

**NUCLEAR REGULATORY COMMISSION**

**ORIGINAL**

Title: Advisory Committee on Reactor Safeguards  
481st Meeting

PROCESS USING ADAMS  
TEMPLATE: ACRS/ACNW-005

Docket Number: (not applicable)

Location: Rockville, Maryland

Date: Thursday, April 5, 2001

Work Order No.: NRC-147

Pages 1-232

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

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

+ + + + +

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
(ACRS)

481ST MEETING

+ + + + +

THURSDAY,

APRIL 5, 2001

+ + + + +

ROCKVILLE, MARYLAND

+ + + + +

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

COMMITTEE MEMBERS PRESENT:

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

## 1 COMMITTEE MEMBERS PRESENT: (CONT.)

2 ROBERT E. UHRIG Member

3 GRAHAM B. WALLIS Member

4

## 5 INVITED EXPERT PRESENT:

6 STEPHEN L. ROSEN

7

## 8 ACRS STAFF PRESENT:

9 SAM DURAISWAMY

10 CAROL A. HARRIS

11 JOHN T. LARKINS

12 JAMES E. LYONS

13 ROBERT ELLIOTT

14

## 15 ALSO PRESENT:

16 ED ANDRUZKIEWIZ

17 HANS ASHAR

18 RAJ AULUCK

19 RAY BAKER

20 WILLIAM BATEMAN

21 CHARLES BRINKMAN

22 WILLIAM L. BROWN

23 WILLIAM BURTON

24 LARRY CAMPBELL

25 C. E. CARPENTER, JR.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 ALSO PRESENT: (CONT.)  
2 ROBERT CARUSO  
3 OMESH CHOPRA  
4 MANNY COMAR  
5 MICHAEL CORLETTI  
6 JAMES DAVIS  
7 JENNIFER DAVIS  
8 JERRY DOZIER  
9 BARRY ELLIOT  
10 ROB ELLIOT  
11 J. FAIR  
12 G. GALLETTI  
13 BEN GITNICK  
14 GEORGE GEORGIEV  
15 JIM GRESHAM  
16 CHRIS GRIMES  
17 FRANCIS GRUBELICH  
18 STEVE HOFFMAN  
19 Y. GENE HSII  
20 CHUCK HSU  
21 B. P. JAIN  
22 WALTON JENSEN  
23 CAROLE JULIAN  
24 PETER J. KANG  
25 ANDREA KEIM

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

1 ALSO PRESENT: (CONT.)  
2           STEPHEN KOENICK  
3           WILLIAM KOO  
4           P. T. KUO  
5           CAROLYN LAURON  
6           SAM LEE  
7           ALAN LEVIN  
8           CHANG-YANG LI  
9           YUEH-LI C. LI  
10          W. C. LIU  
11          LAMBROS LOIS  
12          MICHAEL McNEIL  
13          S. K. MIFON  
14          MATTHEW A. MITCHELL  
15          RICH MORANTE  
16          CLIFF MUNSON  
17          RICHARD ORR  
18          KRIS PARCZEWSKI  
19          ERACH PATEL  
20          PAT PATNAIK  
21          CHARLES PEARCE  
22          ISABELLE SCHOENFELD  
23          PAUL SHEMANSKI  
24          UNDINE SHOOP  
25          DAVID SOLORIO

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

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

ALSO PRESENT (CONT.)

BRIAN THOMAS

EDWARD D. THROM

JIT VORA

HAROLD WALKER

DOUG WALTERS

KEITH WICHMAN

JERRY WILSON

I N D E X

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

<u>AGENDA ITEM</u>	<u>PAGE</u>
1) Opening Remarks by the ACRS Chairman . . . . .	7
2) Interim Review of the License Renewal . . . . .	11
Application for Edwin I. Hatch Nuclear Plant Units 1 and 2	
3) Proposed Final License Renewal Guidance . . . . .	107
Documents	
5) Thermal-Hydraulic Issues Associated . . . . .	158
with the AP1000 Passive Plant Design	

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

(8:30 a.m.)

1  
2  
3 CHAIRMAN APOSTOLAKIS: The meeting will  
4 now come to order. This is the first day of the 481st  
5 meeting of the Advisory Committee on Reactor  
6 Safeguards.

7 During today's meeting, the Committee will  
8 consider the following: Interim review of the license  
9 renewal application for Edwin Hatch Nuclear Power  
10 Plant Units 1 and 2; proposed final license renewal  
11 guidance documents; safety issues associated with the  
12 use of mixed oxide and high burnup fuels;  
13 thermal-hydraulic issues associated with the AP1000  
14 passive plant design; and proposed acrs reports. A  
15 portion of this meeting will be closed to discuss  
16 Westinghouse propriety information applicable to the  
17 AP1000 design.

18 This meeting has been conducted in  
19 accordance with the provisions of the Federal Advisory  
20 Committee Act. Dr. John Larkins is the designated  
21 federal official for the initial portion of this  
22 meeting.

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

1 A transcript of portions of the meeting is  
2 being kept. And it is requested that the speakers use  
3 one of the microphones, identify themselves, and speak  
4 with sufficient clarity and volume so that it can be  
5 readily heard.

6 I will begin with some items of current  
7 interest or announcements. First, Mr. John Szabo of  
8 the Office of General Counsel will meet with us on  
9 Friday -- that is tomorrow -- at 12:15 p.m. to discuss  
10 recent changes in ethics laws and answer any questions  
11 that the members may have relating to conflict of  
12 interest, contracting restrictions, prohibited stocks,  
13 et cetera. So I suggest that we bring our lunch here  
14 and then listen to Mr. Szabo.

15 There will be a meeting at noon today in  
16 the Subcommittee Room with NRR staff to discuss  
17 potential synergistic effects from power upgrades,  
18 high burnup fuels, life extension, and accident  
19 precursors, and life extension, period.

20 Carol Harris will pass out financial  
21 disclosure forms today or tomorrow. And the members  
22 are requested to fill them out and return them to  
23 Carol at the May meeting. I will be meeting with  
24 Commissioner Merrifield today, and Dr. Larkins will be  
25 with me at 3:00 o'clock. You have received copies of

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 the ACRS summary matrix of 2,000 letters and outcomes  
2 that are in front of you.

3 MEMBER KRESS: I didn't know we had  
4 written that many

5 CHAIRMAN APOSTOLAKIS: Two thousand  
6 letters, yes, 2,000 letters. At least it feels that  
7 way. And it has the various criteria that we use to  
8 judge effectiveness and so on. The subcommittee  
9 chairmen are asked to find their own letters and  
10 review what's in this handout and make sure it's  
11 correct.

12 We will do this in tomorrow's session, the  
13 P&P session. So please read them before then. We  
14 will discuss our meeting with the Commission next  
15 month. We will discuss it today between 4:30 and 5:30  
16 and Friday at 3:30, between 3:30 and 4:30, and  
17 Saturday as necessary.

18 You have this pink cover with some  
19 interesting items of interest attached, several  
20 speeches by commissioners, an inside NRC article on  
21 the DPO report, and managerial assignments and changes  
22 within the agency. So the members should find this  
23 interesting.

24 And, finally, I am pleased to announce  
25 that Mr. Harold Larson has been appointed as Special

**NEAL R. GROSS**

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

1 Assistant and Mr. Sam Duraiswamy as Technical  
2 Assistant to the Associate Director for Technical  
3 Support of the ACRS/ACNW.

4 And, with all of that, we are ready to  
5 start our session. The first one is on interim review  
6 of the license renewal application for Hatch Nuclear  
7 Power Plant Units 1 and 2. Dr. Bonaca, this is your  
8 session.

9 VICE CHAIRMAN BONACA: Thank you, Mr.  
10 Chairman.

11 On March 28th, we met with the applicant  
12 and with the staff to review the application of Plant  
13 Hatch Units 1 and 2 for license renewal. We heard  
14 from the applicant, and also we had a significant  
15 amount of information before to review from the SER.

16 On March 27, we spent about half a day  
17 reviewing with the staff the BWRVIP topical reports  
18 for the program in general. That includes in excess  
19 of 20 topical reports, of which we have reviewed  
20 specifically 4 of them.

21 Those topical reports are important  
22 because they are referenced in the Hatch application.  
23 They really are the foundation to the vessel and  
24 internal inspections and evaluations that old BWR was  
25 performing. They are important to us because we will

**NEAL R. GROSS**

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

1 see them likely in every application for BWRs for  
2 license renewal. Today we have the staff and the  
3 applicant coming in and summarizing for the full  
4 Committee what we heard on the 27th and 28th of March.

5 With that, I will move and ask Mr. Grimes  
6 to introduce speakers.

7 MR. GRIMES: Thank you, Dr. Bonaca.

8 My name is Chris Grimes. I'm the Chief of  
9 the License Renewal and Standardization Branch. I am  
10 accompanied by Bill Bateman, the Chief of the  
11 Materials and Chemical Engineering Branch.

12 And the staff is prepared today to  
13 summarize the material that was presented at the  
14 subcommittee meetings and to highlight those specific  
15 areas of interest that the subcommittee pointed out.

16 Mr. William, also known as Butch, Burton  
17 is the project manager. And Butch will present the  
18 summary of the renewal reviews. We are leading off  
19 with Gene Carpenter, who is the lead engineer on the  
20 Boiling Water Reactor Vessel Internals Project. And  
21 we have coordinated with the applicant, who is being  
22 represented here today by Ray Baker from Southern  
23 Company, in order to address the specific questions  
24 that came up during the subcommittee meeting.

25 And I would also like to emphasize that

**NEAL R. GROSS**

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

1 this is an interim report. You know that there are a  
2 number of open items and issues under appeal, for  
3 which there is an ongoing dialogue with the applicant.  
4 And we will do our best today to represent where we  
5 stand on those issues. And we will continue to keep  
6 the subcommittee and the full Committee informed of  
7 our progress on those issues.

8 And, with that, I will turn it over to the  
9 staff to make the presentation.

10 VICE CHAIRMAN BONACA: Thank you.

11 (Slide.)

12 MR. CARPENTER: Good morning. I'm Gene  
13 Carpenter with the Materials and Chemical Engineering  
14 Branch. As Mr. Grimes said, I am the lead for the BWR  
15 Vessel Internals Project, the staff review that has  
16 been ongoing for that.

17 (Slide.)

18 MR. CARPENTER: Today I am going to give  
19 you a very brief overview of the regulatory  
20 perspective on this, what has been accomplished with  
21 the BWRVIP Program to date and how the generic aging  
22 management program has been reviewed.

23 Now, last week when we briefed the  
24 subcommittee on this, Mr. Robin Doyle of Southern  
25 Nuclear gave a fairly comprehensive, if somewhat

**NEAL R. GROSS**

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

1 abbreviated, overview of it. And that took two hours.  
2 I have 30 minutes. So my overview is going to be  
3 exceptionally abbreviated.

4 To start with, BWRVIP is a voluntary  
5 industry initiative of all the BWR owners in the U.S.  
6 and several foreign reactors. It was begun in 1994 to  
7 address the core shroud cracking issue, which  
8 eventually gave rise to Draft Letter 94-03.

9 They now address all of the BWR internal  
10 components, the reactor vessel and an extension of  
11 what they had previously been chartered to do. They  
12 are now looking at the Class I piping material  
13 conditions also.

14 The guidance that the BWRs have put out  
15 covers the current operating term and also the  
16 extended operating period. The staff is looking at  
17 both of those.

18 BWRVIP has been proactively addressing  
19 some of the aging degradation issues that are beyond  
20 present regulatory requirements as well as those that  
21 are within regulatory requirements.

22 The BWRVIP has identified generic  
23 cost-effective strategies that are appropriate for  
24 plant-specific needs. They are also the regulator  
25 interface for all BWR material issues and also the

**NEAL R. GROSS**

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

1 clearinghouse for all the information that has been  
2 gathered, both domestically and internationally. So  
3 they are sharing quite a bit of information, not only  
4 with themselves but also with the staff.

5 (Slide.)

6 MR. CARPENTER: One of the reasons that  
7 Mr. Doyle gave last week for all of this is that the  
8 BWRs were suffering through quite a bit of capacity  
9 loss in the early 1980s. As this chart shows, in the  
10 early '80s, the plants were down up to 20 percent of  
11 the time. And obviously when you have a nuclear  
12 reactor, you would like it to be running as much as  
13 possible.

14 During this time, the staff had put out  
15 quite a few information notices, bulletins, generic  
16 letters, et cetera, regarding some of the material  
17 degradation issues. And BWRs had started working on  
18 this. Again, in 1994, they started doing this as an  
19 organization, the BWRVIP organization.

20 (Slide.)

21 MR. CARPENTER: To give you a rough idea  
22 of some of the components that have been looked at  
23 here, not only are we talking about the entire vessel  
24 itself, we're talking about the core shroud, core  
25 plate, top guide, core spray piping on the internals,

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 the various support legs, basically everything inside  
2 that is safety-related.

3 (Slide.)

4 MR. CARPENTER: As you may remember from  
5 when the core shroud issue first occurred, some of the  
6 components that were of high concern were these welds,  
7 the circumferential welds. Later on vertical welds  
8 were also identified as a cracking problem. And that  
9 is being addressed in one of the BWRVIP reports,  
10 specifically VIP-63, which the staff has reviewed.  
11 They have also looked at, again, the support legs, the  
12 core spray piping, the top guide, more core plate, the  
13 jet pumps, et cetera.

14 To give you a rough idea again, all of the  
15 BWRs in the United States are members of the BWRVIP.  
16 And they all have committed to following the BWRVIP  
17 guidance as it is reviewed by the staff and approved.  
18 If they have any problem with following the guidance  
19 once it is approved, they are required to tell us  
20 within 45 days.

21 (Slide.)

22 VICE CHAIRMAN BONACA: Before you leave  
23 the figure that shows the internals, --

24 MR. CARPENTER: Yes, sir.

25 VICE CHAIRMAN BONACA: -- you might want

**NEAL R. GROSS**

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

1 to point out some of the concerns there may be. I  
2 mean, for example, some failure of hold-down things in  
3 top guide may lead to core movement --

4 MR. CARPENTER: Yes, sir.

5 VICE CHAIRMAN BONACA: -- and, therefore,  
6 their ability to insert control rods. I mean, that's  
7 the kind of issues maybe the members should hear about  
8 briefly.

9 MR. CARPENTER: Right. Some of the issues  
10 that have arisen obviously with core shroud cracking,  
11 you lose two-thirds core coverage. If the core shroud  
12 circumferential welds do give way and there is  
13 movement of the core shroud, you could preclude the  
14 ability to perform a safe shutdown by movement,  
15 damaging of the fuel, precluding the control rods from  
16 inserting.

17 Another problem was with the SLC, standby  
18 liquid control system. If that failed, you would not  
19 be able to shut down under an ATWS condition.

20 The jet pumps, one of the things that was  
21 looked at was what would happen if you had the jet  
22 pumps disassemble. Again, that would preclude  
23 two-thirds core height coverage.

24 If the core spray pipes had significant  
25 cracking in it, you would not be able to perform core

1 spray cooling. If the top guide or the lower core  
2 plate was cracked significantly, again, more problems  
3 there. And these are all some of the issues that were  
4 looked at *in toto* as well as what would happen if you  
5 had cracking in the reactor vessel or in some of the  
6 Class I piping.

7 VICE CHAIRMAN BONACA: Thank you.

8 (Slide.)

