NEAL R. GROSS

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

(202) 234-4433

www.nealrgross.com

1 that instead of a straight verification of a design
2 that's completed, you first have to go through a
3 process where we have criteria on completing the
4 design, and then once it's complete, you would verify.

5 CO-CHAIRMAN KRESS: There was something
6 thought about piping and structures and seismic that
7 prevent you from developing such a DAC high tech?

8 MR. WILSON: Yes, and with that question,
9 I'll turn it over to Mr. Terao.

10 MR. TERA0: I'm David Terao. I'm with the
11 Mechanical and Civil Engineering Branch in NRR, and
12 before I go into my presentation, just to answer your
13 question, Dr. Kress about piping DAC, each of the DAC
14 actually has slightly different format, and for
15 piping, we did have ITAAC, but the DAC were actually
16 the design and acceptance criteria that were spelled
17 out in the FSAR by G.E. and System 80 plus, and they
18 were in different parts of the FSAR.

19 Since the FSAR doesn't have a section
20 called piping, they have a section called seismic and
21 mechanical design and relief valve designs. So the
22 DAC were just spread out in all different parts of the
23 SSAR, the standardized safety analysis report.

24 What the staff then did was to be
25 consistent in addressing DAC, we wrote in our safety

NEAL R. GROSS

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

1 evaluation for ABWR and System 80 Plus. We had a
2 specific section, Chapter 3.12, which was devoted
3 solely to piping and piping DAC and piping ITAAC.

4 And in those sections what we addressed
5 were all of the different design and acceptance
6 criteria that we reviewed and devaluated as part of
7 our Part 52 reviews, and there are actually seven
8 different areas that we looked at in piping design,
9 and these are some of the areas.

10 They're broken into different sections.
11 For example, we looked at the codes and standards. We
12 looked at the analysis methods. We looked at the
13 piping modeling techniques. We looked at the pipe
14 stress analysis criteria. We looked at the pipe
15 support design criteria. We looked at energy line
16 break criteria, and we looked at leak before break
17 criteria.

18 And each of those had many subissues that
19 we addressed in our safety evaluation. So there are
20 many issues that we had to review specifically for
21 ABWR and System 80 Plus.

22 MR. WILSON: Now, those two slides aren't
23 in your handout, but we'll provide you copies.

24 Do you want to go to this one next or the
25 next one?

NEAL R. GROSS

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

1 MR. TERAQ: Yeah. Actually since we got
2 diverted a little with this discussion of DAC, let me
3 try to refocus where we are and try to put my
4 presentation in perspective again.

5 Staff was requested to review the
6 acceptability of the DAC approach for AP 1000 for
7 seismic analysis, structural design, and piping
8 design. And I stress that because, first of all, this
9 is a pre-application review. This is Phase 2. So we
10 aren't reviewing the actual DAC themselves, as I put
11 up on my slide. We aren't at that level.

12 That would be done in Phase 3 when
13 Westinghouse submits its application for design
14 certification. So right now we're looking at the
15 acceptability of the DAC approach.

16 And I guess the two big picture questions
17 that we asked ourselves were, one, since seismic
18 analysis and structural design DAC are new, they've
19 never been used before; can we accept that approach?

20 And then the second question was on the
21 piping DAC which had been used before on ABWR and
22 System 80 Plus. We said, well, why wouldn't it be
23 acceptable for AP 1000.

24 So those are the big picture questions.
25 That's what I addressed today.

NEAL R. GROSS

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

1 CO-CHAIRMAN KRESS: Well, what I was
2 fishing around for is is there something about piping
3 structural and seismic that actually makes it
4 extremely difficult for you to do a DAC or is it just
5 a policy question.

6 MR. TERA0: Those are the details I'm
7 going to get into right now.

8 CO-CHAIRMAN KRESS: Okay.

9 MR. TERA0: Yes, for each of the areas.
10 So in answering the question of what is
11 the acceptability of using the DAC approach, the first
12 question that came in our mind is: well, what
13 criteria do we use for establishing acceptability of
14 DAC?

15 And this is why we went into a lot of
16 detail about the policy issues, because we reviewed
17 the DAC for three different areas:

18 One, does it meet established policy
19 issues as described in the SECY paper?

20 Two, does it make technical sense? In
21 other words, by that what I mean is when we look at
22 the seismic design of a plant, we start with the
23 ground motion, the earthquake ground motion
24 accelerations. We look at those ground motion
25 accelerations onto the building. We perform a

NEAL R. GROSS

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

(202) 234-4433

www.nealrgross.com

1 building analysis. The building analysis generates
2 the amplifications, the accelerations that are used
3 for the piping analysis.

4 The piping analysis then is performed and
5 the results are used to calculate break.

6 CO-CHAIRMAN KRESS: Which is something you
7 can do if you have a site, and the site described.

8 MR. TERA0: I'm sorry?

9 CO-CHAIRMAN KRESS: Well, you can do all
10 of that if you have a site, and the site
11 characteristics.

12 MR. TERA0: yes.

13 CO-CHAIRMAN KRESS: But if you don't have
14 a site, what then do you do? Use a bounding analysis
15 for those things?

16 I mean, I can see how you can do all of
17 that for a plant where you have a specified site.

18 MR. WILSON: The way we handle the site
19 characteristics and design certification is the
20 applicant specifies what we call site parameters, and
21 then we review the design to the site parameters.

22 So, for example, the applicant may specify
23 that he's designing the plant SSE of .3 G. He'll
24 specify ground motion associated with that. He's
25 specify flood levels and those sorts of things.

NEAL R. GROSS

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

1 So part of the definition of the design
2 includes that site parameter.

3 CO-CHAIRMAN KRESS: Okay. So the design
4 then would -- I mean, if someone built one of these
5 things, it would be limited to the site, to at least
6 fall within reference categories, and that would be an
7 ITAAC? You would have to --

8 MR. WILSON: No, it's just part of the
9 review at the combined license stage to verify that
10 that particular applicant is referencing AP 600. We
11 checked the site they planned to put it on and made
12 sure that that site fits in with those parameters that
13 Westinghouse specified when they did their design.

14 MR. BAGCHI: My name is Goutam Bagchi.

15 I just wanted to give a perspective as to
16 what constraints we had. AP 600 design layout is the
17 basis for AP 1000, the same footprint, the same
18 structural element, except everything is higher. More
19 mass, more of everything.

20 We know that while doing our AP 600
21 reviews the site parameters were varied over a wide
22 range, and certain sections became quite critical, and
23 it is our concern trying to locate AP 1000 under all
24 site conditions my not even be feasible. That was the
25 concern.

NEAL R. GROSS

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

1 So we could have perhaps in a theoretical
2 sense used the structural design acceptance criteria
3 had it not been constraining based on AP 600.

4 MR. TERA0: Okay. Coming back to my slide
5 -- thank you, Goutam --

6 MEMBER POWERS: Just to make sure you
7 don't get through this slide --

8 (Laughter.)

9 MEMBER POWERS: You've discussed over and
10 over again and the slide discusses, you know, what
11 makes things acceptable, and I'm saying, gee, I wonder
12 why you don't also look at what makes things
13 unacceptable. That is, why don't you include going
14 back to 52.47 and say why is it that the Commission
15 would impose such a rule.

16 And in the introduction, I thought a
17 pretty good synopsis was given, that they put this
18 rule in because when you didn't do this, you got a lot
19 of on-the-fly design activities that resulted in just
20 an enormous number of headaches.

21 MR. TERA0: That's a very good point, and
22 we certainly did consider it. And that's the third
23 point that I'm trying to make if I can get to it.

24 (Laughter.)

25 MEMBER POWERS: Oh, no. That's our job,

NEAL R. GROSS

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

1 to try to keep you --

2 MR. TERAQ: You saw that, didn't you?

3 MEMBER POWERS: -- to keep the flow of
4 your presentation --

5 MR. TERAQ: So the three areas, the policy
6 issues we looked at. We looked at technical issues,
7 and we also looked at the safety issue on 5247, and I
8 believe Dr. Kress asked what does 5247 actually say.

9 These are the relevant words: application
10 must contain the level of design information
11 sufficient to enable the Commission to reach a final
12 conclusion on all safety questions associated with the
13 design before the certification is granted.

14 CO-CHAIRMAN KRESS: There's that word
15 "sufficient" in there.

16 MR. TERAQ: Sufficient.

17 CO-CHAIRMAN KRESS: That's a judgment
18 call.

19 MR. TERAQ: That's a judgment call.
20 That's correct. But the key words I'd like to focus
21 on are before the certification is granted because
22 there is certainly a timing issue involved here on
23 when the staff can resolve any safety questions or
24 potential safety questions.

25 And that's a crucial issue here because

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 with the Westinghouse DAC approach, they propose in
2 their topical report to provide certain information
3 after design certification, and that leads me into my
4 next slide.

5 CO-CHAIRMAN KRESS: But aren't the DACs --

6 MR. TERAQ: I'm sorry?

7 CO-CHAIRMAN KRESS: Are the DACs that have
8 already been granted for the other types sort of a
9 precedent for that?

10 MR. TERAQ: Well, yes. We did establish
11 a precedent for I and C, human factors and piping, and
12 RAD protection, but seismic and structural, we have
13 not.

14 CO-CHAIRMAN KRESS: I know, but precedents
15 are established by doing it.

16 MR. TERAQ: Yes. The precedents were set,
17 and what I'm saying is that Westinghouse is not using
18 the exact approach. They're proposing something
19 different than the DAC approach that were used in
20 these other plants.

21 CO-CHAIRMAN KRESS: Is there some reason
22 why they have to be exactly like the others?

23 MR. TERAQ: Well, that's what I'm trying
24 to point out. They may not be. It may be acceptable,
25 but what I'm trying to point out here is where they

NEAL R. GROSS

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

1 deviate from the DAC approaches in the other plants,
2 where do they not meet established policy issue ,
3 technical issues or safety issues? That's what I'm
4 trying to point out here.

5 CO-CHAIRMAN KRESS: Okay.

6 MR. TERA0: Okay? Thank you.

7 What this slide shows, what I'm trying to
8 show in this slide is what design information will be
9 provided and when, and for three different areas: for
10 seismic analysis, for structural design, and for
11 piping design.

12 And the second column shows the
13 information that would be provided at the design
14 certification stage, and the third column shows the
15 information that would be provided at the combined
16 operating license stage.

17 CO-CHAIRMAN KRESS: Now, this is
18 Westinghouse's proposal.

19 MR. TERA0: Yes, yes. This is in their
20 topical report.

21 CO-CHAIRMAN KRESS: Okay.

22 MR. TERA0: And so at the combined
23 operating application stage, that's just prior to
24 construction, and then the last column shows what
25 information would be provided once the plant has been

NEAL R. GROSS

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

1 licensed and construction has started.

2 So for seismic analysis, Westinghouse is
3 proposing to develop stick models for the AP 1000 at
4 the design certification stage, and then perform a
5 more finite element analysis for AP 1000 at the COL
6 stage.

7 We didn't see any major problems with
8 that. You go down to the next area, and what
9 Westinghouse did here is they broke down their
10 proposal between rock sites and other than rock sites,
11 and for purpose of simplicity, we'll just call them
12 soil sites. But soil sites means other than rock
13 sites.

14 So for rock sites, the seismic analysis is
15 actually rather simple because you don't get the soil-
16 structure interaction, and so they can -- Westinghouse
17 is proposing to perform a fixed base seismic analysis
18 and generate the amplified response spectra for the
19 piping design, and they would also perform the
20 overturning and stability analysis for the plant. And
21 we agree with that.

22 But when you get to the soil sites,
23 Westinghouse proposed to not do the analysis, but
24 rather, they proposed to develop the seismic analysis
25 DAC, and that would tell you how to do the analysis,

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 say, to generate the soil structure analysis, how to
2 generate the amplified response spectra, and how to do
3 the overturning of stability analysis.

4 And that analysis, we believed, is very
5 complicated. There's a lot of uncertainties. The
6 amplifications can be much larger, and in fact, let me
7 from here jump to the next slide, and I'll come back
8 to this slide.

9 For the seismic analysis, as we're just
10 discussing, it is a first time DAC approach, and it's
11 applicable to only non-hard rock sites, but you would
12 see that the applicant would be required to complete
13 most of the seismic analysis, including the soil
14 structure interaction, the amplified response spectra,
15 overturn the stability analysis.

16 And we found that this was inconsistent
17 with the policy issue of level of detail that's in
18 SECY 90-377. And specifically what it said in SECY
19 90-377 is that the level of detail should be
20 equivalent to or no less than an FSAR at the operating
21 stage for a recently licensed plant.

22 So at that stage obviously the seismic
23 analysis has been completed. So we identified this as
24 a policy issue, but more than that, in the next
25 bullet, we believe that there are some safety concerns

NEAL R. GROSS

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

1 or safety questions that will not be answered until
2 after design certification, and as Goutam Bagchi has
3 described briefly, the AP 1000 plant is taller and
4 heavier than the AP 600 plant. So there is a question
5 about the overturning stability and you would have
6 higher seismic amplifications on soil sites.

7 CO-CHAIRMAN KRESS: But it's not a safety
8 concern until the plant is built and turned on, is it?

9 MEMBER POWERS: Can't one say that just
10 about anything in the design?

11 CO-CHAIRMAN KRESS: Well, my point is you
12 have another chance to say no.

13 MR. TERA0: Yeah, but, no, we don't.

14 MEMBER POWERS: Don't you do that on
15 everything?

16 CO-CHAIRMAN KRESS: Can't you at the COL
17 stage -- can't you say, "No, this has a safety
18 problem. That's not sufficient"?

19 MR. WILSON: Let me get in here and
20 amplify what Dave said, is what we're laying out are
21 ITAAC, in this particular case certain types of ITAAC
22 that's set forward process and acceptance criteria for
23 doing the design and then verifying the design.

24 So if we wrote an ITAAC and they met the
25 ITAAC, then we would have to find that acceptable, but

NEAL R. GROSS

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

1 if we didn't write one sufficiently robust that would
2 lead to what we would normally refer to as an
3 acceptable design, if we were reviewing the design at
4 that stage, then, yeah, we would have a significant
5 problem now.

6 Because in effect, the way the process is
7 set up is if they met all of the ITAAC we're obligated
8 to give them an operating license. And so the burden
9 would be on us then to say --

10 CO-CHAIRMAN KRESS: Yeah, so what that
11 means i you'd have a real burden trying to anticipate
12 all of the things that might be safety related and
13 being sure you have a DAC and ITAAC written in such a
14 way that it covers those.

15 MR. TERA0: That's exactly right. In
16 fact, what I was going to say is that was the
17 difficulty when we established the DAC, the piping DAC
18 for ABWR. I was intimately involved with that. What
19 we had to do is identify what type of issues,
20 anticipate what type of issues can come up in piping
21 and to assure that we have designed an acceptance
22 criteria that will address how those issues are to be
23 analyzed at the COL stage.

24 And it required us to go back and look at
25 all the bulletins, generic letters. At the time there

NEAL R. GROSS

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

1 were issues with Comanche Peak on piping and pipe
2 support designs. We did quite a -- and plus, the
3 five Stone & Webster plants that were shut down.

4 So there were many issues that we tried to
5 incorporate in addressing that.

6 CO-CHAIRMAN KRESS: Well, let me ask you
7 another question about that. If you're doing the
8 design certification at the design certification
9 review stage, don't you have to do that anyway at that
10 time?

11 MR. TERAQ: I'm sorry?

12 CO-CHAIRMAN KRESS: Don't you have to know
13 what the issues of the safety problems with the
14 seismic are and be able to review the SAR and looking
15 for those issues and going back and checking all of
16 the letters?

17 MR. BAGCHI: This is Goutam Bagchi again.

18 Dr. Kress, if we had the freedom to change
19 the base size to anything the applicant wants, then we
20 could do that. However, we are constrained by the
21 size. We are constrained by the design. That is the
22 certified design. The Commission has certified that
23 design.

24 MR. WILSON: Also, Dr. Kress, in your
25 question, you said at the design certification stage.

NEAL R. GROSS

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

1 So understand we don't have that design information at
2 that stage.

3 CO-CHAIRMAN KRESS: If you had that
4 information thought, you would have to do exactly what
5 he said.

6 MR. WILSON: That's correct.

7 CO-CHAIRMAN KRESS: So it would seem to me
8 like the question is do you do that now or do you do
9 it later?

10 MR. WILSON: Yeah, but can you write the
11 design acceptance criteria to appropriately pick up
12 all of that information so that the output product is
13 acceptable, and that's what he's talking about.

14 CO-CHAIRMAN KRESS: And I think that's a
15 legitimate question there, is can you do an ITAAC or
16 a DAC robust enough to cover everything at that time.

17 MR. TERA0: So I guess the bottom line
18 here is that we felt that there were too many
19 uncertainties or unanswered questions that would
20 remain at the design certification stage for us to say
21 that this was a viable approach to use seismic
22 analysis DAC.

23 Even though it's technically feasible, we
24 may be able to come up -- and I say technically
25 feasible with uncertainties here because this is a

NEAL R. GROSS

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

(202) 234-4433

www.nealrgross.com

1 first time approach, and we don't know what we're
2 going to encounter or whether we can anticipate all
3 the type of problems for seismic analysis.

4 CO-CHAIRMAN KRESS: And all you're left
5 with is you have to make a judgment, and it's a
6 judgment call.

7 MR. TERA0: That's right, and also
8 remember that PAR 52 means design finality. So once
9 the design is certified, this staff -- and this is to
10 assure regulatory stability and predictability so that
11 the staff cannot ask anymore questions on that part of
12 design that's certified at the COL stage.

13 CO-CHAIRMAN KRESS: But I view DAC as an
14 exception to that.

15 MR. TERA0: No. Oh, no, as a matter of
16 fact. It is not because once we approve the DAC, then
17 the CO applicant only has to complete the piping
18 design and verify it using ITAAC.

19 MEMBER SIEBER: And the only set of rules
20 come from the DAC.

21 MR. TERA0: That's correct. That's
22 correct. The only set of rules come from the DAC.

23 MR. WILSON: Are you ready for the next
24 slide?

25 MR. TERA0: Let me go back to this one.

NEAL R. GROSS

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

1 So we discussed seismic analysis. The
2 second item here on structural design, what
3 Westinghouse is proposing is to provide some
4 preliminary assessment of the key structural elements
5 for both soil and rock sites at the design
6 certification stage, and then they would establish
7 structural design DAC that would be used at the COL
8 stage to complete the piping structural design.