9 MR. CARPENTER: Okay. The previous slide  
10 was on the domestic members. This is a listing of the  
11 present foreign member utilities. As you can see, it  
12 includes Germans, the Japanese, Taiwanese, et cetera.

13 (Slide.)

14 MR. CARPENTER: Some of the BWRVIP  
15 reports, as I said several times now, have included  
16 the BWR vessel, all safety-related internal  
17 components, and Class I piping.

18 VICE CHAIRMAN BONACA: Just one more  
19 question.

20 MR. CARPENTER: Yes, sir?

21 VICE CHAIRMAN BONACA: Of all the foreign  
22 member utilities you showed, are they all G.E.  
23 reactors?

24 MR. CARPENTER: I don't believe.

25 VICE CHAIRMAN BONACA: Okay. So there are

**NEAL R. GROSS**

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

1 some BWR reactors of other design?

2 MR. CARPENTER: I believe so, yes.

3 VICE CHAIRMAN BONACA: Okay. So there is  
4 a sharing of information with other types of designs?

5 MR. CARPENTER: Right. The BWRVIP  
6 reports, again, they cover the core shroud, shroud  
7 supports, the entire list that I have here, of which  
8 the Hatch review did take a look at all of these.  
9 Some of them are not applicable to Hatch, but we will  
10 talk about that in a moment.

11 The guidelines were basically broken up  
12 into three main sections, those of the inspection and  
13 flaw evaluation guidelines, which create the bases for  
14 the aging management program; repair design criteria,  
15 which would be applicable at any time in plant life,  
16 either during the current operating term or the  
17 license extension term; and also mitigation guidance,  
18 which would give you a way to preclude cracking,  
19 hydrogen water chemistry, noble metal chemistry  
20 addition, et cetera. And that's also good at any time  
21 during plant life.

22 (Slide.)

23 MR. CARPENTER: To give you a brief  
24 overview, as Dr. Bonaca said at the beginning, there  
25 have been quite a few of these BWR reports. These are

1 the majority of the flaws, the inspection and flaw  
2 evaluation guidelines.

3 Several, the BWR reactor vessel pressure  
4 one, BWRVIP-74, had subsumed and the guidance that was  
5 given in BWRVIP-05, which the ACRS reviewed several  
6 years ago. BWRVIP-76, the core shroud, which started  
7 all of this, subsumes the guidance that was previously  
8 approved in BWRVIP-01, -07, and -63, -63 being the  
9 vertical welds, as opposed to the circumferential ones  
10 on the first two.

11 (Slide.)

12 MR. CARPENTER: And, as I said a moment  
13 ago, they also have repair/replacement design  
14 criteria. This is a listing of those for all of the  
15 safety-related equipment.

16 (Slide.)

17 MR. CARPENTER: And also guidance on how  
18 to evaluate crack growth and mitigation. And these  
19 all either have been reviewed or are under staff  
20 review at this time.

21 (Slide.)

22 MR. CARPENTER: Some of the other reports  
23 that have been looked at were: the BWRVIP-03  
24 guidance, which tells the licensees how to do a  
25 consistent examination; and the -06 report, which was

**NEAL R. GROSS**

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

1 a safety assessment of all the reactor internals. And  
2 that gave them the bases for determining which of  
3 these internal components would be looked at and  
4 evaluated.

5 The safety assessment identified  
6 components that were necessary for safe operation  
7 shutdown. The criteria that was used was to:  
8 maintain a coolable geometry, maintain rod insertion  
9 times, maintain reactivity control, assure core  
10 cooling, and assure instrument availability, all good  
11 things.

12 (Slide.)

13 MR. CARPENTER: The general format of the  
14 I&E guidelines, which, again, is the bases for the  
15 aging management program, is an overall description of  
16 the components, the inspection history, and the  
17 susceptibilities of the components; failure  
18 consequences; the inspection requirements, both scope  
19 and frequencies; flaw evaluation methodologies; and  
20 reporting requirements, what they are going to be  
21 telling the staff.

22 The program assures that the inspections  
23 performed correctly and on time by qualified  
24 personnel; and that the inspection results and flaws  
25 are properly evaluated and dispositioned; and that all

**NEAL R. GROSS**

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

(202) 234-4433

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

1 repairs meet approved BWRVIP criteria or applicable  
2 codes, as the case may be.

3 (Slide.)

4 MR. CARPENTER: BWRVIP conclusions were  
5 that the program is broad in scope; the BWRVIP  
6 includes appropriate inspections, evaluation  
7 methodologies, repair criteria and mitigation methods  
8 to assure BWR internals integrity; and the use of the  
9 program during license renewal period provides an  
10 adequate aging management program. Now, that --

11 CHAIRMAN APOSTOLAKIS: Whose conclusions  
12 are these?

13 MR. CARPENTER: Again, this is the  
14 BWRVIP's conclusions.

15 CHAIRMAN APOSTOLAKIS: Not yours? Okay.

16 MR. CARPENTER: I'm about to give you  
17 ours.

18 CHAIRMAN APOSTOLAKIS: Okay.

19 MR. CARPENTER: Okay?

20 CHAIRMAN APOSTOLAKIS: It was too good.

21 (Slide.)

22 MR. CARPENTER: Everyone has their own  
23 little advertisement that they want to put out. This  
24 is the staff's. And the staff has, again, completed  
25 the review of almost all the BWRVIP reports and those

**NEAL R. GROSS**

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

1 that we have reviewed and have approved. And there  
2 have been one or two that we have not approved as  
3 either denied or not yet approved.

4 The staff has concluded that  
5 implementation of the guidelines as modified to  
6 address staff comments will provide an acceptable  
7 level of quality for inspections and flaw evaluations  
8 of the subject safety-related components. We have  
9 also performed an independent research review, which  
10 was NUREG/CR-6677, which I provided copies to the  
11 Committee last week. That found that comprehensive  
12 inspection programs like the BWRVIP can significantly  
13 reduce core damage frequencies.

14 CHAIRMAN APOSTOLAKIS: Can or does?

15 MR. CARPENTER: Can.

16 MEMBER WALLIS: Well, how does an  
17 inspection program reduce a core damage frequency?  
18 Does it lead to a reassessment of some numbers? What  
19 is the mechanism for it?

20 MR. CARPENTER: One second, sir.

21 MEMBER WALLIS: If you found something bad  
22 in your inspections, it would increase the core damage  
23 frequency.

24 MR. CARPENTER: What the summary for the  
25 NUREG-6677 says -- and this is on Page 194 of the

**NEAL R. GROSS**

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

1 report -- "With no credit for inspections, monitoring,  
2 or repair; i.e., no BWRVIP program, and a probability  
3 of significant cracks developing one, coupled with the  
4 initiating event frequencies and system failure  
5 frequencies and the PRA studied, an undesirable  
6 increase in the plant core damage frequency; i.e.,  
7 greater than  $5e^{-6}$  events per year, is predicted.

8 "With the current BWRVIP inspection,  
9 monitoring, and repair program, there is expected to  
10 be no significant increase in CDF; i.e., less than  
11  $5e^{-6}$  events per year, caused by failures of BWR vessel  
12 internals. That is, IGSCC problems can be identified  
13 and evaluated or corrected to preclude a significant  
14 increase in core damage frequency."

15 So you can identify the problems before  
16 they occur.

17 MEMBER WALLIS: So it's the corrective  
18 action that changes the CDF --

19 MR. CARPENTER: That is my understanding,  
20 yes.

21 MEMBER WALLIS: -- or is it just your  
22 state of knowledge, which is different, because you  
23 know more?

24 MR. CARPENTER: If you can find a  
25 potential problem before it can become an actual

**NEAL R. GROSS**

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

1 problem, then you can reduce --

2 MEMBER WALLIS: Presumably if you found  
3 problems which you didn't know about before, you could  
4 conceivably increase your CDF?

5 MR. CARPENTER: If you're correcting them  
6 before they become a problem.

7 MEMBER WALLIS: But if you didn't know how  
8 to correct them, you find something you didn't know  
9 was there before, it wasn't in your PRA, now it is,  
10 you could increase your CDF.

11 MEMBER SHACK: Well, there's the PRA.

12 MR. CARPENTER: That's right.

13 MEMBER WALLIS: But the idea is it always  
14 increases CDF. It may be --

15 VICE CHAIRMAN BONACA: It seems that the  
16 better way to put it would be that -- I mean, it  
17 prevents increases in CDF that would result from the  
18 cracking. I mean, that's really what it says. With  
19 respect to what we have measured today, if we did not  
20 have these inspections and the repair, we would see an  
21 increase in CDF by a certain amount they seem to  
22 quantify.

23 MEMBER WALLIS: What would be the  
24 mechanism for increasing that CDF? It would have to  
25 be some cracking in the map, which increases your CDF.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 VICE CHAIRMAN BONACA: Sure. You have a  
2 high probability of --

3 MEMBER WALLIS: The crack growth is in  
4 your model, and the CDF is increasing. But by  
5 inspecting, you somehow --

6 VICE CHAIRMAN BONACA: For example, he  
7 would have an increase in the frequency of ATWS.  
8 Okay? And now because you have these inspections and  
9 repairs, your frequency of the ATWS --

10 MEMBER KRESS: It affects two things: the  
11 frequency of certain events, one of which would be  
12 ATWS. It also affects the probability of events in  
13 the event tree of going one way or another and certain  
14 event trees. It affects those probabilities. And the  
15 outcome is it in reality has effects on the CDF.

16 MEMBER SHACK: Yes. I mean, your computed  
17 CDF may go.

18 MEMBER KRESS: Sure. Your computed might  
19 have gone up, but the real CDF --

20 MEMBER SHACK: But your actual proved CDF,  
21 which is the one you really should worry about --

22 MEMBER WALLIS: There's no such things as  
23 a true CDF.

24 CHAIRMAN APOSTOLAKIS: There isn't such a  
25 thing. Come on.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 MEMBER WALLIS: It's always a computed  
2 CDF. There's no such thing as a measured CDF. It's  
3 always computed.

4 CHAIRMAN APOSTOLAKIS: I think Graham is  
5 right.

6 MEMBER KRESS: Well, in principle, there  
7 is a CDF.

8 MEMBER SHACK: You may not know what it  
9 is. You may not know what it is.

10 MEMBER KRESS: There had better be a CDF  
11 or we are beating our head against the wall.

12 CHAIRMAN APOSTOLAKIS: But all you have is  
13 the computed CDF. Why is it "significantly"? I mean,  
14 why do you put the word "significantly" there?

15 MR. CARPENTER: I did not do this report.  
16 Is --

17 CHAIRMAN APOSTOLAKIS: I mean, am I to  
18 compare this with the standard  $10^{-6}$  or less vessel --

19 MR. CARPENTER: Well, that they use to --

20 CHAIRMAN APOSTOLAKIS: -- carrier? So 5  
21  $\times 10^{-6}$  is significant?

22 MR. CARPENTER: It is significant, sure.

23 CHAIRMAN APOSTOLAKIS: Yes. That's fine.

24 VICE CHAIRMAN BONACA: The question I  
25 have: In many of these reports on a related issue,

**NEAL R. GROSS**

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

1 there is a statement that some of the degradation  
2 mechanism could lead to inability of inserting control  
3 rods. Okay?

4 And then there is a statement typically  
5 that says: However that happens, you know, the SLC  
6 system is available. And there is no discussion there  
7 on the fact that, you know, the core reliance on the  
8 SLC system is based on a very low frequency of the  
9 ATWS event. I mean, that is not something that makes  
10 me comfortable to know that if you cannot insert the  
11 rods, you have the SLC system anyway. Well, I hope  
12 we'll never have to use that system.

13 So I guess this is in the same contrast of  
14 the evaluation that NUREG provides, I imagine. Yes.  
15 Low probability and low likelihood. Okay.

16 But, anyway, I just wanted to comment how  
17 there is this dependency there on the systems that in  
18 design basis, they are not supposed to be used either  
19 for the life of the plant, --

20 MEMBER FORD: Gene, I have a question.

21 MR. CARPENTER: Yes, sir.

22 MEMBER FORD: -- really, following up from  
23 the meeting we had last week. And it relates to the  
24 risk management and how quantitative we are. It  
25 relates to the last line there. In the VIP documents

**NEAL R. GROSS**

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

1 for disposition of the cracks for the austenitic  
2 calories, we use the upper bound of the data. What  
3 would the procedure be if in the future you found  
4 cracks going faster than that upper bound?

5 And, as you know, we have done that. That  
6 has occurred in the past for the ASME 11 code for  
7 corrosion fatigue. We kept on moving the line up as  
8 we got more data. Would you do the same? Would NRR  
9 advocate the same, just increasing the upper bound as  
10 you get more data? That is the first question.

11 The second question is both for especially  
12 the low alloy steel disposition curves. It's based on  
13 minimal data, and it is not the upper bound. How do  
14 you manage that risk or how would NRR judge the  
15 management to that risk? There could well be data  
16 above the disposition line that has been quoted for  
17 low alloy steels.

18 MR. CARPENTER: Dr. Ford, correct if I'm  
19 misstating what you just asked me. The first part of  
20 the question was: How would we evaluate if future  
21 data comes in that shows that the crack growth rate  
22 that we have at present is unconservative?

23 MEMBER FORD: Correct.

24 MR. CARPENTER: Okay. If we find that we  
25 have a nonconservative crack growth rate, the staff--

1 I feel very confident in stating this categorically --  
2 will go back. And we will evaluate that, and we will  
3 perhaps tell them -- not perhaps. We will tell the  
4 industry to go and reevaluate based on this additional  
5 data.

6 MEMBER FORD: Okay.

7 MR. CARPENTER: Obviously we want to be  
8 conservative. We want to be safe.

9 VICE CHAIRMAN BONACA: But I would expect  
10 that the BWRVIP program would have procedures of this  
11 type to incorporate data in the program.

12 MR. CARPENTER: The BWRVIP is planned to  
13 be a living program. And they are planning to  
14 evaluate as it becomes available and relook at all of  
15 this, yes.

16 MEMBER FORD: And the second question,  
17 which I am really concerned about, the low alloy steel  
18 one, well, that disposition line I know because I did  
19 it was formulated almost out of the air. I hesitate  
20 to say that.

21 MR. CARPENTER: And I would certainly not  
22 correct you at all. You are the expert there, sir.  
23 But I will defer this to the staff expert on this.

24 Bill, Bill Koo, you are the one who looked  
25 at some of this low alloy steel stuff. Could you

**NEAL R. GROSS**

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

1 address Dr. Ford's question, please?

2 MR. BATEMAN: Bill's telling me he did not  
3 perform that review. So I don't think we have that  
4 particular expertise here to support at this time. We  
5 will have to get back.

6 MEMBER FORD: I guess the answer would be  
7 the same as the previous one that it is a living  
8 document, if you like.

9 MR. CARPENTER: Certainly.

10 MEMBER FORD: And, therefore, you would  
11 just revise it.

12 MR. CARPENTER: Certainly.

13 VICE CHAIRMAN BONACA: Just staying on  
14 the issue, however, it would be interesting to know  
15 more about the BWRVIP program and the commitments it  
16 has. I mean, the staff cannot be ultimately  
17 responsible for all the elements of the program.

18 The program is really a leading program  
19 that is supported by the industry. So I would expect  
20 it would have a number of guidelines on how new  
21 information is incorporated, how it is distributed  
22 among the participants, how commitments are revised,  
23 and how the --

24 CHAIRMAN APOSTOLAKIS: Well, presumably,  
25 you know, the results of the inspection program are

**NEAL R. GROSS**

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

1 evaluated by somebody.