9 And then at the COL or after the plant
10 started construction, then they would verify the as
11 built structural design using ITAAC.

12 MR. WILSON: Ready for the structural one?

13 MR. TERAQ: So to address the structural
14 DAAC, again, this is the first time DAC approach. So
15 this is a new policy issue, and this is appropriate
16 for the use of the structural DAC is to be applicable
17 to all sites, hard rock and soil sites.

18 The CO applicant would then complete the
19 structural design. So a substantial amount of design
20 would remain for the CO applicant to complete, and we
21 found that the level of detail here again is
22 inconsistent with the policy issues in SECY 90-377,
23 where a complete design -- in other words, it's not
24 consistent with the type of information that's in an
25 FSAR at the operating license stage for a recently

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 licensed plant.

2 And obviously we will lose benefits of
3 standardization if we don't know what the final design
4 of the buildings look like.

5 The approach is technically feasible
6 though. We believe it can be done, especially for
7 hard rock sites. For soil sites, we think it's
8 technically feasible, but there are some uncertainties
9 that we might anticipate. It gets a little bit more
10 complicated when you have not completed the analysis
11 up front.

12 So we anticipate that there could be some
13 problems later on for other than hard rock sites.

14 And finally, for the piping DAC, the
15 piping DAC is similar to ABWR and System 80 Plus
16 approach. The only difference is that you can see in
17 the third column there on the COL application what
18 Westinghouse is proposing is that the analysis for
19 leak before break qualified piping be provided after
20 design certification, and this is different than what
21 we accepted on System 80 Plus.

22 For ABWR, obviously they didn't use the
23 leak before break approach.

24 Let me address the piping DAC in two
25 slides. One, we'll discuss the policy issues with

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 piping DAC and the second slide will discuss the
2 safety issues.

3 So the policy issues here, piping DAC was
4 used in ABWR and System 80 Plus, and both of those are
5 evolutionary plants. AP 600 completed its piping
6 design, and obviously it's a passive plant.

7 So the question was: how was Westinghouse
8 able to complete the piping design for AP 600 while
9 G.E. and ABB Combustion Engineering were not able to?

10 And staff would note that in a passive
11 plant, there are significantly fewer number of safety
12 related piping subsystems that have to be modeled, and
13 most of those, if not all, are inside the containment,
14 and that the passive plant by nature does not have
15 large motor operator valves with offset actuators.
16 They don't have pumps, heat exchangers where the pipe
17 nozzle is dependent on the vendor design.

18 So because of the simplicity of the
19 design, I mean, you do have check valves, but check
20 valves are relatively easy to make assumptions on its
21 weight. It doesn't have offset center of gravities.
22 So you can make reasonable assumptions to complete the
23 piping design.

24 And that is exactly what Westinghouse did
25 for AP 600, but not for AP 1000. The diameters have

NEAL R. GROSS

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

(202) 234-4433

www.nealrgross.com

1 changed, and Westinghouse is proposing to use the DAC
2 for the AP 1000 piping.

3 Now, the question came up and we've had --
4 yes?

5 MEMBER SIEBER: In the AP 1000, the number
6 of components and the type of components would be the
7 same. It's just the size that's different. Is that
8 true or not?

9 MR. TERA0: That's correct. You may have
10 a slightly larger check valve.

11 MEMBER SIEBER: That's right. Larger
12 diameter piping, larger heat exchanger, larger pumps.

13 MR. TERA0: But they wouldn't have pumps
14 and heat exchangers in either passive plants.

15 MEMBER SIEBER: Right.

16 MR. TERA0: Right. So the question is:
17 why could we not let Westinghouse use DAC approach for
18 AP 1000?

19 And, again, this is more of a policy issue
20 because -- what I'm addressing now -- because we have
21 to go back to the basis for using DAC in ABWR and
22 System 80 Plus, and the basis for using the DAC or a
23 rapidly evolving technology, which doesn't apply here,
24 but the other basis was that as built and as procured
25 information was insufficient to complete the design.

NEAL R. GROSS

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

1 So for evolutionary plants when you had the motor
2 operator valves or heat exchangers or pumps and didn't
3 know where the nozzles were going to be on these
4 vendor specific equipment, it wasn't reasonable for us
5 to have General Electric and Combustion Engineering
6 route the piping when the piping routing can change
7 significantly when they actually purchase the
8 equipment.

9 So the bases was as built land as procured
10 information is insufficient to complete the piping
11 design, and that we felt did not apply here with the
12 passive plant; that the information is sufficient to
13 complete the design.

14 Now, can it be done? Yes, it can be done.
15 We've proved that it can be done, but unless we raise
16 to the Commission that there's a different basis here
17 for approving the use of piping DAC for AP 1000, we
18 felt that this is a policy issue that needs to be
19 brought to the attention of the Commission.

20 CO-CHAIRMAN KRESS: Could be done, but it
21 would have to be on a different basis, and then you've
22 done it before.

23 MR. TERAQ: That's true, and we asked
24 Westinghouse if they can provide us that type of
25 basis, that rationale for using piping DAC since the

NEAL R. GROSS

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

1 basis of as procured information being insufficient
2 does not seem to apply in their case.

3 A separate issue, but nonetheless just as
4 important, is that the leak before break approach is
5 inconsistent with SECY 93-087. On my previous slide,
6 I showed that they would provide the leak before break
7 analysis at the COL stage.

8 In SECY 93-087, it states that leak before
9 break may be used by establishing bounding limits
10 using preliminary analysis results during the design
11 certification phase and verified by ITAAC at the COL
12 phase.

13 So that's the one difference that we felt
14 that for leak before break on AP 1000, that it was not
15 consistent with the SECY 93-087 policy.

16 And there are some safety issues, as well,
17 which I'll discuss in the next slide that's related to
18 leak before break.

19 Piping safety issues. We found that
20 there's actually three areas that we identify that's
21 related to safety, that identify safety issues. Some
22 of these we've discussed with Westinghouse, and
23 actually some of these we have not because they
24 actually came out as a result of our discussions on
25 developing our internal position on these issues.

NEAL R. GROSS

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

1 So I apologize to Westinghouse that they
2 may not have heard some of these issues, but the first
3 issue on leak before break, when we approve leak
4 before break, it is usually for an operating plant,
5 and for an operating plant, you know the seismic
6 stresses. You know the piping materials. So for a
7 standard plant, for a paper plant, the staff had to
8 address three critical areas to assure that leak
9 before break can be used.

10 And those three areas were the margins on
11 load, the margins on flaw size, and the margins on
12 leakage rate. And what we approved for System 80 Plus
13 was System 80 Plus established bounding surveys for
14 those three areas of loads, flaw size, and leakage
15 cracks.

16 And then what System 80 Plus did is they
17 used preliminary stress analysis at least for those
18 leak before break lines or the critical size leak
19 before break lines to verify that there was sufficient
20 margin available so that when the plant is finally
21 built and they get the final stress analyses and the
22 material properties, that we felt that there was
23 enough margin to not have any questions raised at that
24 time.

25 But Westinghouse is proposing to do this

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 analysis at the COL stage. So what we feel is that
2 these margins will not be confirmed at the design
3 certification stage. So we believe that that's one
4 issue that does not meet 5247(a)(2).

5 Another issue, the second issue here
6 emerges as a result of the leak before break
7 uncertainty, and this is an issue on subcompartment
8 pressurization and flooding because without knowing
9 what is the minimum size line that we will approve for
10 a leak before break, the question is: well, what is
11 the pressurization one would use? What size pipe
12 break would one use to establish your subcompartment
13 pressurization for flooding effects?

14 And in fact, this was an issue that was
15 raised by the ACRS back in June, in an ACRS letter
16 dated June 16th, 1992. So we were well aware of ACRS'
17 concerns at that time of compartment pressurization
18 and flooding of DACs, that it be addressed as part of
19 the DAC.

20 And Westinghouse has not addressed this
21 issue. It's not say that it cannot be resolved, but
22 at this time, we have not discussed with Westinghouse
23 how thy plan to address those issues.

24 The third issue is a relatively new issue,
25 and this deals with that the passive piping design

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 needs to be finalized because the thermal hydraulic
2 characteristics of the passive safety systems are very
3 sensitive to the piping volume.

4 And so when they change their piping
5 sizes, we need confirmation that those final piping
6 sizes are going to be the final piping size, and they
7 will meet the seismic stresses and thermal stresses
8 and the routing.

9 So without that confirmation, it does
10 interface with the thermal hydraulics area.

11 So in summary, just summarizing what I
12 talked about, so the seismic analysis DAC, what we
13 found was there were safety issues involved and policy
14 issues involved, but technically it's a feasible
15 approach with some uncertainty.

16 With a structural design DAC, it's mainly
17 just policy issues, and we feel that it's technically
18 feasible even though there are some uncertainties
19 since this is the first time we're using this
20 approach, and for the piping design, we find that
21 there were policy issues, safety issues, but we
22 believe it is technically feasible.

23 So that concludes my presentation.

24 MR. WILSON: So, Mr. Chairman, in summary
25 then, similar to what Mr. Drozd pointed out, what the

NEAL R. GROSS

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

1 staff is recommending is that we not accept the use of
2 additional design acceptance criteria on AP 1000.