2 VICE CHAIRMAN BONACA: Well, I mean --

3 CHAIRMAN APOSTOLAKIS: That's what makes  
4 it a program.

5 VICE CHAIRMAN BONACA: That's right, but  
6 I would like -- you know, what we have heard here is  
7 that the NRC would make certain requirements. The  
8 point is that the program really should be or has been  
9 successful before the NRC participated in that.

10 MR. CARPENTER: Correct. BWRVIP, as I  
11 said at the beginning, is the clearinghouse for all of  
12 this information. They do collect it. They do  
13 provide it to all of their member utilities. And they  
14 do evaluate all of the material that is looked at.  
15 And they do come in and meet with the staff on a  
16 regular basis to discuss the materials issues that  
17 they have been evaluating, both domestically and the  
18 information that they receive from overseas.

19 To date, whenever there is a problem or  
20 there has been a concern raised, they have been very  
21 fast in responding to that problem. For instance, a  
22 couple of years ago, we had an instance with cracking  
23 in the jet pump elbow risers. The BWRVIP took that on  
24 very fast, and they did resolve it with the issuance  
25 of a couple of reports, including the BWRVIP-28

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 report, which gave us a justification as to why the  
2 operating plants were safe to continue operation until  
3 they could perform inspections, and then later on with  
4 the BWRVIP-41 report, which it gave inspection  
5 guidance.

6 So they are looking at issues as they do  
7 arise. And obviously the staff is looking at the same  
8 issues on a concurrent basis.

9 Yes, sir?

10 MEMBER SIEBER: If I would go back to  
11 Slide 3, --

12 MR. CARPENTER: Yes, sir.

13 MEMBER SIEBER: -- which shows the core  
14 shroud, you talk about these inspections, but the  
15 geometries for the welds shown in that figure to me  
16 would be pretty complex. And so my question is: What  
17 kind of inspection do you do? And how certain are you  
18 that you detect whatever indications are there in the  
19 geometry that is shown on this figure?

20 MR. CARPENTER: The BWRVIP has guidance.  
21 Originally the BWRVIP was seven guidance for the  
22 inspection of the core shroud circumferential welds.  
23 That was later added to with the -63 report, which  
24 deals with the vertical welds. And then it was all  
25 subsumed into the BWRVIP report, which is still under

**NEAL R. GROSS**

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

1 staff review.

2 They also have the BWRVIP-03 report, which  
3 is the guidelines on how to perform inspections,  
4 visual, UT, ultrasonic examinations, various other  
5 types of examinations that would be done of the  
6 vessel. It gives you guidance on how to qualify the  
7 inspections and what makes a successful inspection.

8 So when they perform these inspections to  
9 the guidance of the staff-approved BWRVIP-07 and -63  
10 reports, using the -03 guidance, which has also been  
11 reviewed and approved by the staff and modified with  
12 staff comments, then we have a fairly high confidence  
13 level that you are going to find whatever there is to  
14 be found.

15 Does that answer your question, sir?

16 MEMBER SIEBER: Yes. Just as a little bit  
17 of a follow-up, though, if I look at a VT-type  
18 inspection, the indication has to be pretty  
19 substantial in order to pick that up as a VT.

20 MR. CARPENTER: Well, bear in mind the  
21 VT-3 examination, which is code-required, is a very  
22 broad examination.

23 MEMBER SIEBER: Right.

24 MR. CARPENTER: The BWRVIP has taken that.  
25 And they have reduced that down to an enhanced VT-1,

**NEAL R. GROSS**

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

1 which is a one-half mil examination. So it is a much,  
2 much finer examination.

3 MEMBER SIEBER: So you have gone beyond  
4 the code requirement?

5 MR. CARPENTER: The BWRVIP has gone  
6 considerably beyond code requirements, yes.

7 MEMBER SIEBER: Thank you very much.

8 MEMBER POWERS: I don't really understand  
9 the response. It says: Gee, BWRVIP used a bunch of  
10 expert opinion to come up with an inspection  
11 technique. The staff looked at that. And based on  
12 their expert opinion, they approved it.

13 Does anybody at any time go back and say,  
14 "Okay. Here is a system that we know has flaws in it.  
15 Show that the technique, in fact, does find those  
16 flaws"?

17 MR. CARPENTER: Yes, sir. The EPRI/NDE  
18 Center qualifies the inspectors.

19 MEMBER POWERS: It qualifies them for the  
20 techniques against some sort of sample. But he is  
21 asking: In this geometry, in this complexity, does it  
22 work?

23 MEMBER SIEBER: That's different.

24 MEMBER POWERS: That's different.

25 MR. BATEMAN: Bill Bateman on the staff.

1 I think we would need to adequately  
2 address your question for you to select a particular  
3 weld which you thought was a complex geometry. And  
4 once we understood what particular weld we were  
5 talking about, we would be better able to give you an  
6 answer. We might even have to go back to the BWRVIP  
7 to help get that answer.

8 MEMBER POWERS: I think that would be a  
9 useful thing for me to formulate the question that  
10 way. I don't think I can. But I think there is a  
11 generic issue here, one that we need to think about a  
12 little bit. What can we do to validate by actual  
13 experience, rather than expert opinion, these  
14 judgments on the adequacy of the inspections?

15 Now, in some cases; for instance, in the  
16 flaw distributions and pressure vessels, we have been  
17 fortunate enough to get a couple of pressure vessels?  
18 And they tear them apart at Oak Ridge or something  
19 like that. And they get an actual distribution, and  
20 they can do a lot of things.

21 Is there anything in the offing of getting  
22 some actual internals someday that we can keep Oak  
23 Ridge busy tearing things apart looking for flaw  
24 distributions?

25 MEMBER SHACK: They'll still be screaming

1 hot.

2 MEMBER POWERS: Well, these vessels aren't  
3 a walk through the park either.

4 MEMBER SHACK: Compared to the core, they  
5 are.

6 MEMBER WALLIS: It's very simple, then.  
7 You just deny license renewal. Then you've got a  
8 vessel you can take apart.

9 VICE CHAIRMAN BONACA: Actually, we could  
10 ask a question of the licensee that they had  
11 indications on the shroud they could not tell if,  
12 really, there were actual cracks. But they repair  
13 them anyway because of the concern they had.

14 Could you expand on how effective it was  
15 in the inspection, what the difficulty was in  
16 determining whether it was an incipient crack or --

17 MR. BAKER: I'm looking to Charles Pearce  
18 in the audience. And I am not sure that either one of  
19 us have the actual detailed knowledge of the repair  
20 that was affected today. We can certainly follow up  
21 at a later date.

22 VICE CHAIRMAN BONACA: For the  
23 application, it sounds like, really, you can tell if  
24 it was a crack or not.

25 MR. BAKER: It was my understanding that

**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 we preemptively repaired it. So whether there was a  
2 crack or not did not matter.

3 VICE CHAIRMAN BONACA: That's right.

4 MR. BAKER: The repair was to support it  
5 in a different way.

6 VICE CHAIRMAN BONACA: Wouldn't that pump  
7 be a comment on the difficulty of making that  
8 determination?

9 MR. BAKER: Yes. I just don't know.

10 VICE CHAIRMAN BONACA: Yes. Thank you.

11 MEMBER SHACK: I think Dana's comments are  
12 correct. I can't think of any situation in which one  
13 has qualitatively determined the probability of  
14 protection for an NDE technique except maybe steam  
15 generator tubes. It's largely the difficulty of  
16 getting representative samples.

17 You know, most people aren't going to  
18 volunteer to take their reactor apart. Even if you  
19 could afford to do it, the sampling sizes you get are  
20 just small. I mean, I think it is important in this  
21 particular case, as Gene mentioned, that the VIP has  
22 committed to the enhanced VT-1 with the half mil  
23 resolution.

24 In this particular situation, the flaw  
25 tolerance is such that, by and large, these cracks

**NEAL R. GROSS**

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

1 have to be very large before they are structurally  
2 significant. And so probably it is an expert judgment  
3 again, but I would probably be more confident that I  
4 could detect a crack of structural significance here  
5 with the enhanced VT-1 than I probably would -- you  
6 know, that I would be more confident in that than I  
7 would be most inspections, you know, my probability of  
8 detection of the structurally significant flaw.

9 But, again, it certainly hasn't been  
10 demonstrated in any rigorous fashion.

11 VICE CHAIRMAN BONACA: We just recently  
12 had the experience where inspections were conducted,  
13 nuclear inspections, and nothing was done. And then  
14 --

15 MEMBER SHACK: Borton follow-up is a very  
16 effective inspection.

17 VICE CHAIRMAN BONACA: Well, when you find  
18 a Borton, you find that you have a crack. Then you  
19 look back at the other nozzles, and you find that you  
20 have indications that you hadn't seen the year before.

21 MEMBER POWERS: It doesn't work at all for  
22 BWR.

23 VICE CHAIRMAN BONACA: No. Borton  
24 inspections aren't very good for BWR.

25 VICE CHAIRMAN BONACA: No. I understand.

1 I am only saying that I think the issue of inspections  
2 is a very important one. I think the answer maybe is  
3 the one that Bill is offering, that before you have a  
4 real effect, you would have a visible indication.

5 MEMBER SHACK: Well, I think it was  
6 important to go to the enhanced VT-1 because, as Jack  
7 mentioned, VT-3 sees when they are broken parts laying  
8 in the reactor. And even VT-1 is like a 132nd  
9 resolution, --

10 VICE CHAIRMAN BONACA: Right.

11 MEMBER SHACK: -- which is like for a  
12 stress corrosion crack, rather difficult. But, again,  
13 when you get to the enhanced VT-1 and you have a fairly  
14 large flaw tolerance, then you begin to I think  
15 develop more confidence.

16 MEMBER SIEBER: I take it a lot of surface  
17 has to go on prior to the actual examination.

18 MR. CARPENTER: That is correct, yes. The  
19 BWRVIP-03 document does describe in detail how you are  
20 supposed to clean the lighting, et cetera.

21 MEMBER SIEBER: Right.

22 MR. CARPENTER: Bear in mind visual  
23 examinations are not the only examinations being  
24 performed. They all started performing ultrasonic  
25 examinations.

**NEAL R. GROSS**

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

1 MEMBER SIEBER: Yes. That bothers me,  
2 too, a little bit. When I look at welds like H3 and  
3 H5, the only UT shots you can make are angle shots.  
4 And you may not be able to differentiate in the area  
5 of the lower core plate what components are where from  
6 a UT readout. It just seems complex to me.

7 MR. CARPENTER: I understand.

8 MEMBER WALLIS: When you look on the  
9 bottom of one of these vessels, what do you see? Do  
10 you see junk of any sort or is it bright and clean and  
11 shiny or what?

12 MR. CARPENTER: I don't know the answer to  
13 that, sir. I haven't looked in the bottom.

14 MEMBER WALLIS: I just want a feel for  
15 what kind of things you see in there when you look.

16 MEMBER SIEBER: I think you see a lot of  
17 crud.

18 MEMBER WALLIS: There's a lot of dirt or  
19 buildup?

20 MEMBER SIEBER: Well, it's crud, which is  
21 --

22 MEMBER WALLIS: Unidentified deposit?

23 MEMBER SIEBER: Well, it's usually sort of  
24 a harder deposit in the core area because softer ones  
25 would be swept away. You know, there is boiling and

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 all kinds of turbulent flow in there. So it would be  
2 an adhered hard type of crud.

3 MEMBER WALLIS: An unidentified crud.

4 MEMBER SIEBER: Which has to be cleaned  
5 off to do a VT-2 point.

6 MEMBER LEITCH: Sometimes you see some  
7 pieces of debris, too. Like down at the bottom, we  
8 have had problems with -- there is a suction line  
9 right from the bottom to -- I think it goes to reactor  
10 water cleanup that has been plugged or obstructed at  
11 several plants as a result of maintenance losing  
12 pieces of things down in that suction line.

13 MEMBER FORD: Gene, could you comment on  
14 the question of inspection frequency? You talk about  
15 it being a proactive plan, which it is. As you go  
16 into a new era, like a relicensing era, you don't  
17 really know what you are starting with because not  
18 everything has been inspected, especially down in the  
19 bottom of the reactor. And all of the stub tubes  
20 going through there, not all of them have been  
21 inspected.

22 Is that something that would normally be  
23 required by the NRR or how would you deal with that?

24 MR. CARPENTER: Dr. Ford, you play a great  
25 straight man. Specifically for the lower plenum

**NEAL R. GROSS**

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

1       internals, the staff has requested that the BWRVIP  
2       revise their document to go in and do a baseline  
3       inspection of the internals so that you do know what  
4       you have in there during the current operating term.  
5       And that way when you go into the license renewal, you  
6       will have a benchmark. So you will be able to see  
7       that.

8                   MEMBER FORD: The reason why I understand  
9       that there has been a cracking incident at Nine Mile  
10      Point, I'm told that that was not inspected. And,  
11      yet, you had a very large crack all the way around  
12      this particular weld. And it hadn't been inspected at  
13      all.

14                   So how can we guarantee or ensure that  
15      there is a minimal possibility of cleaning that in the  
16      future? Would this program of inspecting the reactor,  
17      100 percent inspection of the reactor, before  
18      relicensing solve that particular problem; i.e.,  
19      starting your clean slate, you know what your devil  
20      is?

21                   MR. BATEMAN: This is Bill Bateman from  
22      the staff. I don't think that we can tell you with  
23      any 100 percent certainty if the BWRVIP does generate  
24      an inspection, that they will be able to identify 100  
25      percent of the potential defects at the bottom of the

**NEAL R. GROSS**

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

1 core stub tube welds at our CRDM housings, et cetera.  
2 I don't think we're going to tell you that.

3 I think what we can say is in the case of  
4 the Nine Mile one, they did identify the leak. They  
5 did come in for a relief request to do a roll repair.  
6 And we accepted that under the proviso that they would  
7 subsequently develop a permanent repair.

8 So that is typically how we would handle  
9 items that were missed in an inspection. You know,  
10 they would manifest themselves in some kind of a leak  
11 later on.

12 MEMBER LEITCH: The Hatch license renewal  
13 application depends upon certain BWRVIP reports that  
14 have yet to receive staff approval. What is the logic  
15 of the resolution of that? Do we expect that those  
16 reports will be approved prior to the Hatch  
17 application being approved or is Hatch committed to  
18 live by those VIPs once they are approved? How did  
19 that work out?

20 MR. CARPENTER: Well, let me address first  
21 the BWRVIP reports that the staff is reviewing. And  
22 then I'll pass on what Hatch specifically is going to  
23 be doing.

24 There are two inspection and flaw  
25 evaluation guidelines that the staff has not yet

**NEAL R. GROSS**

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

1 approved which Hatch is referencing. And those are  
2 specifically BWRVIP-74, which is the reactor pressure  
3 vessel guidelines, and BWRVIP-76, which is the core  
4 shroud guidelines.

5 Now, please note -74 is a revision to the  
6 BWRVIP-05 document, which the staff has approved  
7 previously and we did talk to the ACRS about. That  
8 again is available of the licensees to perform  
9 inspections to that guidance.

10 The VIP-76, the core shroud, subsumes  
11 three other documents, which the staff has already  
12 looked at, VIP-01, -07, and -63. -63 still has open  
13 items on it, and the BWRVIP still owes a response to  
14 us to that, which is the reason the -76 document is  
15 still under staff review.