3 And with that we'll turn it over to you.
4 If you have anymore questions in this area before we
5 turn the presentation back to Westinghouse.

6 CO-CHAIRMAN KRESS: Well, I think you've
7 answered most of my questions. Do any of the other
8 committee members?

9 MR. LYON: This is Jim Lyon from the
10 staff, and before Westinghouse comes up or, you know,
11 we're making this shift, we presented this information
12 to Westinghouse a couple of weeks ago. We've been
13 having some conversations with them, and one of the
14 things that we had raised to them is that in the
15 seismic area especially, seismic area, that doing a
16 design acceptance criteria for the seismic area for
17 the soil sites could be alleviated by limiting the
18 plant to a hard rock site, providing us the type of
19 information that they were going to provide us, you
20 know, and then providing us the structural design on
21 that.

22 Westinghouse has been talking to us, and
23 they actually sent us a letter this morning that talks
24 about, you know, one of their ways of maybe providing
25 limiting AP 1000 to a hard rock site, then a plant

NEAL R. GROSS

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

(202) 234-4433

www.nealrgross.com

1 that would be built at an other than hard rock site
2 would then have to be reviewed at the COL stage for
3 that other than hard rock site. It would become
4 basically a site parameter. One of the site
5 parameters would limit it to a hard rock site.

6 That's something that then could be
7 reviewed at the combined license stage for an
8 applicant that wants to reference the AP 1000, but put
9 it at a site other than a hard rock site with all of
10 the site parameters.

11 CO-CHAIRMAN KRESS: What that does for you
12 other than having a DAC is it gives you a handle to
13 say no?

14 MR. LYON: Right, and what it allows us to
15 do is resolve all of the issues at the combined
16 license stage prior to issuing --

17 CO-CHAIRMAN KRESS: You can make a safety
18 review then.

19 MR. LYON: Right.

20 CO-CHAIRMAN KRESS: And see if it
21 satisfies your criteria, and if it doesn't, you can
22 say no.

23 MR. LYON: Right.

24 MR. WILSON: In that situation, similar to
25 what you asked before, then they would -- we would

NEAL R. GROSS

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

1 have an opportunity to review the actual design before
2 the granting of the combined license.

3 CO-CHAIRMAN KRESS: And that's what I was
4 misinterpreting the DAC to allow you to do, but
5 apparently it doesn't, but this process would allow it
6 to --

7 MR. LYON: That's right, and so we're
8 considering -- and I think in that scheme, then if you
9 take the piping DAC by itself, we may be able to work
10 with that, and that's something that we're kind of in
11 discussions with Westinghouse on now to try and move
12 forward.

13 So I think that's probably a good, you
14 know, lead-in to segue.

15 CO-CHAIRMAN KRESS: A good segue into the
16 Westinghouse.

17 MR. LYON: Into their discussion.

18 MEMBER SIEBER: I wonder about that a
19 little bit though. If you limit this to just hard
20 rock sites, I don't think there are that many hard
21 rock sites around, are there?

22 If you look at river sites, you have to
23 have cooling water somehow. If you look at river
24 sites, every one of them is -- or not every one, but
25 a log of them have flood plains there. So that's not

NEAL R. GROSS

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

1 hard rock. In fact, soils liquification is pretty
2 high on those kinds of sites.

3 Building them on pilings is not good
4 because that effectively just raises the height of the
5 plant, which seismically makes it worse.

6 Lake and ocean front sites, those are
7 pretty tough, too, and so it may solve the licensing
8 problem and the technical problems that you have, but
9 then you end up with a certified design that nobody
10 wants to buy.

11 MR. WILSON: Well, what it would mean it
12 would be more likely if the plant is by reference,
13 that there would be additional design work that would
14 have to be reviewed during the combined license review
15 process.

16 MR. BAGCHI: As I recall though, Seabrook
17 site is hard rock. Catawba is hard rock. There are
18 hard rock sites.

19 MEMBER SIEBER: There are some sites, but
20 most of them are not, it seems to me.

21 CO-CHAIRMAN KRESS: I presume Westinghouse
22 is sufficiently sagacious to design their system to
23 make use of the sites they want to make use of even
24 though they may have not put an end to this SAR yet.
25 They probably would design it to make use of the

NEAL R. GROSS

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

1 various sites.

2 MR. WILSON: Why don't we let Westinghouse
3 answer that?

4 CO-CHAIRMAN KRESS: With that we'll turn
5 it over to whoever is taking the floor for
6 Westinghouse.

7 MR. ORE: Good afternoon. My name is
8 Richard Ore. I'm with Westinghouse. I have
9 responsibility for the seismic work, for the
10 structures, for the piping.

11 I would like to start by thanking the
12 staff for sort of an excellent summary. It allows me
13 to jump through some of my presentation very quickly,
14 but I would like to sort of make a few points from it.

15 Firstly, --

16 MR. CORLETTI: One second, Richard.

17 This is Mike Corletti.

18 His presentation starts on about page 15
19 of the handout.

20 MR. ORE: And the first slide I'm going to
21 use is number 11.

22 Firstly, to address the --

23 CO-CHAIRMAN WALLIS: What is this? Excuse
24 me.

25 MR. ORE: We did indeed --

NEAL R. GROSS

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

1 CO-CHAIRMAN WALLIS: Excuse me.

2 CO-CHAIRMAN KRESS: We're still trying to
3 find it.

4 CO-CHAIRMAN WALLIS: This thing leaps from
5 slide five to slide 14.

6 MR. ORE: There should be a package that
7 is entitled AP 1000, approach to design acceptance
8 criteria.

9 MEMBER SIEBER: Yeah, that's slide 15.

10 MR. ORE: And that was slide 15, and in
11 the handout package, four back, is one that is
12 identified as slide 11.

13 CO-CHAIRMAN KRESS: N, that's not in ours.

14 MR. CORLETTI: Richard, you added that.
15 I'm sorry. I didn't put that in there.

16 MR. ORE: My apologies. Would you arrange
17 for a hard copy for them?

18 We had submitted a request in Phase 2 to
19 review the approach of using design acceptance
20 criteria on both structures and seismic analyses. We
21 had one meeting with staff early last year, and we
22 have had another meeting recently and additional phone
23 calls and resulting from that we transmitted a letter
24 yesterday that said that in design certification, in
25 the design control document that we propose to submit

NEAL R. GROSS

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

1 at the end of March, we will request design
2 certification including seismic analysis and
3 structural design for a hard rock site.

4 Now, in response to the question earlier,
5 on AP 600 we did a review of 22 existing nuclear power
6 plant sites, and we found 50 percent of them --

7 MEMBER SIEBER: Are hard rock.

8 MR. ORE: -- the nuclear island is founded
9 on rock, yes. Sometimes it's down at the -- our
10 excavation depth is 40 feet. I think there were one
11 or two cases where the rock was down 50 or 60 feet,
12 where perhaps I've taken credit for a rock site
13 because you would go down to it with your foundations.

14 MEMBER SIEBER: Yeah, i think I know where
15 that one is.

16 MR. ORE: Fifty percent of the existing
17 plants are on rock.

18 MEMBER SCHROCK: Is there any potential
19 ambiguity about the definition of a hard rock site?

20 MR. ORE: I don't believe so. There is a
21 site parameter that is established in the first
22 section of the design control document. For AP 600,
23 we requested and obtained certification for sites
24 where the shear away velocity of the soil exceeded
25 1,000 feet per second.

NEAL R. GROSS

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

1 For AP 1000 we have changed that to a
2 shear away velocity exceeding 3,500 feet per second.
3 In the AP 600 we did a series of analysis. One of
4 them was at 3500 feet per second. In order to
5 demonstrate there that soil structure interaction
6 effects were negligible.

7 In fact, in one of the previous revisions
8 of a standard review plan I believe that that cutoff
9 of 3,500 feet was given then for whether you needed to
10 look at soil structure in traction or not.

11 CO-CHAIRMAN KRESS: So given that comment,
12 basically what Jim Lyon suggested, it looks like it's
13 going to come about.

14 MR. ORE: Yes.

15 CO-CHAIRMAN KRESS: And all we have to
16 deal with then is the piping deck.

17 MR. ORE: That's correct. So now I would
18 like just to talk about the piping deck unless there's
19 any questions related to the seismic analyses or
20 construction design.

21 CO-CHAIRMAN KRESS: No, I think we're h
22 pretty good shape there. So we can go straight to
23 the --

24 (Laughter.)

25 MR. ORE: Now I will continue on the

NEAL R. GROSS

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

1 piping, and this now starts at slide 22 of the handout
2 package that I believe you have. And this will be
3 fairly brief because it's been covered by the staff
4 extensively.

5 The DAC and ITAAC approach was permitted,
6 was used for ABWR and for System 80 Plus. The way
7 it's done is in the design control document we agree
8 on the design acceptance criteria and for the piping
9 design criteria and the analytical methods and the
10 acceptance criteria.

11 The implementation is verified in the
12 ITAAC, and basically the verification is that there is
13 a series of ASME design reports on every piping line,
14 and that the scope of that is clearly defined in ASME.
15 It includes any reconciliation of as built changes,
16 and in addition, we have an evaluation against the
17 acceptance criteria for leak before break to
18 demonstrate that those lines that we intended to apply
19 LVP to were qualified to the acceptance criteria.