16 Once we look at all of those, it is going  
17 to be a fairly -- I won't say minor effort, but it  
18 will be a fairly quick one to complete the reviews of  
19 those two documents.

20 So yes, I do expect that by the time the  
21 final SE for Hatch is issued, we will have completed  
22 the reviews of these two documents.

23 VICE CHAIRMAN BONACA: From what you have  
24 said, what you are telling me is that you don't see  
25 the issues being reviewed are major issues of

**NEAL R. GROSS**

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

1 contention or problems?

2 MR. CARPENTER: There are some open items  
3 still in the Hatch review.

4 VICE CHAIRMAN BONACA: Yes.

5 MR. CARPENTER: But those I'm not ready to  
6 address at this time.

7 VICE CHAIRMAN BONACA: I'm not talking  
8 about the elements of those vessel and shroud VIPs  
9 that have not been approved yet.

10 MR. CARPENTER: Hatch has --

11 VICE CHAIRMAN BONACA: Not Hatch. I'm  
12 talking about the VIPs.

13 MR. CARPENTER: Oh, okay. If you're  
14 talking about just those two reports, --

15 VICE CHAIRMAN BONACA: Yes.

16 MR. CARPENTER: -- no, I don't see that we  
17 are going to have a terrible amount of contention  
18 between the staff and the VIP to resolve the open  
19 items.

20 VICE CHAIRMAN BONACA: That's the sense we  
21 got during the subcommittee meeting.

22 MR. CARPENTER: Yes, yes.

23 VICE CHAIRMAN BONACA: Thank you.

24 MR. CARPENTER: And if there are no other  
25 questions on this, I will go to my final slide.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 (Slide.)

2 MR. CARPENTER: The staff is completing  
3 the review of the license renewal appendices. And we  
4 have found that by referencing the aging management  
5 programs and completing the action items in the  
6 staff's SE, that there will be a reasonable assurance  
7 that applicants will adequately manage aging effects  
8 during the extended operating period and that the  
9 generic AMPs usage will significantly reduce staff  
10 review of license renewal applications in the future.

11 MEMBER WALLIS: This reasonable assurance  
12 is somebody's judgment?

13 MR. CARPENTER: Yes, sir.

14 MEMBER WALLIS: This is a nice sort of  
15 expression here, but what do you really mean by  
16 "reasonable assurance"?

17 MR. GRIMES: This is Chris Grimes. I'll  
18 address that question because this transcends license  
19 renewal.

20 Reasonable assurance is the finding that  
21 we have associated with our libation under the Atomic  
22 Energy Act because we cannot provide the public with  
23 certainty of safety. We developed a finding that was  
24 derived from the requirements in Part 50 that say that  
25 our obligation is to have reasonable certainty,

**NEAL R. GROSS**

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

1 reasonable assurance, that the plant is safe. And the  
2 whole construct of the regulations is built around  
3 that.

4 Each individual piece, whether it's the  
5 vessel internals program or the adequacy of aging  
6 management associated with water chemistry or the  
7 completeness of the scoping, all of those are  
8 predicated on individual staff judgments that are  
9 founded in criteria that we usually promulgate in reg  
10 guides and the standard review plan.

11 MEMBER WALLIS: So these are the same  
12 words you use when you have a new reactor. So one  
13 could conclude that the licensed reactor is as safe as  
14 a new one.

15 MR. GRIMES: I wouldn't go that far. I  
16 would say that there are standards that were  
17 established on a different basis. We use --

18 MEMBER WALLIS: It's less safe than a new  
19 one. So how much less safe is it?

20 MR. GRIMES: We don't make any assertion  
21 that it's more or less safe. We assert there is  
22 reasonable assurance that aging will be adequately  
23 managed for the purpose of issuing a renewed license.  
24 But the original license we established reasonable  
25 assurance that this plant will operate within its

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 design envelope.

2 MEMBER WALLIS: I'm just saying if I try  
3 to explain that to an undergraduate, it doesn't mean  
4 anything. It just means that the staff is satisfied.  
5 I like that. That's fine. You're doing your job.

6 But it's not English. It's not something  
7 that is the understandable to the public. If you  
8 could say these are as safe as they were when they  
9 were new or something, some sort of measure of this  
10 assurance, it might be more helpful.

11 MR. GRIMES: It's a very good point. And  
12 so I don't want to make light of it. The difficulty  
13 that we have is trying to establish in plain language  
14 what constitutes -- we're satisfied it's safe enough,  
15 recognizing that the degree, whether it's more safe or  
16 less safe, is something that evolves. And that is why  
17 license renewal focuses not on some established line  
18 in a sand of safety but more the processes that are  
19 used to continually challenge the judgment over time.

20 And we will continue to try and work on  
21 articulating some simple explanation for the purpose  
22 of trying to explain to the public how we reach these  
23 decisions.

24 MEMBER WALLIS: One problem is, of course,  
25 it's not risk-informed. As you continue to measure

**NEAL R. GROSS**

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

1 the risk, you might be able to provide assurance that  
2 it's no riskier than it was.

3 MR. GRIMES: I would like to be able to  
4 say that. I hesitate primarily because of the process  
5 aspect and the state of the knowledge. Several  
6 comments before got to the complexity of the  
7 inspection activity relative to a finding of whether  
8 or not we have identified everything that possibly  
9 could happen. And we don't emphasize enough the  
10 living program aspect that learns as it goes. And  
11 reliance on the quality assurance process is to change  
12 behavior when knowledge teaches you something  
13 different.

14 I think that we might say that we believe  
15 that it will be as safe or more safe, but then when  
16 we're challenged by a quantitative measure that we  
17 struggled to be able to explain what we thought was  
18 safety when it was originally licensed versus what we  
19 know of safety today versus what we speculate about  
20 safety in the future.

21 MR. CARPENTER: If there are no further  
22 questions on the BWRVIP, I will turn this over to Mr.  
23 Baker.

24 VICE CHAIRMAN BONACA: Thank you. I  
25 appreciate it. Any other questions for Mr. Carpenter?

1 (No response.)

2 VICE CHAIRMAN BONACA: If none, then we  
3 can move on. I believe we have now a presentation by  
4 Southern Company. Mr. Baker?

5 (Slide.)

6 MR. BAKER: Good morning. My name is Ray  
7 Baker, and I am the Hatch project manager for the  
8 Hatch license renewal application. I would also like  
9 to say that with me today is Charles Pearce, who is my  
10 direct supervisor, who is the manager for the license  
11 renewal group at Southern Nuclear. I appreciate the  
12 opportunity to speak to you today on behalf of Plant  
13 Hatch.

14 In the subcommittee meeting last week, we  
15 were asked to specifically focus on two items for your  
16 attention today. So today I am pleased to speak in  
17 some detail about the recent Hatch operating  
18 experience and to discuss our programs in terms of  
19 existing, enhanced, and new programs.

20 (Slide.)

21 MR. BAKER: I would like to first provide  
22 a summary discussion of the Plant Hatch vessel  
23 internals operating experience. And following that I  
24 will discuss the significant aging issues that Plant  
25 Hatch is currently addressing; that is, those items

**NEAL R. GROSS**

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

(202) 234-4433

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

1 that were observed during the five years preceding the  
2 Hatch application's submittal.

3 This discussion addresses aging issues  
4 only for those systems, components, and structures  
5 that are subject to aging management review under the  
6 license renewal rule.

7 First I would like to discuss our reactor  
8 vessel internal experiences. And we have actually  
9 talked some about that already, but let me go back a  
10 bit further than the shroud to the core spray  
11 spargers.

12 On Unit 1, IGSCC was identified in one of  
13 the core spray spargers early in life. That was  
14 repaired by a mechanical clamp. No additional IGSCC  
15 or other degradation has been detected since then. A  
16 full flow injection test was formed a few refueling  
17 outages ago with pre and post-injection inspections.  
18 And no problems were noted.

19 Another experience relates to feedwater  
20 nozzles. Unit 1 experience feedwater nozzle cracking  
21 in the late 1970s we replaced and the old slip-fit  
22 sparger that was the original design with the  
23 triple-sleeve, double-piston sparger. And we modified  
24 operation of the feedwater flow controller at that  
25 time. These changes appear to have eliminated 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](http://www.nealrgross.com)

1 causes of cracking in that component.

2 The Unit 2 sparger was replaced during  
3 construction with a welded sparger. And these fixes  
4 that Plant Hatch and other BWRs have implemented  
5 appear to have resulted in elimination of feedwater  
6 nozzle cracking. This was identified in a Hatch  
7 submittal that led to a generic submittal for the  
8 current inspection program. That is a revision to the  
9 original NUREG-0619 program that the BWRs use for  
10 feedwater nozzles. This, in turn, is referenced in  
11 BWRVIP-74 as a corrective approach for extended  
12 operation. And this is also referenced in the GALL.

13 As we noted earlier, both core shrouds  
14 have been preemptively repaired. The repair hardware  
15 and the vertical welds are inspected per the BWRVIP  
16 criteria.

17 And the final internals item I would note  
18 is that the access hole covers have been replaced with  
19 covers attached by mechanical means, as opposed to  
20 welded. And the materials used in the replacement  
21 covers are not considered to be IGSCC-susceptible.

22 MEMBER LEITCH: You have removed the CRD  
23 return line from both Hatch units, the CRD return line  
24 with a nozzle on the vessel that was experiencing some  
25 cracking?

1 MR. BAKER: I'm not familiar with that.  
2 I'm sorry. I don't know.

3 MEMBER LEITCH: I think most of the BWRs  
4 had removed that, but my question was basically  
5 specifically related to Hatch. So I would like to  
6 know the answer to that question when we get a chance.

7 MR. BAKER: We'll follow up with that.

8 MEMBER LEITCH: Thank you.

9 MR. BAKER: Next I'll turn to the current  
10 aging issues for the in-scope system structures and  
11 components; that is, those components that are of  
12 particular interest for license renewal. First I'll  
13 mention the control rod drive cap screws. Across the  
14 BWR fleet, a number of control rod drive cap screws  
15 have exhibited indications of localized corrosion and  
16 stress corrosion cracking.

17 G.E. issued a SIL, SIL Number 483, to  
18 address this issue. G.E. determined that inadequate  
19 design in conjunction with environmental conditions  
20 contributed to the failures. G.E. developed redesign  
21 cap screws to mitigate that degradation. The new cap  
22 screw design has a larger radius at the shank-to-head  
23 transition region to reduce stress concentrations and  
24 to fabricate from a higher-strength material. It  
25 includes a new washer design that features slots to

**NEAL R. GROSS**

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

(202) 234-4433

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

1 facilitate drainage of any collected fluid.

2 These indications that were observed were  
3 detected during VT-1 examinations. And no bulking  
4 failures occurred. Plant Hatch is currently in the  
5 process of upgrading all the control rod drive cap  
6 screws to the new G.E. design.

7 Next I'll discuss plant service water  
8 piping corrosion and fouling. Instance of fouling and  
9 corrosion in plant service water pipelines have  
10 occurred and continue to occur at Plant Hatch.

11 Areas of significant degradation or  
12 leakage have been limited to smaller diameter piping  
13 sections less than or equal to four nps. Specific  
14 areas of focus are low flow areas where fouling and  
15 localized corrosion may occur in creviced areas and in  
16 heat exchangers. In many cases, the plant service  
17 water and RHR service water piping inspection program  
18 identified the degradation prior to leakage. In all  
19 cases, no loss of system-intended function occurred.

20 The plant service water and RHR service  
21 water piping inspection program does aggressively seek  
22 out those areas where degradation may be occurring  
23 based on past experience. So it is experience-rated.  
24 The future inspections are based on the past  
25 experience.

1                   We continue to selectively replace  
2 sections of carbon steel piping in this river water  
3 environment with 304, 304L, or AL-6XN stainless steels  
4 to greatly reduce the potential for recurrence.

5                   The next area of operating experience I  
6 would like to speak to is flow-assisted or  
7 flow-accelerated corrosion; in particular, in the  
8 high-pressure coolant injection system and the reactor  
9 core cooling system.

10                   We had initially excluded locations in  
11 HPCI and RCIC from the fact program based on their low  
12 usage. These systems are expected to operate less  
13 than two percent of the time. However, degradation  
14 and minor leakage of piping downstream of the HPCI and  
15 RCIC steam supply drain pipes has occurred in the past  
16 five years. This is piping that is downstream of the  
17 condensers for these turbines.

18                   The identified leaks were minor in nature.  
19 And no loss of intended function occurred. These  
20 indications resulted in the addition of fact program  
21 sample points in these two systems for the Plant Hatch  
22 application.

23                   The next area I would like to speak to is  
24 related to the torus shell, the corrosion of the torus  
25 shell. Plant Hatch protective coating activities in

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 the torus have identified limited areas on the  
2 interior torus shell surfaces where some breakdown of  
3 the inorganic zinc coatings and subsequent localized  
4 corrosion have occurred.

5 The protective coatings program provides  
6 for regular monitoring of the corrosion rates in the  
7 torus and for repair of degraded coatings and  
8 surfaces. And no loss of intended function has ever  
9 occurred with regard to this.

10 Another area of interest is general  
11 corrosion of carbon steel in components such as piping  
12 and supports in areas routinely exposed to weather,  
13 such as intake structure pit area, service water valve  
14 pits, and the emergency diesel generator-building  
15 roof. Plant Hatch has implemented actions to address  
16 those areas and is in the process of implementing  
17 additional actions to identify and prevent future  
18 degradation occurrences due to weather exposure.

19 Finally, I would like to mention the fire  
20 water storage tank. Damage to the original installed  
21 vinyl coatings and subsequent corrosion of fire water  
22 tanks has occurred due to various causes. The Plant  
23 Hatch fire protection program identifies this  
24 degradation during routine inspection of the tanks and  
25 provides for continued monitoring of those areas of

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 degradation. No loss of intended function or leakage  
2 of any kind has occurred due to this degradation.

3 MEMBER SIEBER: What kind of water  
4 treatment do you use for fire water?

5 MR. BAKER: This is deep well water. So  
6 there is no water treatment applied to that.

7 MEMBER SIEBER: Treatment.

8 MR. BAKER: That's right. It's raw water.

9 MEMBER SIEBER: So it's pretty high in  
10 dissolved solids and minerals and --

11 MR. BAKER: It's raw water.

12 MEMBER SIEBER: Thank you. Filter?

13 MR. BAKER: That's deep well. So it's a  
14 clean source, yes.

15 MEMBER WALLIS: But deep wells have lots  
16 of dissolved materials in them. Water from deep wells  
17 has all kinds of stuff in it.

18 MR. BAKER: Yes, sir. There are chemistry  
19 samples taken. And there are limits applied to that  
20 that --

21 MEMBER SIEBER: But there is basically no  
22 treatment?

23 MR. BAKER: There's no treatment. That's  
24 right.

25 VICE CHAIRMAN BONACA: You mentioned in

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 the beginning that you replaced the vessel access hole  
2 cover plates?

3 MR. BAKER: Yes, that's correct.

4 VICE CHAIRMAN BONACA: Okay.

5 MR. BAKER: They were replaced with a  
6 mechanical design, as opposed to a welded-in design.

7 VICE CHAIRMAN BONACA: So they have been  
8 experiencing degradation?

9 MR. BAKER: We replaced them. And I do  
10 not recall if that was a preemptive repair or whether  
11 there was an indication it was observed.