20 CO-CHAIRMAN KRESS: What about this
21 comment that small changes in the piping layout or
22 sizes could have significant safety implications
23 because you're highly driven by passive systems that
24 rely on natural convection driving forces?

25 MR. ORE: We don't believe so. I've got

NEAL R. GROSS

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

1 some additional slides. The AP 1000 -- let me just --
2 I think I prefer just to defer that if I could get to
3 it, if I may.

4 MR. CORLETTI: Richard, this is Mike
5 Corletti. If I could just speak to that a little bit.

6 In regards to changes in the pipe routing
7 and how it could affect the passive system performance
8 from a thermal hydraulic safety point of view, those
9 characteristics are already captured in the ITAAC and
10 are set in other portions of the ITAAC. So
11 information that we had a range of piping resistance,
12 L over D information, for the inlet and the outlet of,
13 say, the core make-up tank lines.

14 The elevation of those core make-up tanks
15 are also set. So from the things that would affect
16 the safety analysis from like elevations and
17 resistances, those are already covered in the ITAAC.

18 MR. ORE: As described by NRC, for AP 600
19 we did extensive analyses of all safety related
20 piping. I believe it was all piping larger than two
21 inch in diameter. In doing those analyses, we made
22 certain assumptions on vendor data, particularly
23 things like valves, valve weight, valve operators.

24 These calculations were audited by NRC and
25 found acceptable. The question we ask ourselves

NEAL R. GROSS

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

1 though is: what have we gained when we end up with a
2 verification process, the ITAAC, that is virtually
3 identical to the ITAAC required of the other vendors,
4 of the other plants?

5 This now goes to slide 25. What we gain
6 from our AP 600 work, very definitely we gained
7 confidence that all of the line routings work in the
8 audit. So with NRC staff we got agreement on the
9 methods and the implementation particularly of all of
10 those methods.

11 We believe on AP 1000 we gain significant
12 benefit from what we did on AP 600. Our line routings
13 are substantially the same obviously, with a slightly
14 bigger diameter pipe, with some slight changes, but
15 nothing significant.

16 The analyses will use the same methods as
17 AP 600, and the design specifications, transient
18 conditions, the operating conditions are all
19 substantially the same as AP 600.

20 Now perhaps I can go back to the question
21 of the LBB lines. Mike had addressed the response on
22 thermal hydraulics may be different. Clearly with the
23 larger diameter there's going to be slightly different
24 stress conditions, but we do not believe that there
25 will be significant changes required.

NEAL R. GROSS

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

1 On AP 600, in the ITAAC that we have on
2 each system, we have a requirement that we meet all of
3 the acceptance criteria, and in the extreme, if we had
4 to reroute pipe, we would have to still meet all of
5 the acceptance criteria, which includes subcompartment
6 pressurization issues, flooding, all of the sort of
7 pipe rupture hazard type issues if you have to reroute
8 a line.

9 We recognize that there are some sort of
10 issues related to subcompartment pressurization that
11 we don't want to defer until after the plant is built.
12 Therefore, we have included in the design control
13 document and a preliminary mock-up of this was
14 actually informally given to the staff month ago, and
15 we specifically say combined licensed applicants
16 referencing the AP 1000 certified design will complete
17 the leak before break evaluation, and this is sort of
18 at the time of the combined license application, and
19 they will demonstrate that they meet bounding curves
20 that are provided in the AP 1000 design control
21 document.

22 An example of this, which will be in the
23 submittal, it was in the preliminary one a month ago
24 and will be in the one at the end of March. We define
25 for the piping analyst when he is qualifying the

NEAL R. GROSS

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

1 system a bounding curve that shows if he's at an area
2 below the curve, designated here as .1, and this is a
3 relationship between the stresses under operating
4 conditions to the stresses under the safe shutdown
5 earthquake condition; if he's below that curve, he
6 meets to leap before break acceptance criteria. If
7 he's above it, he doesn't.

8 These bounding curves include all of the
9 margins required by NRC. There are margins on load
10 and margins on leak rate built into these curves. So
11 if the combined license applicant can demonstrate that
12 he meets these curves, then his piping layout
13 satisfies the leak before break requirements.

14 MEMBER SCHROCK: Could you restate the
15 meaning of those terms on the axes of that graph?

16 MR. ORE: Certainly. On the X axis the
17 normal stress. This is the stress, the membrane
18 stress in the pipe, membrane plus bending, and normal
19 operating conditions.

20 CO-CHAIRMAN KRESS: The internal pressure?

21 MR. ORE: No, this is -- well it's
22 internal pressure and it's dead weight. It's normal
23 thermal, and under a given condition, he identifies
24 what his stress in the pipe is, and he can then go up
25 to the bounding curve and see this is the maximum

NEAL R. GROSS

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

1 stress then that I can accept when I combine it with
2 the safe shutdown earthquake, the faulted conditions.

3 And if, indeed, he's above this curve, he
4 does not meet the criteria for leap before break. If
5 he's below this curve, then he does. And this is
6 similar to the approach that was used on the CE
7 plants.

8 CO-CHAIRMAN KRESS: The only difference
9 between the two axes is the loadings you'd get from
10 seismic?

11 MR. ORE: Pardon?

12 CO-CHAIRMAN KRESS: The only difference
13 between these two axes is the loading you'd get from
14 seismic?

15 MR. ORE: One of them is normal operating.
16 The other is faulted. I think the primary difference
17 is just seismic, yes.

18 MEMBER SHACK: To be certain, to make sure
19 that you have enough stress to get a measurable leak
20 compared to the size of stress it's going to take to
21 actually fail the pipe.

22 MR. ORE: That's correct.

23 MEMBER SHACK: Which is sort of what
24 you're comparing.

25 MR. ORE: And that's why actually if the

NEAL R. GROSS

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

1 operating stress is higher, you can go to a higher or
2 safe shutdown.

3 MEMBER SHACK: It's better news, yeah.

4 MR. ORE: It doesn't sound right, but
5 effectively you're stressing the pipe enough under
6 normal operating conditions if there is a crack, it
7 will be a visible leak.

8 CO-CHAIRMAN KRESS: And why do these
9 things flatten off at the ends? Is that just a
10 safety --

11 MR. ORE: What we do is we take sort of
12 two points actually sort of as a lower extreme and an
13 upper extreme based on sort of typical practice. I
14 think the upper extreme is the sort of highest that
15 you can go under ASME.

16 CO-CHAIRMAN KRESS: So you know you're not
17 going to be --

18 MR. ORE: You're pretty much up to yield
19 at that stage.

20 CO-CHAIRMAN KRESS: Okay. I understand.
21 There's just not any significance to those lines
22 really since you're not going to be in there.

23 MR. ORE: You will never be able to
24 qualify a line outside these ranges.

25 So sort of in conclusion, we intend, we

NEAL R. GROSS

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

1 are proposing to follow a path that we believe is
2 consistent with the approach used on ABWR and System
3 80 Plus. I was very pleased to see the overhead from
4 Dave Terao that said he believes that such an approach
5 is technically feasible.

6 Yes, there may be some sort of discussion
7 on it, but we believe the overall approach is
8 appropriate.

9 CO-CHAIRMAN KRESS: How do you argue
10 against or debate their point that passive systems,
11 piping is not nearly as complex as, say, System 80
12 Plus piping, and therefore, it shouldn't be that
13 difficult for you to really lay out a similar thing to
14 AP 600 that you did?

15 MR. ORE: We have effectively laid it out
16 the same as AP 600. Now, systems are clearly simpler
17 because of the passive systems. Unfortunately, we do
18 still have certain sort of valves and things like
19 that, and Part 52 specifically says you do not have to
20 select vendors on things like that.

21 So you cannot do final analyses anyway,
22 and the question really is: well, why do very
23 elaborate initial analyses for review by NRC and then
24 have to redo them at the as built stage?

25 CO-CHAIRMAN KRESS: So you think it might

NEAL R. GROSS

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

1 fit that second criteria there. You really can't do
2 it until you get the as procured and as built?

3 MR. ORE: You are not going to be able to
4 have final confirmation until you have done the as
5 built.

6 MR. CORLETTI: As you all know -- this is
7 Mike Corletti again -- as much as I'd like to agree
8 that we only have check valves in our plant, we do
9 have quite a bit of motor operator valves. All would
10 have to be procured. All with end to end dimensions
11 and centers of gravity.

12 So whereas on AP 600, we did do analysis
13 making assumptions, we learned, I think, the hard way
14 that we still had to come back to that at the end and
15 redo it again with all of the final, as procured valve
16 information.

17 CO-CHAIRMAN KRESS: If you were to build
18 an AP 600, is there some chance that you'd find
19 yourselves in a bind because you said one thing in
20 your FSAR or your certification rule and you find out
21 that when you get ready to build it that your
22 assumptions were bad?

23 MR. CORLETTI: We certainly hope not, but
24 again, our DAC approach and the fact that we've gone
25 through that on AP 600 gives us significant confidence

NEAL R. GROSS

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

(202) 234-4433

www.nealrgross.com

1 that even for AP 1000 we're not going to have to face
2 that same problem.