12 MEMBER LEITCH: There were at least  
13 industry indications.

14 MR. BAKER: Yes, there were industry  
15 indications. I don't recall whether there was one at  
16 Hatch or not.

17 MEMBER POWERS: Can I come back to this  
18 fire water tank that you have?

19 MR. BAKER: Yes.

20 MEMBER POWERS: You say that you have a  
21 degradation because the liner has been damaged in the  
22 past. And it is corroding. But no loss of function  
23 has occurred. How long do we have to wait before it  
24 does have a loss of function?

25 MR. BAKER: The entire purpose of the

**NEAL R. GROSS**

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

1 monitoring program is to prevent that from occurring.  
2 So that is is --

3 MEMBER POWERS: I guess I am a little  
4 perplexed. Corrosion is only taking place when the  
5 guy is inspecting it?

6 MR. BAKER: No, that's not --

7 MEMBER POWERS: Well, what is it about the  
8 inspection program that prevents the tank from failing  
9 at 1:00 o'clock in the morning?

10 MR. BAKER: First, the corrosion is not  
11 significant corrosion. It is a surface corrosion that  
12 is well-behaved. It's not something that is a rapidly  
13 occurring situation.

14 The monitoring is frequent enough to  
15 observe any progress of it. It is in localized areas  
16 where the damage to the liner had occurred. And there  
17 are acceptance criteria relative to how much corrosion  
18 would be allowed before further action would be  
19 required.

20 Routine maintenance activities are  
21 performed in the plant. So this is not something that  
22 would just be left to corrode through to failure.

23 MEMBER SIEBER: But I think there is  
24 another issue, which you may be referring to, Dr.  
25 Powers. If the liner comes off, it's inorganic, and

1 it usually comes off. It's flakes. Flakes go through  
2 the fire water system. And if you have all of the  
3 sprinklers in the plant, the sprinkler heads have  
4 pretty small nozzles in them. And so they're  
5 susceptible to plugging from this debris caused by the  
6 coating.

7 If I remember your application, you  
8 actually have two tanks.

9 MR. BAKER: Two tanks. Yes, that's right.

10 MEMBER SIEBER: And they are 300,000 a  
11 piece?

12 MR. BAKER: Yes. Large tanks, yes.

13 MEMBER SIEBER: So one of the tanks by  
14 itself is adequate to satisfy the code requirement for  
15 a fire water system. Does that mean that you on  
16 occasion drain the other tank through the inspection  
17 system?

18 MR. BAKER: That's correct.

19 MEMBER SIEBER: So the tank is fully  
20 drained. And, therefore, you can work on the coding  
21 and restore it as necessary?

22 MR. BAKER: That's one of the mechanisms  
23 where some of the damage has occurred, in fact, is  
24 from scaffolding up inside a tank to nick the  
25 coatings.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 I would also observe that outside the  
2 scope of license renewal, just as part of routine  
3 plant activities, there is a plan to drain and recoat  
4 those tanks with a newer state-of-the-art.

5 This coating was the state-of-the-art 25  
6 years ago or so. When it was applied today, it's no  
7 longer state-of-the-art. I believe that there will be  
8 a recoating of that in the future.

9 But it is from our perspective here in  
10 managing the aging, the focus would be to make sure  
11 that we have it captured by identifying it and then  
12 managing it.

13 MEMBER SIEBER: A secondary issue is the  
14 fact that you have debris now in fire water.

15 MR. BAKER: Yes.

16 MEMBER SIEBER: And if it goes to  
17 sprinklers, you may have sprinklers that don't  
18 operate.

19 MR. BAKER: That's right. Thank you.

20 MEMBER LEITCH: What's the material of the  
21 recirc piping at Hatch? Is it still 304 stainless?  
22 Most of the plants of the Hatch vintage had 304 and  
23 were --

24 MR. BAKER: Unit 1. Unit 1 has the  
25 original recirculation piping. So it's the original

**NEAL R. GROSS**

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

1 304 or 304L. I do not recall which. Unit 2, the  
2 recirculation system piping was replaced. If my  
3 memory serves me correctly, it's 316 nuclear grade of  
4 the place design so that it doesn't have the dead ends  
5 on it.

6 MEMBER LEITCH: Yes. Thank you.

7 MR. PEARCE: Ray, my name is Charles  
8 Pearce. I'm with Southern Nuclear. I stepped out for  
9 a second. I can give you your answer on your CRD  
10 return lines. They were cut and capped. We do an  
11 inspection of that weld periodically. The lines now  
12 feed into the reactor water cleanup. So, actually,  
13 the CRD line was rerouted to reactor water cleanup,  
14 which now feeds back into the feedwater, ultimately  
15 back into the vessel.

16 MEMBER LEITCH: That's both units?

17 MR. PEARCE: Both units.

18 MEMBER LEITCH: Yes, thank you.

19 MR. BAKER: Thanks. I just could not  
20 recall whether we had done that specifically.

21 MEMBER LEITCH: Thank you.

22 (Slide.)

23 MR. BAKER: Now I would like to turn to  
24 the Plant Hatch license renewal programs. This first  
25 viewgraph lists the existing programs that we had

**NEAL R. GROSS**

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

1 credited. We characterize a program as existing, as  
2 opposed to enhanced or new, if only administrative or  
3 minor technical changes were made.

4 Typical administrative changes include  
5 revisions to identify the license renewal commitments  
6 in the program. For example, you see several water  
7 chemistry programs in the left-hand column. And so  
8 for each one of those, the applicable water chemistry  
9 programs would note commitments to the minimum  
10 standards that are contained in the appropriate EPRI  
11 BWRVIP water chemistry guidelines. In addition,  
12 technical changes of a minor nature were made to the  
13 two programs that I have highlighted there in the  
14 blue.

15 MEMBER SIEBER: Do you use hydrogen  
16 injection?

17 MR. BAKER: Yes, we do. It is a part of  
18 the regime that is provided for in the EPRI water  
19 chemistry guidelines.

20 MEMBER SIEBER: Right.

21 MR. BAKER: There are two modes you can do  
22 it with or without. Certainly there is no desire to  
23 do it any period of time without. Our normal mode is  
24 with hydrogen injection.

25 MEMBER SIEBER: Have you used hydrogen

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 injection? For how many years? The plant is too old.

2 MR. BAKER: We were one of the first.

3 MEMBER SIEBER: The plant is too old to  
4 have always used it.

5 MR. BAKER: No. We were one of the first.

6 MEMBER SIEBER: All right.

7 MR. BAKER: So that I don't recall the  
8 exact year. For a number of years now.

9 MEMBER SIEBER: Okay.

10 MR. BAKER: And we also have aggressively  
11 pursued and implemented a noble metal addition.

12 MEMBER SIEBER: All right. Okay.

13 (Slide.)

14 MR. BAKER: On this next viewgraph, I list  
15 our enhanced programs. As you can see on this  
16 viewgraph, most of the programs were enhanced by  
17 broadening the scope of the program. I would note  
18 that the categorization here is not absolute. All of  
19 these programs, perhaps with the exception of  
20 structural monitoring program, also include monitor  
21 technical additions.

22 However, for the programs, protective  
23 coatings program and equipment piping and insulation  
24 and monitoring program, the technical changes that we  
25 made for license renewal were more extensive.

1 MEMBER SIEBER: In the structural area, do  
2 you monitor building settlement?

3 MR. BAKER: Building settlement has been  
4 observed user technical specification requirements  
5 from the beginning of operation. And a consolidation  
6 settlement occurred prior to the completion of  
7 construction. And we have observed no significant  
8 differential structure to soil or building  
9 differential settlements.

10 So it's not really a part of the  
11 structural monitoring program.

12 MEMBER SIEBER: Do you have a requirement  
13 to survey the buildings with appropriate benchmarks  
14 that see over the years how much one changes relative  
15 to the other?

16 MR. BAKER: We continue to monitor  
17 building settlement by the tech specs.

18 MEMBER SIEBER: All right. Thank you.

19 MR. BAKER: Yes, sir.

20 (Slide.)

21 MR. BAKER: Finally, this viewgraph  
22 depicts the new programs that are being accredited for  
23 license renewal. The four programs on the left are  
24 the four new one-time inspections. These inspections  
25 are to be performed during the last five years of the

**NEAL R. GROSS**

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

1 current term and serve as confirmatory inspections.  
2 Therefore, areas where we believe no significant age  
3 degradation is occurring beyond that which is being  
4 managed by other programs, these inspections will be  
5 used to confirm those expectations.

6 The three highlight programs contain many  
7 elements that were contained in existing plant  
8 procedures and activities. However, a number of those  
9 activities were not appropriate for crediting and  
10 license renewal. So we have repackaged, revised, and  
11 rearranged those activities into the three programs  
12 shown here for primarily documentation purposes.

13 So these are the 30 programs and  
14 activities that will function during the renewal term  
15 to adequately manage aging effects for the end scope  
16 system structures and components at Plant Hatch.

17 That concludes my presentation. Are there  
18 any questions?

19 MEMBER FORD: What spurred the galvanic  
20 susceptibility inspection? Was it a problem that you  
21 foresaw or was there a real problem that you reacted  
22 to?

23 MR. BAKER: It's potential. We have a  
24 number of dissimilar connections; for example,  
25 in-plant service water. And we want to observe it.

**NEAL R. GROSS**

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

1 That will be the leading indicator for us. We believe  
2 it's raw water and dissimilar metal connections. So  
3 we would want to make sure.

4 MEMBER FORD: Okay. So it is not in the  
5 raptor itself?

6 MR. BAKER: No. No, sir.

7 MEMBER SIEBER: Another aspect of galvanic  
8 corrosion is the grounding mat. What steps do you  
9 take to determine that it is still intact and capable  
10 of performing its function?

11 MR. BAKER: The grounding was not an end  
12 scope component for license renewal in our plant, but  
13 I would need to find out what the routine maintenance  
14 of those is.

15 MEMBER SIEBER: When those mats fail, when  
16 a plant gets 40 or 50 years old and those mats  
17 deteriorate, then you can take a Simpson volt meter --

18 MR. BAKER: Yes.

19 MEMBER SIEBER: -- and go from one pillar  
20 to another and get 10 or 15 volts. Sometimes that  
21 changes trip settings on equipment, causes higher  
22 currents during restarts. It can make a lot of  
23 problems.

24 MR. BAKER: I know that we have paid  
25 attention to the grounding mat for the 2 units over

**NEAL R. GROSS**

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

1 the first 20 years, but I would have to specifically  
2 address that later as to what we currently are doing.

3 MEMBER SIEBER: Thank you.

4 VICE CHAIRMAN BONACA: Just for  
5 clarification, a passive component inspection, that's  
6 why you have an inaccessible component inspections;  
7 right?

8 MR. BAKER: Yes, that is correct. Yes,  
9 primarily the focus of that is when something is  
10 excavated or exposed that is normally not accessible,  
11 we will take advantage of that opportunity to examine  
12 it.

13 VICE CHAIRMAN BONACA: Yes.

14 MEMBER LEITCH: I'm concerned about the  
15 suction to the river water pumps. I'm not sure what  
16 you call them, but I assume you have river water  
17 cooling a heat exchanger which, in turn, cools the RHR  
18 system.

19 MR. BAKER: Yes. It's a part of RHR  
20 system. It's RHR service water.

21 MEMBER LEITCH: RHR service water. And  
22 they take suction. Those pumps take suction from the  
23 river?

24 MR. BAKER: Yes, that's correct.

25 MEMBER LEITCH: Now, I'm not familiar with

**NEAL R. GROSS**

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

1 the configuration of Hatch. I was kind of concerned  
2 about this over years silting building up and then  
3 some unusual tide condition occurring, high winds or  
4 something, that might cause those pumps to lose  
5 suction.

6 MR. BAKER: We have a couple of activities  
7 that address that. The Altamaha River is basically a  
8 floodplain. It's a meandering river historically.  
9 The area immediately adjacent to the plant has been  
10 straight for a number of years. It is a nice straight  
11 section of the river.

12 We have permits for dredging. And we do  
13 dredge in front of the intake structure approximately  
14 every 18 months. There is also a periodic inspection  
15 by divers that we send down to make sure that the  
16 actual intake structure pit itself as clean. So those  
17 activities occur routinely.

18 MEMBER LEITCH: Okay. Thank you.

19 MR. BAKER: Thank you.

20 VICE CHAIRMAN BONACA: Any other questions  
21 for Mr. Baker?

22 (No response.)

23 VICE CHAIRMAN BONACA: If not, thank you  
24 for your presentation. And now we want to hear from  
25 the staff, somebody with the NRR. Mr. Burton?

**NEAL R. GROSS**

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

1 (Slide.)

2 MR. BURTON: Good morning. My name is  
3 William Burton. I generally go by Butch. I am the  
4 lead project manager for the staff review of the Hatch  
5 license renewal application.

6 I want to make my apologies up front. I  
7 like to make my mistakes early, obviously full  
8 Committee, as opposed to the subcommittee meeting.

9 (Slide.)

10 MR. BURTON: The first thing I want to do  
11 is give a little overview of the Hatch application  
12 submittal. The application was submitted by letter  
13 dated February 29th of last year. As you all know, it  
14 is a two-unit boiling water reactor. It is located  
15 about 11 miles north of Baxley, Georgia and  
16 approximately 70 miles from Savannah, Georgia, west of  
17 Savannah.

18 Right now Unit 1, its current license is  
19 due to expire in August of 2014 and asking for a  
20 20-year extension to 2034. Similar, Unit 2, current  
21 license is due to expire in June of 2018, again a  
22 20-year extension to 2038.

23 I did want to put up briefly -- this is  
24 not in your package -- just where we are in terms of  
25 the review.

1 (Slide.)

2 MR. BURTON: We just completed on March  
3 16th the AMR inspection. We took a team of folks from  
4 both Region 2 and from headquarters to go down and see  
5 how some of the commitments that are currently  
6 outlined in the aging management programs are actually  
7 being implemented on site.

8 And compared to some of the previous  
9 applications, Southern Nuclear is a lot further along  
10 at this point in terms of actually implementing those  
11 commitments from the aging management programs into  
12 their on-site procedures.

13 MEMBER WALLIS: I would think this is very  
14 important. I mean, I read the SCR draft. It seems to  
15 be this assurance that they have these programs. I  
16 don't have the same assurance that they are really  
17 good programs, that they are good enough programs.  
18 Just the fact that they have a program doesn't mean to  
19 say that it is good enough.

20 MR. GRIMES: This is Chris Grimes. I  
21 would like to emphasize that the scope of these  
22 inspections is intended to verify that the procedures  
23 are in place or that the attributes of the program  
24 relative to scope, methods, criteria, and so forth are  
25 there.

1 Another aspect of the inspection includes  
2 the inspectors looking at the effectiveness of the  
3 programs relative to operating experience. Now,  
4 clearly if they are new programs, you are correct.  
5 There's not much we can ask the inspector to do about  
6 trying to assess the effectiveness of the program.

7 For some of the longstanding original  
8 inspection and maintenance activities, we do gather  
9 insights in terms of the effectiveness of the programs  
10 in order to try and bolster the conclusions in the  
11 safety evaluation about the effectiveness of the  
12 programs. So it is an aspect of the reasonable  
13 assurance finding we try to develop.

14 VICE CHAIRMAN BONACA: And I understand  
15 also that, although it is not referenced yet because  
16 it is not finally approved, the GALL information has  
17 been extensively used as a reference for evaluation.

18 MR. GRIMES: Yes, sir, that's correct.  
19 The staff had the benefit not only of contributing to  
20 GALL in parallel with this review but also having it  
21 available for the users to use as a reference  
22 material, even though we don't explicitly cite it in  
23 the safety evaluation.

24 VICE CHAIRMAN BONACA: Thank you.

25 MEMBER POWERS: Before we move on, could

1 I ask a question about this inspection team that you  
2 send down there? Did that include people who looked  
3 at the fire protection system?

4 MR. BURTON: Yes. In fact, I was the team  
5 member who actually did look into fire protection.  
6 One of the questions that came up earlier had to do  
7 with the fire water tanks. I do want to say that as  
8 part of that inspection, I did go down and look at  
9 some of the videotapes that they took at the inside of  
10 the tanks. What they did was they did an inspection  
11 of the tanks back in '91 and observed that some of the  
12 coating was beginning to break down into grade and  
13 looked at some of the condition reports that followed  
14 from that.

15 And then they did it again in '99 and  
16 actually observed those tapes. There was some -- you  
17 could see the decomposition and some of the debris in  
18 the bottom. But, as Mr. Baker had said, they are  
19 actually in the process of -- they are going to be  
20 recoating the tanks in the near future. And those  
21 were the original coatings.

22 MEMBER POWERS: Did they have to re-flush?  
23 Did the fire water dispersal lines

24 MR. BURTON: I believe that was probably  
25 part. I know when they emptied the tanks, I believe

1 that was part of the entire thing. Procedurally, they  
2 do that.

3 One of the things that the Committee is  
4 interested in is comparing applications. Obviously  
5 because this is the first BWR, there is particular  
6 interest in whether there are in particular any new or  
7 unique aging effects that BWRs are subject to versus  
8 the Ps. The staff did pay particular attention to  
9 that.

10 Now Southern Nuclear took a commodity  
11 approach in that rather than just looking system by  
12 system, they actually identified what materials are we  
13 looking at, and in what environments are those  
14 materials operating, commodity groups.

15 As such, what we found was that there are  
16 no unique materials. The materials are not being  
17 operated in any kind of unique environment. As a  
18 result, we did not see any new or unique aging  
19 effects. In fact, in the application there is an  
20 Appendix C-1 that really speaks to aging effects and  
21 some of the consequences of that. But we did not find  
22 anything new. So in that respect, we really don't  
23 expect the BWRs -- we don't expect to see anything  
24 unusual compared to any of the PWRs.

25 MR. GRIMES: This is Chris Grimes. I want

1 to emphasize that we did see uniqueness relative from  
2 application to application. But when Butch says we  
3 didn't find any new aging effects, remember that  
4 that's drawn on the nuclear plant aging research  
5 program that began over a decade ago. I would have  
6 hoped that we would not have found any new aging  
7 effects in this application. So that was reassuring.

8 But we did learn some process lessons in  
9 terms of the way that the information was packaged.  
10 Specifically, with respect to commodity groups.

11 MR. BURTON: And actually to follow on on  
12 that, to talk about some of the other differences that  
13 you may see compared to some of the previous  
14 applications. As Chris said, it really was the  
15 uniquenesses were really a matter of process and  
16 packaging I guess you would say.

17 As you now know, it's the first to use the  
18 BWRVIP reports, which we have already discussed. It  
19 was the first to use a functional approach versus a  
20 system approach in the scoping process.

21 Now what do I mean by that? What Southern  
22 Nuclear did was they looked at every single system in  
23 the plant, identified all of its functions, and then  
24 bounced the functions off of the scoping criteria. So  
25 what you see is not a direct correlation between the

**NEAL R. GROSS**

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

1 system and whether it's in scope or not. What you see  
2 is the identification of the in-scope function, which  
3 was I think a little bit different approach.

4 Then finally, Southern Nuclear as you all  
5 know, there are 10 program attributes that are  
6 assigned as criteria to evaluate the aging management  
7 programs. Southern Nuclear took a unique approach in  
8 that they took the 10 program attributes and applied  
9 them to a demonstration of adequate management.

10 Probably the best way to do it is to show  
11 you what I mean by that.

12 CHAIRMAN APOSTOLAKIS: This "functional  
13 versus system approach" what does that mean? Even if  
14 you look at the system, you look at its function,  
15 right?

16 MR. BURTON: Yes.

17 CHAIRMAN APOSTOLAKIS: So what's the  
18 difference?

19 MR. BURTON: The difference is that  
20 normally you would look at a system and you would say  
21 does the system directly meet what turns out to be the  
22 eight or nine questions that constitute the scoping  
23 criteria. Probably the best way to do it is to give  
24 you an example.

25 Main steam. Main steam, most of us think

**NEAL R. GROSS**

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

1 that would obviously be in scope. But what actually  
2 happened was they looked at main steam and looked at  
3 each of its functions, and which of those functions  
4 would actually meet the scoping criteria. As it  
5 turned out, for main steam the in-scope function was  
6 contained in isolation.

7 So that is actually what brought the  
8 system into scope, but it was actually that particular  
9 function. In fact, maybe this wasn't the best  
10 example, because what we also found was that as they  
11 looked across systems, you found certain functions  
12 that were common across a number of systems. What  
13 they chose to do was to actually pull those functions  
14 out and group them separately. Containment isolation  
15 was one of them. Because it cut across so many  
16 different systems, they have a specific category for  
17 the containment isolation group C61.

18 Another one was reactor coolant pressure  
19 boundary. That function cut across a number of  
20 systems. It was actually pulled out and categorized  
21 separately. So it was really a function-based  
22 assessment.

23 CHAIRMAN APOSTOLAKIS: That's not very  
24 clear, but at least we are making progress.

25 VICE CHAIRMAN BONACA: We commented quite

**NEAL R. GROSS**

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

1 a bit during the subcommittee meeting that that  
2 created a lot of difficulty for reviewers,  
3 particularly when the people on the subcommittee had  
4 to review it because you have a system that you  
5 presume just because there will be scope, then you are  
6 looking at it, you don't find a description of the  
7 system up front. Then coming through this, you just  
8 don't find it. You have to search through these  
9 functions, for example, that it perform a containment  
10 isolation, then you find an element of that system.  
11 So you say well wait a minute now, are the other  
12 pieces of that system out of scope? A lot of the  
13 questions in the NRC had to do with that. The answer  
14 is no, they are in scope. They are somewhere else.

15 So it made it very confusing, I must say.  
16 But I think that ultimately, you learn to do it.

17 CHAIRMAN APOSTOLAKIS: This is a good step  
18 forward. If you keep it up, eventually you will  
19 rediscover PRA.

20 MR. BURTON: Okay. Let's go on.

21 MEMBER POWERS: We're busy trying to  
22 decide whether that's a good rediscovery or a bad  
23 rediscovery.

24 MEMBER SHACK: If you didn't put in core  
25 damage frequency, George, it wouldn't exist.

**NEAL R. GROSS**

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

1 MR. BURTON: Oh boy. What Dr. Bonaca just  
2 spoke about, we spoke about that extensively at the  
3 subcommittee meeting. We reached a consensus that  
4 these issues are what we call navigational issues,  
5 being able to see your way through the application.  
6 There were several challenges in that respect.

7 This is an example, this is in the  
8 application, in one of the appendices, called the  
9 Aging Management Program Assessment. What Southern  
10 Nuclear did was they looked at each commodity group  
11 and each aging effect for that commodity group. What  
12 they did was they took the ten attributes, as you see  
13 over here on the left, and actually showed where the  
14 program coverage was for that, which was actually very  
15 good.

16 It wasn't what we normally see in terms of  
17 how the 10 program attributes are applied. I should  
18 say that the navigational -- the RAIs that came out  
19 having to do with navigational questions, and we had  
20 a number of RAIs because we didn't see how the ten  
21 attributes were being applied directly to the  
22 programs. We had a number of RAIs that came out as a  
23 result of that. By my estimate, probably a third of  
24 the RAIs fell into those groups.

25 We issued the safety evaluation report.

**NEAL R. GROSS**

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

1 We had 18 open items. Obviously we have had ongoing  
2 dialogue. At this point, we have four that are under  
3 appeal. I need to explain what that is.

4 With the license renewal process, we allow  
5 for situations where if we don't seem to be making  
6 progress at the working level, we have a series of  
7 appeal meetings that start at the branch chief level  
8 and move ahead, to try and resolve those issues.

9 Right now, of the 18 open items, we have  
10 four that are under appeal. In fact, one of my  
11 takeaways from the subcommittee meeting was to give  
12 you the status because when we had the subcommittee  
13 meeting, the following day we were going to have the  
14 first of the appeal meetings. So the next slide, I'll  
15 be speaking on that.

16 So we have four under appeal now. That's  
17 not to say that that's the be all and end all. As we  
18 continue our dialogue at the working level, if we find  
19 additional items that need to go into appeal, we'll  
20 start to do that.

21 Of the 18, five are now in a confirmatory  
22 status. What that means is that the staff and  
23 Southern Nuclear, we have reached agreement but we  
24 haven't dotted all the Is, crossed all the Ts. It's  
25 not official yet. So until then, it is actually

**NEAL R. GROSS**

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

1 confirmatory.

2 CHAIRMAN APOSTOLAKIS: Who is the ultimate  
3 authority regarding appeals, the one that says this is  
4 it?

5 MR. BURTON: This is it? Well, I'll let  
6 Chris speak to that.

7 CHAIRMAN APOSTOLAKIS: Chris?

8 MR. GRIMES: I don't think that highly of  
9 myself. The ultimate authority would be the  
10 Commission. If an individual applicant isn't  
11 satisfied with the staff position after it's addressed  
12 at the branch level, we go to the division level.  
13 Then we go to the office level. Ultimately, the issue  
14 could go up through the EDO to the Commission if it  
15 were significant enough.

16 Most of the issues of industry concern  
17 that got to that kind of strategic level, I think were  
18 revealed in the credit for existing programs issue  
19 that went to the Commission and instruction the  
20 Commission gave us in terms of how to offer the  
21 industry an opportunity to take credit for existing  
22 programs, which is the way that it was phrased.

23 So we'll discuss that a little bit further  
24 in the next meeting, where we talk about the improved  
25 renewal guidance.

1 MR. BURTON: I did want to -- I didn't  
2 write down all the items that are now confirmatory,  
3 but I did want to give you an idea.

4 One of the open items that we had was we  
5 asked for a one-time inspection for the fuel oil tank  
6 bottoms. That was on the table. We since learned  
7 that they had actually already done such an  
8 inspection, and have actually given us the result.

9 They had actually dug up and inspected one  
10 of the four big EDG fuel oil tanks, and found that  
11 there was very little reduction in thickness. That  
12 argument also carried over into their two smaller fuel  
13 oil tanks for their diesel fire pumps.

14 So we got that response fairly quickly  
15 because they had already done it. So that's basically  
16 closed, but again, we haven't done all the official  
17 paperwork.

18 Another one is the complex assembly issue.  
19 If you remember, that issue came up with Oconee. That  
20 was actually resolved. We developed an approach to  
21 resolving that. Initially it was not clear that  
22 Southern Nuclear was taking the same approach. But  
23 since then, we have clarified that they are going to  
24 be doing the assessment similar to Oconee.

25 MEMBER SIEBER: You are talking about

1 skid-mounted equipment?

2 MR. BURTON: Yes.

3 MEMBER SIEBER: That means you treat  
4 individually each component or sub-component on the  
5 skid?

6 MR. BURTON: Yes. The complex assembly  
7 issue, as it arose at Oconee, had to do with the  
8 diesel generators, which are active components. But  
9 in addition to the diesel, you had skid-mounted  
10 auxiliaries. Should they be considered part of the  
11 active assembly and therefore not subject to an AMR or  
12 not?

13 MEMBER SIEBER: Right. That was resolved,  
14 that they are now treated separately. For example,  
15 transformers and like components, piping?

16 MR. BURTON: That's right. We found from  
17 Oconee that it was really not appropriate to lump the  
18 skid-mounted auxiliaries and treat them as if they  
19 were all active, to actually do an assessment  
20 separately.

21 Again, initially it was not clear to the  
22 staff whether Southern Nuclear at Hatch was taking the  
23 same approach, but we have since clarified that they  
24 will be taking that approach.

25 MEMBER SIEBER: One thing that I found in

1 a number of plants is that often licensees do not  
2 identify with mark numbers valves, heat exchangers,  
3 and other components in the skid package. For  
4 example, the generator hydrogen seal oil system might  
5 have 50 valves in it. It's mounted on a skid, on a  
6 bed plate. It has one mark number.

7 Is that the condition at Hatch? Does  
8 anybody know? Or do you have individual mark numbers  
9 for all the components or sub-components on the skid?

10 MR. BAKER: Certainly for the two items  
11 that are the subject of the open item, which are the  
12 diesel generator and the hydrogen recombiner, we  
13 specifically know all the sub-parts of those skid-  
14 mounted assemblies.

15 MEMBER SIEBER: But other ones, you don't  
16 know?

17 MR. BAKER: I'm not aware of anything that  
18 would be in the license renewal envelope that would  
19 meet that. What you say is probably true for parts of  
20 the plant that are not in the scope of license --

21 MEMBER SIEBER: Seal oil, some chillers,  
22 for example?

23 MR. BAKER: Yes.

24 MEMBER SIEBER: The chillers often are  
25 skid-mounted thing. A lot of times, they are safety

**NEAL R. GROSS**

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

1 related.

2 MR. BURTON: A couple of things that I did  
3 want to point out. One had to do, we touched on it  
4 earlier, had to do with inaccessible components,  
5 buried and the like. One of the things that we  
6 emphasized when we went down on the AMR inspection was  
7 to understand exactly how these things are identified  
8 and taken care of procedurally. In fact, as a result  
9 of the inspection, what we have is -- well, they have  
10 an excavation procedure. They have in the proposed  
11 draft form, a mark-up of that procedure which actually  
12 says when you are either burying up components or if  
13 you are digging around a structure, they actually have  
14 the hooks in the procedure to actually take you to the  
15 appropriate aging management programs to do the  
16 inspection.

17 Another thing that I wanted to talk about  
18 scoping issue, in the past the Committee has had  
19 questions about design basis events, and what is the  
20 population of events that you are looking at to  
21 determine what's in scope.

22 Because of the functional approach to the  
23 scoping, as I mentioned before, the staff is not real  
24 clear on exactly how they identified the design-basis  
25 events. As it turned out, at the time that they

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 submitted the application, they had a draft version of  
2 what they called the nuclear safety operational  
3 analysis, which has since been incorporated into the  
4 FSAR.

5 This analysis was a comprehensive look at  
6 the design-basis events. Even though it was in draft  
7 form and they didn't take specific credit for it in  
8 the application, it was a part of their general review  
9 in their scoping process.

10 Since then, the rule requires an annual  
11 update to the application based on any changes to the  
12 CLB. So we actually caught the NSOA as part of the  
13 annual update. As a result of that, they actually  
14 brought in -- the only thing that was brought into  
15 scope that wasn't there previously was the rod block  
16 monitor. So that was taken care of also.

17 VICE CHAIRMAN BONACA: But you didn't go  
18 through every indication that all the components for  
19 the scoping match the one in the design-basis, or did  
20 you?

21 MR. BURTON: Well, okay. If I speak to  
22 your question, maybe this will address it. One of the  
23 things that is important to understand is exactly how  
24 the staff approaches its review.