3 MR. ORE: Okay. That concludes my
4 presentation.

5 MR. BURKHART: Mr. Ore, this is Larry
6 Burkhart, the project manager.

7 You say that it's similar. Can you
8 quantify the differences between the approach compared
9 to the System 80 Plus?

10 You're saying it's similar. Is it exactly
11 the same? What are the differences?

12 MR. ORE: Our intent is that it be exactly
13 the same, yes, that we would, indeed -- we have got
14 all of the design criteria in the design control
15 document. We will provide a similar reference in the
16 CE approach in Chapter 1, I believe it is.

17 There's a reference to all of the
18 subsections containing design criteria for piping. We
19 would have a similar table and that all becomes Tier
20 2 stuff.

21 MR. BURKHART: So it sounds like your
22 approach is the same, not just similar. I just
23 thought there --

24 MR. ORE: The intent is that it be the
25 same.

NEAL R. GROSS

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

(202) 234-4433

www.nealrgross.com

1 MR. BURKHART: Okay. I just wanted to
2 know --

3 MR. ORE: Without going line by line, I
4 did not want someone to pick me up and say, "Well,
5 something is slightly different.

6 MR. BURKHART: I just wanted to know if
7 there were any differences that you knew of.

8 MR. ORE: No, the intent is that it be the
9 same.

10 MR. CORLETTI: And this is Mike Corletti.
11 It is certainly our intent to follow that
12 precedent, and we'd be very interested to work with
13 the staff in regards to places where we perhaps have
14 deviated. We don't believe we have, but we certainly
15 look forward to working with them to resolve that.

16 CO-CHAIRMAN KRESS: Any other questions on
17 the DAC from the members?

18 (No response.)

19 CO-CHAIRMAN KRESS: At this point in time
20 I propose we take a break. We were supposed to be
21 scheduled for one at three, but we can start a little
22 early, and I'd say be back from the break at three,
23 and we'll start on the applicability of the scaling.

24 Is that all right with everyone?

25 Okay. Let's recess for a break.

NEAL R. GROSS

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

1 (Whereupon, the foregoing matter went off
2 the record at 2:43 p.m. and went back on
3 the record at 3:03 p.m.)

4 CO-CHAIRMAN KRESS: Let's reconvene.

5 Before I turn this over to you to continue
6 with the tests and scaling, I think Mike Corletti
7 wants to make a few words for Westinghouse, if you
8 don't mind.

9 MR. CORLETTI: Yes. I just thought I'd
10 just take two minutes to brief you on really where we
11 think we are in the overall program for AP 1000.

12 As you know, we started the pre-
13 certification review. Really it began last December.
14 We've been answering the RAIs with the staff, the
15 staff RAIs. We believe we're just about to the end of
16 this phase.

17 As part of that, we've just recently
18 submitted to the staff a red line and strikeout, what
19 we call our highlight and strikeout version of our
20 DCD, of the AP 600 DCD, that really illustrates the
21 differences between AP 600 and AP 1000, and this is
22 one of the books.

23 There's 20 volumes, and it's being
24 provided to the staff now as they plan the design
25 certification review, as they get their estimates to

NEAL R. GROSS

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

1 see what they think it will take to certify AP 1000.

2 CO-CHAIRMAN KRESS: That's that little
3 line with the pointed end on it

4 MR. CORLETTI: Yes, here. We're right
5 here in the number three, pre-certification review,
6 and we are preparing and we are prepared to submit our
7 application at the end of March. March 28th is our
8 scheduled date when we will be submitting the complete
9 design certification document and the PRA.

10 What we've submitted so far is everything
11 except for Chapter 15 and except for the PRA.

12 So our plan is to submit March 28th. The
13 other two lines you see there is our projections for
14 where the rest of the marketplace is as far as
15 utilities are now getting ready to submit early site
16 permits, and hopefully a COL application, which we
17 believe is a critical path item.

18 Our goal is to make AP 1000 design
19 certification not to be critical path, so to be
20 finished prior to the utilities having their early
21 site permits and, therefore, AP 1000 would be a viable
22 product for them.

23 CO-CHAIRMAN WALLIS: How many utilities
24 are involved in this?

25 MR. CORLETTI: There are several that are

NEAL R. GROSS

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

1 considering early site permits at this time, at least
2 two or three that we know of.

3 CO-CHAIRMAN WALLIS: Haven't made a
4 downpayment or anything.

5 MR. CORLETTI: No, not to our knowledge.
6 (Laughter.)

7 MR. CORLETTI: But we're working on it.

8 So that's all. I can pass this around.
9 We have this on a CD, which we could also make
10 available to the ACRS. I can get you copies if that's
11 appropriate.

12 Paul we could do that.

13 CO-CHAIRMAN KRESS: Well, I think we
14 definitely want that.

15 MR. CORLETTI: Okay, great. And you can
16 look for the complete edition coming March with.

17 CO-CHAIRMAN KRESS: Okay.

18 MR. CORLETTI: So thank you.

19 CO-CHAIRMAN KRESS: Thank you.

20 Okay. With that I'll turn it back to you,
21 Andrzej.

22 MR. DROZD: The last two remaining groups
23 of issues from Phase 2 review are testing or a more
24 precise applicability of AP 600 testing to AP 1000,
25 and the applicability of safety analysis codes that

NEAL R. GROSS

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

1 were used in AP 600's review into 1000.

2 Today, this afternoon Dr. Steve Bajorek
3 and Dr. di Marzo will address testing and scaling
4 issues that were analysis and applicability and its
5 applicability to AP 1000 design. I just want to
6 briefly summarize major points that staff will be
7 including in a proposed SECY paper to Commission on
8 safety and testing.

9 First of all, we will notice that there
10 are no new phenomena identified from what we see.
11 That is, what other questions and problems there were
12 with the design during AP 600, the certificate review,
13 we see the same issues being addressed or needed o be
14 addressed during AP 1000.

15 Therefore, in general, in general, we do
16 see that whatever was used to analyze and/or support
17 codes during AP 600 certificate review is applicable
18 to AP 1000 review.

19 That doesn't mean that we do not have
20 certain concerns. First of all, we notice that some
21 physical models that are the basis for various
22 subroutines and various analysis used in analyzing
23 safety behavior of the plant needs to be either
24 modified or verified or both, and specifically liquid
25 entrainment model is one of the outstanding issues

NEAL R. GROSS

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

1 that we think needs to be verified and/or modified
2 because it's a basis for many other applications, for
3 transient analysis or small break LOCAs.

4 CO-CHAIRMAN KRESS: It's the same
5 entrainment model they had for AP 600?

6 MR. DROZD: That is the same issue.

7 CO-CHAIRMAN KRESS: And we found AP 600
8 acceptable because of what?

9 MR. DROZD: Well, Dr. Bajorek will show
10 and prove the application for this particular model
11 may increase -- the application of this model to AP
12 1000 increases certain uncertainty of behavior.
13 Therefore, we need some improvements.

14 CO-CHAIRMAN WALLIS: There's one liquid
15 entrainment model or it applies everywhere liquid is
16 entrained?

17 MR. DROZD: Might as well jump in.

18 (Laughter.)

19 MR. BAJOREK: This is Steve Bajorek from
20 Research.

21 There are two models that we're going to
22 discuss. I believe that in NOTRUMP and in other codes
23 that Westinghouse would use there are different models
24 and correlations in that code which would try to model
25 both of these processes.

NEAL R. GROSS

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

1 MEMBER SCHROCK: Isn't the question where?
2 I mean, there are different entrainment problems in
3 the whole system. Which one was we talking about?

4 CO-CHAIRMAN WALLIS: Yeah, there's
5 entrainment from the core. Let's say there's gas
6 coming out, vapor coming out the core. Does the
7 entrain drop?

8 Then there's the question of whether or
9 not drops are entrained into the ADS-4 line. From a
10 pipe there's maybe a completely different problem.

11 MR. BAJOREK: There's two different
12 processes. Let me start and get to it.

13 CO-CHAIRMAN WALLIS: Did I force you to
14 go? Did I drive our friend away?

15 (Laughter.)

16 CO-CHAIRMAN WALLIS: As soon as I
17 mentioned simple hydraulics.

18 MEMBER POWERS: The man has the good sense
19 to evacuate the scene.

20 (Laughter.)

21 MR. BAJOREK: Okay. There are two
22 packages coming around. The first one will say 81,000
23 top down and bottom up scaling evaluation, and there's
24 another one coming around that we'll get to in a
25 moment.

NEAL R. GROSS

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

1 We'll start on the top down/bottom up
2 scaling, though I'm going to switch the first couple
3 of overheads, and I want to explain exactly what the
4 role of research was in the review.

5 We were asked to participate by reviewing
6 the PIRTs that Westinghouse had supplied, look at the
7 test programs that they applied to the primary system,
8 and determine to what extent Westinghouse's contention
9 that all of the test programs that were submitted as
10 part of the AP 600 still were valid and could be
11 applied to the AP 1000 conditions.

12 So we started off by taking a look at the
13 PIRT. We basically agreed with what we saw there at
14 Westinghouse. They increased the rankings of some
15 processes; others stayed the same. By and large, we
16 did not have any major objections there.

17 We asked them to add condensation induced
18 water hammer and deal with that, and that was pretty
19 much what we ended our analysis of the PIRT.

20 And then we looked at scaling for the
21 primary system tests. We looked at AP 1000. We
22 revisited AP 600 because we wanted to make sure that
23 as we did the evaluation, we were consistent with the
24 decisions, and we were seeing the same types of
25 problems that we saw in the AP 600.