25 The application identifies things that the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 applicant has identified as being in scope and subject  
2 to an AMR. Obviously we look at that. But a large  
3 part of our review is to look at the things that the  
4 applicant decided was not in scope and was not subject  
5 to an AMR to see if there's anything that was in that  
6 population that actually met the scoping or the  
7 screening criteria and to bring it in.

8 Was that getting at your question?

9 VICE CHAIRMAN BONACA: I think so, because  
10 I know also that you took three systems.

11 MR. BURTON: Yes.

12 VICE CHAIRMAN BONACA: And for those, you  
13 went through what I would call a painstaking  
14 verification that everything which had to be in it  
15 would be. So that audit I guess provides the level of  
16 comfort.

17 MR. BURTON: That is correct.

18 We have had two inspections at Southern  
19 Nuclear so far. The review process allows for three.  
20 We have done two. I have spoken already about the AMR  
21 inspection, which was the second inspection. The  
22 first inspection, which we did back in September, was  
23 the scoping inspection. Again, because of some of the  
24 navigational issues that the reviewers were having and  
25 again, the functional approach to the scoping, when we

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 went down to the scoping inspection, we actually took  
2 several systems and actually walked through step by  
3 step from beginning to end how you identified their  
4 functions, how you bounced those against the scoping  
5 criteria, how you evaluated the evaluation boundaries,  
6 and how you did the screening. So we walked through  
7 several systems step by step.

8 What we found was that talking with their  
9 engineers, we were comfortable that they were doing  
10 things properly, but we found procedurally it wasn't  
11 real clear. It didn't take them through step by step  
12 exactly what to do. They were doing it, but the  
13 procedure didn't really match.

14 So one of Southern Nuclear's takeaway from  
15 our scoping inspection was to update the procedure to  
16 make it less goal-oriented, which is how it was  
17 originally, and make it more prescriptive. In fact,  
18 we went down later to confirm that they had made those  
19 changes. In fact, they had.

20 MR. GRIMES: This is Chris Grimes. I  
21 would like to clarify. There are two aspects to the  
22 staff's evaluation basis for scoping. There's the  
23 inspection that looks at how the scope verifies that  
24 the scope of equipment matches our understanding, our  
25 safety evaluation basis. But we separately conduct a

**NEAL R. GROSS**

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

1 methodology audit. I think it was during the audit  
2 that we identified the procedural weaknesses.

3 But the audit looks at the process and  
4 verifies that there is a completeness aspect to the  
5 process that the applicant uses so that we don't have  
6 to rely simply on our sample of results in order to  
7 develop a conclusion about the completeness of the  
8 scope.

9 MEMBER WALLIS: I asked you about scope by  
10 way of an example, take say spent fuel pumps, look at  
11 spent fuel pull section of the Hatch application. You  
12 find a lot of stuff about boring things like anchors  
13 and bolts and structural steel and so on. What about  
14 the function of the pool? The pool shouldn't leak.  
15 What is there that assures it shouldn't leak? It has  
16 a liner, I believe. It's not in scope. It's not in  
17 scope presumably because something else takes care of  
18 it. Is that what I conclude from this?

19 Only the boring things are in scope. The  
20 things that really matter don't seem to be there.  
21 Why?

22 MR. GRIMES: This is Chris Grimes. I  
23 would first like to start off by observing that Dr.  
24 Wallis is obviously not a civil engineer.

25 (Laughter.)

1 It wasn't boring to --

2 MEMBER WALLIS: I'm one of the most civil  
3 members of the --

4 (Laughter.)

5 I think that is something that when you  
6 first look at it, strikes one. That doesn't mean it's  
7 not really a question of civil versus mechanical or  
8 something. The things that are picked out to be in  
9 scope are the things which one would sort of least  
10 expect to fail, so something must be happening to take  
11 care of all the other things.

12 What is that something?

13 MR. GRIMES: Mr. Baker should address the  
14 Hatch specific. Then I'd like to address the generic  
15 aspect.

16 MR. BAKER: I think what you are seeing  
17 here is what Butch was referring to as one of those  
18 navigational things. In reality, the spent fuel pool  
19 liners are in scope.

20 MEMBER WALLIS: They are?

21 MR. BAKER: Yes, sir.

22 MEMBER WALLIS: They don't appear in the  
23 spent fuel section as being in scope. You have to  
24 find them somewhere else?

25 MR. BAKER: I'll open up the book and show

1 it to you during a break. But it is in scope, yes.  
2 We consider that important as well.

3 MR. GRIMES: And from a generic point of  
4 view, we learned a lesson on Calvert Cliffs and Ocone  
5 on articulating what is in scope for spent fuel pools.  
6 You may recall that Chris Gratton spent some time  
7 trying to explain why the cooling function is not  
8 considered a design-basis function for the purpose of  
9 license renewal because the staff relies on the  
10 capability for the pool to be able to maintain its  
11 geometry, even with the loss of cooling. So the  
12 cooling function was explored most extensively during  
13 the first two applications. Then we have refined the  
14 guidance to look for those things that are really  
15 important to the boundary integrity of the pool and  
16 the ability to maintain the coolable geometry.

17 So I think that when we learn some more  
18 packaging techniques and some more plain language  
19 lessons, I think that you will find that all of the  
20 really interesting stuff is buried within those civil  
21 structural kinds of details.

22 VICE CHAIRMAN BONACA: And also I would  
23 like to add in addition to that's true that your  
24 cooling system was not in scope, but your make-up --  
25 you had a make-up capability which was a safety grade

**NEAL R. GROSS**

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

1 and was in scope that would allow you to make up  
2 inventory in case you were losing the cooling  
3 capability.

4 So the basic functions are assured. That  
5 was the whole --

6 MEMBER WALLIS: Maybe it's a problem with  
7 the way the thing is organized. The function of  
8 cooling is somewhere in the report. I look up fuel  
9 pools in the part that was assigned to me to look at,  
10 it's all about acapults. But somewhere else, someone  
11 else is reviewing the cooling, which makes it  
12 difficult to get the perspective on how you handle the  
13 fuel pool.

14 MR. BURTON: Now you see some of the  
15 challenges the staff had. This all falls under the  
16 category that I spoke about before regarding  
17 navigational problems. So yes, if there is anything  
18 specific, we can probably get you to the right place.

19 As I mentioned, there were four items that  
20 are currently on the table as subject to appeal. We  
21 had the subcommittee meeting on March 28th. We had  
22 the appeal meeting the next day on the 29th. So one  
23 of the takeaways from the subcommittee meeting was to  
24 report back and see exactly where we stood as a result  
25 of that meeting.

**NEAL R. GROSS**

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

1           So what I have done is I have taken the  
2 four issues and tried to put them in a simple question  
3 format. The first one was should the draw-down test  
4 that's required by the technical specifications be  
5 credited as an aging management program to confirm  
6 maintenance of reactor building in leakage limits.

7           One of the things that the staff was  
8 concerned about during the period of extended  
9 operation, how will Southern Nuclear continue to  
10 maintain their controlled in-leakage for the reactor  
11 building. What was on the table was that all of the  
12 inputs to controlled in-leakage are going to be  
13 managed through inspections and corrective actions,  
14 the penetrations, all of the structural elements.

15           Our question was well, that is somewhat of  
16 an indirect measure of whether it's actually going to  
17 do that. I guess one example of that, and I am going  
18 to go back to my ABWR days, is that one of the items  
19 that they looked at concerning turbine building  
20 flooding was they monitored pressures for service  
21 water, surf water, things like that, and that a drop  
22 in pressure would be indicative of a large leak and  
23 subsequently flooding in the turbine building.

24           One of the questions that came up is  
25 suppose you had leakage that wasn't quite enough to

**NEAL R. GROSS**

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

1 reduce the pressure to the point where you got the low  
2 pressure actuation. You get all this flooding in  
3 there, but there's nothing instrumentally to tell you  
4 that.

5 So we said okay, well what's the direct  
6 measure of flooding, level. Okay. That was one of  
7 the things that we came up with.

8 Similarly here, you can look at all of the  
9 inputs to in-leakage for the reactor building, but it  
10 is somewhat indirect. The way you can tell most  
11 directly is to measure the draw-down, for which we do  
12 have a tech spec.

13 Southern Nuclear was saying that is a very  
14 gross test. In order for you to see anything as part  
15 of that drawdown test, you would have to have  
16 substantial degradation in the penetrations and things  
17 like that, which we would catch by our existing aging  
18 management programs far before they would degrade to  
19 that degree.

20 So as a result of our discussions, we felt  
21 like probably the best thing is to have a combination  
22 of the two. To have the inspections and the ongoing  
23 corrective actions when you saw a problem, along with  
24 the drawdown is a confirmatory sort of test.

25 So that is where we are with this right

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 now. Still dialogue going on, but --

2 VICE CHAIRMAN BONACA: Confirmatory still  
3 would put it into the aging management program as part  
4 of it?

5 MR. BURTON: Yes.

6 VICE CHAIRMAN BONACA: Okay.

7 MR. BURTON: Number two --

8 MR. GRIMES: Actually, Butch, in the  
9 interest of time, make sure that we get through the  
10 whole presentation and try and stay on schedule. I  
11 think it would be fair to categorize all four of these  
12 things as ongoing dialogue, haven't made any  
13 decisions. We need to make sure that we clearly  
14 understand what the true value of the drawdown test  
15 is. We need to clearly understand the current  
16 licensing basis treatment and categorization and  
17 bookkeeping associated with category II piping with  
18 respect to the seismic II/I issue.

19 VICE CHAIRMAN BONACA: We would like to  
20 hear something about that issue however, because you  
21 know, a face value seems as if those components should  
22 be in scope. But I understand that there are issues  
23 to do that maybe too much of the piping was placed,  
24 was evaluated as a II/I and shouldn't be. So there  
25 are other things we don't understand.

**NEAL R. GROSS**

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

1 MR. GRIMES: And that is the point that I  
2 want to make. At this point, on all four of these  
3 issues, I know I do not have enough information to  
4 make a decision. I think the applicant and the staff  
5 both went away with an understanding that we need to  
6 talk some more because we do not know the whole story.  
7 On the seismic II/I, it was clear from the nature of  
8 over an hour's dialogue that we still do not have a  
9 very clear understanding of how the applicant treated  
10 the design capability for postulated breaks in  
11 category II piping. We need to understand that before  
12 we can move forward on that issue.

13 VICE CHAIRMAN BONACA: Wouldn't that be a  
14 significant expectation of the guidelines you have  
15 established if you had to say that now there are  
16 seismic II/I components that do not fall into -- I  
17 mean there is a --

18 MR. GRIMES: Yes. I would say there's  
19 fundamentally a violation of the current licensing  
20 basis if we don't capture the capabilities. We have  
21 a semantic problem because the piping is not in scope.  
22 The criterion in the license renewal rule says the  
23 failure of components whose -- the postulated failures  
24 of components whose failure could affect safety-  
25 related piping or safety related functions.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1           If you have included the pipe whipper  
2 strength in scope, do you now have to postulate that  
3 the piping fails in a different way? Do you have to  
4 inspect the piping to make sure that the pipe whipper  
5 strength prevents the failure that it's going to  
6 impact the safety function?

7           The pipe wasn't in scope. The restraint  
8 was in scope. So this gets back to the problem that  
9 we have communicating with this commodities approach  
10 because you looked for a system. Your paradigm was  
11 built on the way that we normally do system reviews.  
12 But their communication package is different. It  
13 looks at functions. This gets back to Dr.  
14 Apostolakis' point earlier. That is, we have backed  
15 into a new way of categorizing that is more in line  
16 with the way that PRA analysts look at things.

17           But in terms of our ability to clearly  
18 articulate how aging will be managed so that the  
19 current licensing basis will be maintained for the  
20 period of extended operation, what I observed on the  
21 29th was two groups of people talking past each other,  
22 because they were talking from a different paradigm of  
23 how they packaged their scope.

24           VICE CHAIRMAN BONACA: What about the  
25 housing? The housing, will it be covered by your

**NEAL R. GROSS**

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

1 complex assembly definition, which has been in this  
2 position previously.

3 I mean all I'm trying to say is that I  
4 think that maybe there are ways to, for example, for  
5 the seismic over one, one could conclude that elements  
6 have to be in scope, and then accept a modified or a  
7 known existing accident management -- I mean aging  
8 management commitment because of special  
9 circumstances. Are you exploring the possibility? I  
10 mean that would be one way to maintain the commitment  
11 to II/I, but the recognizing as you always do that in  
12 some cases, you don't need the specific problem.

13 MR. GRIMES: That's why I jumped in and  
14 tried to cut short the debate over the issues because  
15 I know that on all four of these things we only have  
16 half a story, and that we clearly need to have more  
17 dialogue with the applicant in order to achieve a  
18 shared understanding about whether or not we disagree  
19 about anything.

20 On the housings, I believe that we made  
21 our point more clearly to the applicant in terms of  
22 what our expectation is. We discovered that housings  
23 to some are not housings to all, and that they now  
24 better understand that we are not violating the  
25 Commission's tenets of going into piece parts. We

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 need to develop some guidance beyond what we are going  
2 to tell you at the next presentation about improved  
3 renewal guidance.

4 We need to develop some improved guidance  
5 on making this distinction between complex assemblies  
6 that are on skids and separating out active and  
7 passive functions of components, which is a piece  
8 parts issue. They sometimes get described using the  
9 same terminology.

10 VICE CHAIRMAN BONACA: I asked for this  
11 presentation if you remember last week, because I  
12 thought that you expressed an interest in having our  
13 position on these four items. Are you still  
14 interested in having our position on the fourth or  
15 not?

16 MR. GRIMES: After the meeting that we had  
17 on Thursday, I think that I would say not, because I  
18 think that we owe you an explanation about what it was  
19 that we decided that we wanted to argue about. We may  
20 be in a position soon when we come back to the  
21 subcommittee with the explanation of the resolutions,  
22 we may want you to express a view about whether or not  
23 the pipe-break criteria are time-limited or not,  
24 because of the explanation that the applicant gave us  
25 about how they were used as a screening tool for

**NEAL R. GROSS**

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

(202) 234-4433

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

1 design, and that they do not actually -- they are not  
2 limited in some way.

3 But even on that issue, I think that we  
4 need some more dialogue in order to understand what  
5 the regulation envisioned as a time-limited aging  
6 analysis. So at this point, I don't think that you  
7 have enough information to give us an informed opinion  
8 on these issues, because I know I don't.

9 VICE CHAIRMAN BONACA: Okay. Thank you.

10 MR. BURTON: That's all I have.

11 MEMBER WALLIS: I have a question for you  
12 now. I thought you were going to talk about the SER.  
13 So I want to ask you a big picture question. This  
14 slide with the four appeal items sort of supports what  
15 I want to say.

16 I read the SER. A lot of it is simply  
17 repeating what's in the application. Then there's the  
18 staff evaluation. The staff evaluation seems to  
19 consist of saying something is within scope. The  
20 applicant has identified this component subject to an  
21 AMR. There's some AMP here and this other thing is a  
22 TLAA, which is what your appeal issues are all about.

23 Okay. There's a procedural thing, it  
24 seems to me. You are now saying we are going to  
25 consider this, this, this, and 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](http://www.nealrgross.com)

1           The big question is is the AMR good  
2 enough? Are the components that are subject to review  
3 really going to last another 20 years? All these  
4 questions don't seem to be addressed because there's  
5 all this stuff about procedure. Is this in scope or  
6 out of scope? Is it a TLAA? Is this AMR? You know,  
7 that's okay, that's fine. But that seems to me is the  
8 preliminary to now evaluating the quality of all these  
9 things for the purpose of license renewal.