NEAL R. GROSS

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

1 We also took a look at SPES APEX and we
2 threw ROSA into the mix as well. To make sure that I
3 clarify what we looked at, we stuck primarily to the
4 test data and the test programs. We did not get
5 intimately involved in looking at the codes or the
6 analysis as part of our review.

7 We did not look at the containment issues.
8 These were things that NRR decided that they would
9 prefer to handle themselves.

10 So I'm going to look primarily at the
11 test, the range of conditions. Is that data
12 applicable now so that you can take a NOTRUMP, a LOFT
13 TRAY (phonetic), and a COBRA TRAC, whatever code they
14 might apply, and use these experimental data for
15 validating --

16 CO-CHAIRMAN KRESS: You're looking
17 strictly at the integral effects test and not any of
18 the separate effects?

19 MR. BAJOREK: We looked at the separate
20 effects test. I'm not going to talk about those today
21 primarily because the separate effects tests were
22 either unchanged relative to how they would be
23 applied, meaning ADS-1, 2, or three was not changed in
24 AP 1000. The conclusions from those tests still
25 apply.

NEAL R. GROSS

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

1 Westinghouse did produce some scaling
2 rationale and some arguments for the separate effects
3 test. They showed that they were very close or within
4 the range for AP 1000.

5 In some cases, for example, the PRHR, if
6 you remember, that was a test, three vertical tubes
7 and they developed a heat transfer correlation. To
8 comment on those tests was a bit difficult for the AP
9 1000 because approval really hinged on their ability
10 to model the PRHR component in the ROSA facility.

11 So we're starting to get away from the
12 applicability of the tests, even in AP 600. So the
13 focus of our work was on the integral tests.

14 How we're going to structure our
15 presentation this afternoon is along the lines of the
16 three main elements that we perform for scaling. I'm
17 going to talk initially about top-down scaling and how
18 we evaluated ROSA, SPES, APEX and compared that to AP
19 600 and AP 1000.

20 Dr. de Marzo is going to talk about some
21 supplemental calculations that he performed to take a
22 look at the transient process in going from ADS 1, 2,
23 3 through the IRWST.

24 What I will be doing for the top-down
25 scaling looks at many of these processes in their

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 steady state performance mode. What Dr. di Marzo will
2 take a look at is the transient effects in going
3 through some of these important changes in the
4 transient.

5 Once we get done with that, we're going to
6 focus on some of the bottom-up scaling issues, and
7 that's where we're going to spend more time talking
8 about entrainment. So what I'd really like to do is
9 to go through the top-down type of scaling in a
10 relatively rapid fashion so that we can get to some of
11 the things that I think are going to be more
12 contentious.

13 I think on the first page, I just wanted
14 to lay out a few of the things that as we go through
15 the top-down scaling those parametric changes in the
16 AP 1000 that tend to affect most of or many of the
17 scaling parameters, certainly the power.

18 Other things that come into effect are the
19 larger volumes in the AP 1000. The steam generator is
20 larger. We've got larger CMTs, and a larger pressure
21 rise.

22 So we have a larger primary system, larger
23 pressurizer.

24 One of the things that was done to the AP
25 1000 is a change to the resistance of several lives.

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 In particular, the ADS-4 line resistance was reduced
2 till it was only about 28 percent of what it had been
3 in the AP 600.

4 That's good. The idea is to try to get
5 the system to blow down faster.

6 They also made it easier to get water into
7 the system by reducing the line resistance from the
8 CMT through the DVI line. The thing I want --

9 CO-CHAIRMAN KRESS: Don't they do that by
10 changing the diameter?

11 MR. BAJOREK: The diameter, and also there
12 is an orifice change in the CMT itself to make it
13 easier. The thing I want to note here as we start
14 going to the top-down scaling, well, in the tests we
15 had whatever the AP 600 was, or as close as they could
16 get to it in the facility, but now we've made change
17 to make it easier to get water out than it is to get
18 water in, and that's going to cause a little bit of a
19 problem in one part of the -- in one period of the
20 transient.

21 Where are we going to lead with this? I
22 think as Andrzej was starting to mention, by and large
23 we're going to find that the tests that were run for
24 AP 600, SPES, ROSA, and APEX largely have many of the
25 characteristics that show that they are acceptable for

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 use with the AP 1000. That's good. That covers much
2 of the transient.

3 However, we find two major exceptions, and
4 we feel that those are the things that we're going to
5 have to deal with in a lot more detail in Phase 3 of
6 the review, and those are the entrainment processes as
7 they affect the flow quality leading to the ADS. A
8 look of these separately in terms of entrainment that
9 occurs in the hot leg, something that might be
10 important for one or two inch breaks where we have
11 levels up into the hot leg, and this is our primary
12 mode of entrainment that carries liquid into the ADS-
13 4.

14 For the DVI line break, which leads to the
15 minimum vessel inventory and is the most severe
16 accident for AP 1000, the process that we're going to
17 be most concerned with is this upper plenum pool type
18 entrainment where we have a two phase level above the
19 core plate. Gas is bubbling through this liquid
20 carrying droplets along the streamlines, again, out
21 through the ADS-4.

22 As we go along, we're going to talk about
23 these processes. What Marino is going to take a look
24 at is what's the effect of this flow quality as it
25 gets to the ADS, and how does that affect the

NEAL R. GROSS

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

(202) 234-4433

www.nealrgross.com

1 transient nature of AP 1000?

2 Top-down scaling. There were several
3 different methodologies --

4 MEMBER SCHROCK: I guess --

5 MR. BAJOREK: Sorry?

6 MEMBER SCHROCK: I wonder if this is the
7 right time or maybe it shouldn't be left until later,
8 but the modeling of this in APEX experimentally showed
9 that you get a sloshing back and forth in this line.
10 It doesn't look like the picture that you're showing
11 here, but is something quite different from that.

12 MR. BAJOREK: We're getting ahead a little
13 bit.

14 MEMBER SCHROCK: Well, okay. So you don't
15 mean literally that what you're looking at is a steady
16 flow that has this kind of configuration?

17 MR. BAJOREK: No, no. We'll have some
18 water in the hot leg. It will have a different
19 regime, and I'd like to talk about that when we get to
20 it.

21 MEMBER SCHROCK: A pulsating discharge.

22 MR. BAJOREK: Yes.

23 MEMBER SCHROCK: Okay.

24 MR. BAJOREK: There were several
25 methodologies that were proposed for doing top down

NEAL R. GROSS

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

1 scaling for the AP 600. Westinghouse proposed, too,
2 that they used for the AP 600 one that I would prefer
3 as a multi-loop top down scaling, another a single
4 loop.

5 In the W cap that was submitted in support
6 of AP 1000, they submitted another scaling methodology
7 different from the first two. So I would characterize
8 that as the third methodology.

9 INEL produced a scaling methodology for
10 the NRC, and in addition, there was work done by
11 Wolfgang Wolfe to come up with another scaling
12 methodology. Each one has different ways of looking
13 at the system. Each one has their good points and
14 their bad points.

15 For doing an independent scaling analysis
16 for this, we decided we wanted to stay independent.
17 So we stayed away from the Westinghouse methodologies.
18 We looked at INEL and the work that was done by
19 Brookhaven and decided that it was clearer but faster
20 to use the INEL scaling methodology and went down that
21 path.

22 That methodology takes AP 600 or the AP
23 1000 transient, divides it up into five major periods,
24 eight subperiods. We divided the AP 1000 transient up
25 in the same type of detail and looked at two different

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 scenarios, double ended guillotine break of the DVI
2 line and also the one inch break, and developed the
3 scaling parameters for each one of those scenarios.

4 CO-CHAIRMAN KRESS: Now, with the top
5 down, you mean you write the equations for energy
6 conservation and momentum and continuity, and you non-
7 dimensionalize those, and you end up with your pi
8 parameters.

9 MR. BAJOREK: That's exactly it.

10 CO-CHAIRMAN KRESS: Based on reformulating
11 for some figure of merit of interest, like pressure or
12 level or something. That's what's meant by top down.

13 MR. BAJOREK: Yes. Yes, sir.

14 The INEL looks at primarily the energy
15 equation and the mass conservation equation to develop
16 a pressure rate of change in a tank level equation, as
17 they call it, basically a mass balance in the vessel,
18 which is one of the things I liked about that
19 methodology, because it focuses on mass in the vessel
20 through much of the transient.

21 CO-CHAIRMAN KRESS: I don't like reopening
22 old sores and things, but I don't think I ever got a
23 good response to my question for AP 600, and I'd like
24 to raise it again.

25 Just why is it you feel that that ratio of

NEAL R. GROSS

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

1 pi groups at range .52 is an acceptable range? What
2 is it about that range that tells you it's acceptable?
3 Is that a judgment or do you have some technical basis
4 that says that if your pi groups are in that range,
5 you don't have significant distortion of the equation
6 so that you're outside of some limits?

7 I don't think I've ever received a good
8 response to that question yet.

9 MR. BAJOREK: In starting this, I looked
10 for that answer in the previous documentation, and I
11 was unable to find that. My use of it here is
12 primarily historical.

13 CO-CHAIRMAN KRESS: Yeah, that's the way
14 it was used before.

15 MR. BAJOREK: Now, what I've tried to do
16 here is at least make it scrutable and say, well, this
17 is the criteria that as I step through the scaling,
18 I'm going to look for numbers to fall within this
19 range, say that they're okay. I keep an eye on things
20 being close.

21 CO-CHAIRMAN KRESS: You've got to have
22 some criteria for these pi groups to say whether
23 they're acceptable or not. You know, why not .5 to
24 1.5 or .75?

25 You know, the question is why this choice.

NEAL R. GROSS

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

1 MR. BAJOREK: From the top down scaling I
2 really don't have a good answer for that, although I
3 want to add that when we start to look at the bottom-
4 up scaling, my opinion is that this is insufficient.
5 You need to not only look at this relative change in
6 some number, but also if you're headed to some type of
7 a cliff, if you're simply looking at a froude number,
8 well, this will give you a nice, warm feel that it's
9 in about the same type of area of a flow regime map,
10 but doesn't tell you if you just inched over a
11 boundary or not.

12 CO-CHAIRMAN KRESS: Right, right.

13 MR. BAJOREK: So in the bottom-up scaling,
14 I try to scrutinize this a little bit more that --

15 CO-CHAIRMAN WALLIS: That's because of
16 CCFL. I mean, if the criterion is one and you happen
17 to be two, that makes a tremendous difference.

18 CO-CHAIRMAN KRESS: Yeah, yeah.

19 MR. BAJOREK: Right.

20 CO-CHAIRMAN KRESS: That leads me to my
21 other question about this, and maybe you can file it
22 away, Professor di Marzo, and that is the pi groups,
23 in my mind, are kind of coefficients on partial
24 derivatives of these overriding equations, and there's
25 no reason in my mind that each partial derivative

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 should have the same influence as the other partial
2 derivatives.

3 So why should I have one range that I say
4 is acceptable? It seems like that range ought to be
5 specific depending on the pi group I have. And also
6 carrying on there, it looks like one could make
7 sensitivity studies with pi groups, and you know, if
8 you had the right way to do it, and you could find
9 out. You could actually pinpoint some range that
10 would give you the same change, percentage change in
11 the endpoint thing.

12 You know, I don't see any of that in this
13 at all, and that's what's bothering me about it.

14 MR. BAJOREK: Okay.

15 MEMBER SCHROCK: I had one other comment.
16 That is that I think the INEL and Brookhaven scaling
17 began with the HEM equations.

18 MR. BAJOREK: They did, yes.

19 MEMBER SCHROCK: And this leaves open the
20 question of the adequacy of scaling decisions where
21 non-equilibrium effects are of significance. I never
22 heard an answer during the AP 600 discussions that
23 resolved that question, and I don't know if we're
24 headed towards one now or not, but I guess I might
25 keep asking it.

NEAL R. GROSS

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

1 MR. BAJOREK: Okay. I won't have an
2 answer for that today.

3 MEMBER SCHROCK: Okay.

4 MR. BAJOREK: But just to point out how
5 we've addressed top down scaling in this review, very
6 similar to what we saw for the AP 600. We stayed
7 towards this acceptance criteria between a .5 and a
8 two.

9 When things fell out of that range, we
10 asked ourselves is the distortion conservative or non-
11 conservative. If it was a conservative distortion in
12 the test that was deemed acceptable,, if it was a
13 distortion in one of the parameters that on an order
14 of magnitude basis was a no never mind quantity --

15 CO-CHAIRMAN KRESS: Okay. So you did take
16 that into consideration in your judgment.

17 CO-CHAIRMAN WALLIS: Let's look at a
18 specific phenomenon. The fangs in the CMT or the
19 condensation sucked the water back into the CMT. This
20 was later concluded not to apply to full scale plant
21 because the hydrostatic heads were so much bigger than
22 something.

23 Did that get revealed by these pi groups
24 or by someone's wisdom from something else or what?
25 I mean, shouldn't it have shown up in the pi group

NEAL R. GROSS

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

1 somehow or would it be a bottom-up scaling?

2 MR. BAJOREK: I think a bottom-up scaling
3 is a place where that would have to be addressed. The
4 top-down scaling tends to homogenize the entire system
5 and wash out sharp discontinuities.

6 CO-CHAIRMAN WALLIS: Well, this was a
7 balance between them, some parts were dropped due to
8 condensation and some pressure difference due to
9 hydrostatics. It's a balance between the things. You
10 would think it would show up as a pi group.

11 MR. DI MARZO: This is Marino de Marzo.

12 Specifically to that phenomena there, it
13 wouldn't be captured in top down because you don't
14 have the description to that detail of components
15 level that would -- so you have a PBL line and a CMD.

16 CO-CHAIRMAN WALLIS: No, if you look to
17 the equations, you find you have the hydrostatic term
18 and the pressure term that you --

19 MR. DI MARZO: Not at this level of
20 detail.

21 CO-CHAIRMAN WALLIS: Not at this level?
22 Okay.

23 MR. DI MARZO: So it is left to be
24 addressed at bottom up.

25 MR. BAJOREK: This example of the top-down

NEAL R. GROSS

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

1 scaling, I just want to show you the way that we
2 arrived at some of our results. The example is what
3 INEL referred to as the intermediate Sub-phase 3.
4 That refers to this period. You don't have this
5 figure in your package. I'm sorry.

6 This is when the ADS 1, 2, 3 system has
7 been triggered. The water in the CMT is below 80
8 percent. The CMT is injected for a period.
9 Accumulators are starting to come on. The system is
10 depressurizing. There's voids in the upper head,
11 upper plenum, hot legs. As a result, the steam
12 generators have become ineffective.

13 The PRHR is operable, but is under a
14 degraded condition at this point. Lots of things
15 going on during this period, which makes it
16 interesting from a scaling point of view.

17 CO-CHAIRMAN KRESS: When you talk about
18 pressure, pressure varies around the system. Is that
19 pressure in the upper head or where is that pressure?

20 MR. BAJOREK: Generally --

21 CO-CHAIRMAN KRESS: Oh, it says upper head
22 pressure at the top.

23 CO-CHAIRMAN WALLIS: Yeah, it does.

24 CO-CHAIRMAN KRESS: Okay, okay.

25 MR. BAJOREK: It was either that or --

NEAL R. GROSS

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

1 well, the pressurizer wouldn't be good for this.

2 CO-CHAIRMAN WALLIS: Well, until you get
3 on later on, it doesn't matter too much. Five mega
4 Pascals is quite a big pressure compared with the
5 hydrostatic.

6 CO-CHAIRMAN KRESS: Yeah, did you consider
7 pressure a very definitive figure of merit to worry
8 about?

9 Rather than say water level in the core,
10 of course, is very important. Pressure may be, but
11 I'm not sure I can see it.

12 MR. BAJOREK: Well, it makes a difference.
13 It's used very frequently in defining the reference
14 conditions in each one of these subphases.

15 CO-CHAIRMAN KRESS: Okay.

16 MR. BAJOREK: Okay. For the intermediate
17 subphase, INEL defined roughly a dozen dimensionless
18 groups to characterize the depressurization flows into
19 and out of the system.

20 To apply the methodology, we got geometric
21 information for the AP 1000, as well as for the test
22 facilities and for the AP 600. In this case, APEX
23 doesn't get thrown into the mix because it wouldn't be
24 applicable for early parts of this period.

25 It took into account the larger area side

1 in the ADS system. It gives us a larger flow rate for
2 the AP 1000, lower resistance in the CMT, which
3 increases the CMT flow rate; larger volumes in the CMT
4 and the primary system

5 Recalculated all of the various pi groups;
6 looked at the ratios of those pi groups for AP 600 to
7 the AP 1000, ROSA and SPES, comparing those
8 dimensionless groups. In this case ROSA comes through
9 clean.

10 CO-CHAIRMAN KRESS: If your criteria of .5
11 to two --

12 MR. BAJOREK: Point, five to two. If you
13 decrease that to about 1.5, it still wouldn't make it.
14 So it --

15 CO-CHAIRMAN KRESS: Right. And the closer
16 those are to one, the more you feel --

17 MR. BAJOREK: The closer they are to one
18 they are the better. As they start to get to 1.99 or
19 two or .5, it's at least an indication that it's
20 starting to get out of that acceptance criteria that's
21 been used before.

22 Now, in the case of SPES, there were two
23 groups that did fall outside of that range for the AP
24 1000.

25 CO-CHAIRMAN KRESS: So when you

NEAL R. GROSS

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

1 reformulate your equations, undimensionalized, and you
2 get these pi groups from the top down, you need to
3 focus on the dependent variable that you're going to
4 come out with.

5 Now, these pi groups are for pressure?

6 MR. BAJOREK: These two are for pressure,
7 those two that like I say I have indicated. The si
8 are for pressure. The five or six down below are from
9 the mass equation.

10 CO-CHAIRMAN KRESS: Okay. So you've got
11 different ones in there.

12 MR. BAJOREK: Yes. They're both in there,
13 but for SPES we find two that are potentially
14 distorted. We looked at both of those. In both cases
15 the distortion is a conservative one, meaning that
16 performance in the plant should be better than what it
17 was in the facility, and they're both in groups which
18 are of relatively minor importance in the comparison
19 of the pi groups that had the maximum, the largest
20 values.

21 CO-CHAIRMAN KRESS: And how did you
22 determine the importance? How did you determine the
23 importance?

24 MR. BAJOREK: Oh, that's done by an order
25 of magnitude.

NEAL R. GROSS

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