10           MR. BURTON: Do you want to --

11           MR. GRIMES: I'll take it. It's in my job  
12 description. The staff did exactly what we asked of  
13 them in terms of prepare a safety evaluation that  
14 addresses the requirements of the rule, because the  
15 Commissions said that the rule is the predicate upon  
16 which they develop a basis for granting a renewed  
17 license.

18           I would say that we looked very carefully  
19 during the concurrence review to make sure that for  
20 scoping, it specifically says there is reasonable  
21 assurance that everything that needs to be in scope is  
22 in scope and it's based on an explanation about what  
23 was looked at.

24           There are statements in the safety  
25 evaluation that precede the we have reasonable

**NEAL R. GROSS**

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

1 assurance that aging will be adequately managed for  
2 the scope that talk about we conclude that the program  
3 is effective or that there's experience that  
4 demonstrates that it works or things like that.

5           Actually as I was reflecting on the  
6 challenge that you offered before concerning could we  
7 put the reasonable assurance finding in more plain  
8 English. I was thinking to myself now where in the  
9 NRC, where in the agency would I go to get a really  
10 good explanation about what the reasonable assurance  
11 finding means in plain language that I could use to  
12 convince the public. It occurred to me that the best  
13 qualified group would probably be some advisory  
14 committee to the Commission.

15           (Laughter.)

16           As we proceed to try and develop a plain  
17 language version of our traditional safety evaluation  
18 findings that more clearly explains why the Commission  
19 felt that managing aging for the stuff that's in the  
20 CLB that is relied on to prevent or mitigate accidents  
21 or protect against station blackout or all the rest of  
22 the stuff that the Commission determined was  
23 important, will continue to look for ways to express  
24 that in language that the general public, the folks  
25 that attended the workshop yesterday with Mr. Cameron

**NEAL R. GROSS**

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

(202) 234-4433

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

1 and the public participation interests, as we find  
2 ways to try and articulate these things so that they  
3 can better understand what we are really trying to  
4 tell them, then we'll evolve those into improvements  
5 in the style guide for our safety evaluations.

6 But at this point, the language construct  
7 was based primarily to have everything in the  
8 regulation covered. We'll try to look for ways to  
9 improve on the clarity of that finding.

10 MR. BURTON: And I guess I just wanted to  
11 add to that, because I'm not exactly sure what parts  
12 of the application we're looking at. But certainly in  
13 section 2, the scoping and screening, the primary  
14 thing was to ensure that all the right things are  
15 being captured.

16 Section 3 is more the assessment of the  
17 adequacy of the aging management and things like that.  
18 I don't know if you as part of your review included  
19 section 3. If it did and if there's some question  
20 again --

21 MEMBER WALLIS: Yes, I did, and section 4  
22 too.

23 MR. BURTON: In section 4, the TLAAs.

24 MEMBER WALLIS: So maybe what I'm asking  
25 questions, might have some influence on how you finish

**NEAL R. GROSS**

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

1 up writing the SERs so that it is clearer. That you  
2 haven't just gone through sort of putting things in  
3 boxes. You have actually done some really digging in,  
4 convince yourself that things are in good shape.

5 MR. BURTON: Sure.

6 MEMBER LEITCH: I have two quick  
7 questions. I guess they are really for Mr. Baker. A  
8 number of BWRs are in the pipeline going to be asking  
9 for power uprates. Is that in the Hatch plans?

10 MR. BAKER: Hatch has done the extended  
11 power uprate on both units.

12 MEMBER LEITCH: Is that five percent order  
13 of magnitude or was it one of those larger ones?

14 MR. BAKER: Go ahead, Chuck, if you have  
15 the numbers.

16 MR. PEARCE: Charles Pearce, Southern  
17 Nuclear. The first uprate we did was five percent,  
18 105%. The second uprate was greater than five  
19 percent. I'm not sure about this number, but I think  
20 it was eight percent. So we did 105% uprate and then  
21 we did another, about eight percent uprate.

22 MEMBER LEITCH: So you see, Hatch is being  
23 at its ultimate capacity now?

24 MR. PEARCE: Well, I can't speak to  
25 whether there's going to be a further uprate plan or

**NEAL R. GROSS**

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

1 not. I think we don't have any plans in the immediate  
2 future, let's put it that way.

3 MR. BAKER: The original license was 2436  
4 megawatts. We're currently talking 2736 megawatts.  
5 So that is the extent of the uprate.

6 MEMBER LEITCH: And the other question was  
7 do we know what the core damage frequency is for the  
8 Hatch units?

9 MR. BAKER: We have that. Chuck, if you  
10 can find it before I can. I have it in my notes.

11 MR. PEARCE: The core damage frequency,  
12 the total is 1.22 e to the minus fifth.

13 CHAIRMAN APOSTOLAKIS: When you say total,  
14 what do you mean?

15 MR. PEARCE: That includes the frequency  
16 from all the events.

17 CHAIRMAN APOSTOLAKIS: External as well?  
18 External events?

19 MR. PEARCE: The external events, you are  
20 talking about the earthquake, fire? That, I do not  
21 know. I'm not a PRA expert. I just have the total.  
22 I don't believe it includes external events, but I can  
23 check into that in the break.

24 MEMBER LEITCH: And that's the same for  
25 both units?

1 MR. PEARCE: Yes. It's in that ballpark  
2 for both units.

3 MEMBER LEITCH: Thank you.

4 VICE CHAIRMAN BONACA: Okay. Any other  
5 questions?

6 MEMBER WALLIS: Those where there's no,  
7 what will it be in 20 years? Do you make any  
8 predictions like that? There must be some effect of  
9 aging.

10 CHAIRMAN APOSTOLAKIS: This is not in the  
11 PRA.

12 MR. GRIMES: This is Chris Grimes. But we  
13 have been periodically checking with the Office of  
14 Research. I understand that they do have some model,  
15 aging models for PRAs that they are continuing to try  
16 and develop, but they are not ready to try and roll  
17 them out yet. But we have continued -- we will  
18 continue to monitor the research programs because we  
19 are looking forward to an opportunity at some point in  
20 the future where we might be able to see a risk model  
21 for age, for a plant age.

22 VICE CHAIRMAN BONACA: All right. Are  
23 there any more questions for Mr. Burton or for any of  
24 the presenters? There are none, so Mr. Chairman, I  
25 pass it onto you.

**NEAL R. GROSS**

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

1 CHAIRMAN APOSTOLAKIS: Thank you. We will  
2 recess until 10:55, with a narrow factor of three.

3 (Whereupon, the foregoing matter went off  
4 the record at 10:40 a.m. and went back on  
5 the record at 10:58 a.m.)

6 CHAIRMAN APOSTOLAKIS: The next issue is  
7 proposed final licensing guidance documents. Dr.  
8 Bonaca is still the leader.

9 VICE CHAIRMAN BONACA: Thank you, Mr.  
10 Chairman.

11 In November of last year, we wrote a  
12 report with comments on the license renewal guidance  
13 documents. At that time, we had reviewed in draft  
14 form. Since that time, also the industry and the  
15 public has had an opportunity to provide a lot of  
16 comments to the NRC. The staff has now updated those  
17 documents, essentially the SRP, the reg guide, and the  
18 GALL report, to address those comments.

19 They have written them now in a final new  
20 reg form. I mean they have assigned new reg members  
21 and reg guide number to it. They have presented it to  
22 the subcommittee last March 27th. We are here to  
23 review them and to provide recommendation if possible  
24 on whether they should be finalized and other issues.

25 With that, I will begin to introduce Mr.

**NEAL R. GROSS**

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

1 Grimes.

2 MR. GRIMES: Thank you, Dr. Bonaca.

3 Yes, by way of introduction, we drew from  
4 the subcommittee meeting a desire to make clear to the  
5 full committee that we believe that the substantial  
6 amount of effort has gone into improving the guidance  
7 for the conduct of license renewal reviews and  
8 understanding of the attributes of effective aging  
9 management programs.

10 The staff is going to describe highlights  
11 of those features for you. But I want to emphasize  
12 that we continue to rely on the foundation of the  
13 renewal rule, which relies on the regulatory process  
14 to provide for the unforeseen. We are certainly going  
15 to have new experiences in the future, and may reveal  
16 new aging effects or may, like the core shroud  
17 cracking that you just discussed, a decade from now,  
18 something else is going to occur. We have a process  
19 to impose new generic requirements when we learn new  
20 lessons in the future.

21 The whole theme of this activity to  
22 develop generic aging lessons learned has been a focus  
23 on process, on providing the tools to the plant owners  
24 so that they will continue to find and learn and  
25 correct as they go, because these programs aren't

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 going to start until more than a decade from now.  
2 Then they go 20 years beyond that point. So we are  
3 looking way out into the future in terms of the  
4 expected behavior changes that result from these  
5 regulatory requirements.

6 You also asked us to present a judgement  
7 on the potential erosion of the safety margin. This  
8 gets back to the conversation that I struggled with  
9 Dr. Wallis' challenge to try and articulate a safety  
10 conclusion.

11 Recognizing that there's constant growth  
12 of knowledge, this process approach fundamentally  
13 relies on an ability to continue to maintain an  
14 adequate margin of safety. That doesn't necessarily  
15 mean that the margin is larger or smaller or better  
16 known or less well-defined. It really gets to the  
17 individual inspection and maintenance activities that  
18 learn and grow and adjust according to what is  
19 understood about the impacts on margins.

20 In some cases, we learned things that  
21 cause us to take margin away because we think we're  
22 smart enough to know how to reduce the margins. In  
23 other cases, we recognized that the uncertainties are  
24 growing, and so we provide additional conservatism in  
25 the way that we manage the plant design. So we

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 increase the margins of safety where we learn that we  
2 do not know enough.

3           Trying to find a simple way to articulate  
4 that in plain language will continue to be a  
5 challenge. So there are still issues that we will  
6 pursue for future improvements in this guidance. But  
7 we believe that, and I mentioned before, more than a  
8 decade of nuclear plant aging research that's actually  
9 going on the 20th anniversary of the NPAR program,  
10 about a decade's worth of experience in trying to do  
11 license renewal reviews, we think that the guidance is  
12 now sufficiently mature that the Commission should  
13 approve it for implementation on all future renewal  
14 reviews with the recognition that we will continue to  
15 add to it as we learn new lessons in the future.

16           Our hope and expectation is that after we  
17 have made this presentation, that the ACRS will agree  
18 that it is more than adequate for this purpose, and  
19 should endorse it with the Commission.

20           VICE CHAIRMAN BONACA: One last note I  
21 would like to make. Before the meeting, this  
22 presentation is over, I would like also to hear about  
23 the commitment that was made in the response to our  
24 previous letter that the GALL report to be updated  
25 with some frequency I understand? At the time, there

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 was a commitment made but no procedures or specific  
2 processes established yet. Maybe you could comment on  
3 that at the end of the meeting?

4 MR. GRIMES: I'll do that.

5 VICE CHAIRMAN BONACA: Thank you.

6 MR. GRIMES: I'm sorry, and I was supposed  
7 to say and now I'd like Dr. Sam Lee to introduce the  
8 staff's presentation.

9 MR. LEE: Good morning. My name is Sam  
10 Lee. I'm from the License Renewal and Standardization  
11 Branch, NRR. This is this morning's agenda. After my  
12 introduction, Jerry Dozier is going to talk about some  
13 examples of the public comments received. Ed Kleeh is  
14 going to talk about certain NEI continued items. Dave  
15 Solorio is going to discuss the one-time inspections.

16 The improved license renewal documents  
17 consist of the generic aging lessons learned, GALL  
18 report. With that document is an evaluation of aging  
19 management programs -- references to GALL report to  
20 focus to staff review in areas where the programs are  
21 evaluated, and a regulatory guide that endorses NEI  
22 document 95-10 that provides guidance to licensing  
23 applicant in preparing their application.

24 This has been a significant agency effort  
25 involving staff from the Office of NRR, including the

1 staff that are doing the license renewal application  
2 review. Also, the Office of Research. On my left,  
3 Jit Vora is a team leader from Research. Contractors  
4 from Argonne National Lab. On my right, Young Liu is  
5 the project manager from Argonne. Also from National  
6 Lab, on my left Rich Morante. He is the project  
7 manager from Brookhaven.

8 We are preparing a SECY paper to the  
9 Commission submitting this document for the approval  
10 by the end of the month. During our interaction with  
11 NEI to discuss the public comments on the documents,  
12 they identified five items for further discussion with  
13 the staff after the issuance of these documents.  
14 After we discuss these items with you later today,  
15 we'll continue a dialogue with NEI on these items.  
16 The result of any additional guidance of clarification  
17 will be incorporated in a future update of the  
18 documents.

19 In addition, when new technical  
20 information and new operating experience becomes  
21 available, and also when the staff reviews additional  
22 applications, and what we learn, we will incorporate  
23 into future updates of these documents.

24 NEI indicated to us that the applicants  
25 that will be submitting the applications next year

**NEAL R. GROSS**

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

1 will be using these documents.

2           So to address how these documents ought to  
3 be applied, NEI is conducting a demonstration project  
4 in which they are preparing sample portions of an  
5 application and submitting them for staff review and  
6 comment. They are scheduled to submit this by the end  
7 of the month. We'll be working with industry through  
8 this demonstration project over the details for the  
9 implementation for procedures.

10           That concludes the opening remarks. If  
11 there's any questions? Okay. Jerry Dozier will go  
12 into the public comments.

13           MR. DOZIER: Good morning. My name is  
14 Jerry Dozier. I'm from the License Renewal and  
15 Standardization Branch. With me, I have Mike McNeil  
16 from the Division of Research, Barry Elliot from the  
17 Division of Engineering, and Omesh Chopra from Argonne  
18 National Laboratories.

19           There were over 1,000 comments that were  
20 on the improved regulatory guidance. This slide just  
21 represents some of the ways in which we evaluated the  
22 comments and tried to incorporate them into the GALL  
23 report, primarily chapter 4.

24           For example, in the first bullet, there  
25 was a lot of discussion and a lot of debate and a lot

1 of comments on where is the threshold for radiation-  
2 assisted stress corrosion cracking, void swelling,  
3 where is this threshold? Is it 10 to the 17th, 10 to  
4 the 21st, somewhere in between?

5 What we did though is really what the  
6 staff wanted, is to have an effective aging management  
7 program. What we wanted to do was to find the  
8 components that had the most susceptible locations.  
9 We wanted to monitor and inspect with an effective  
10 inspection technique those locations. That was really  
11 the aging management program we wanted.

12 So by getting rid of the threshold, we got  
13 rid of a lot of the comments and a lot of the debate,  
14 and uncertainties. We came out with an effective  
15 aging management program, which is what we really  
16 wanted in the first place.

17 On the second bullet, any unmade comments  
18 that in the GALL report, in earlier versions, if we  
19 could credit a program, we would credit. For example,  
20 in boric acid corrosion, you could use the regular  
21 boric acid corrosion program and you could also credit  
22 ISI. Any IS that we provide only a minimal  
23 acceptable, the boric acid corrosion program has been  
24 effective in the current term, and we expect it to be  
25 very effective in the extended term, so we

**NEAL R. GROSS**

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

(202) 234-4433

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

1 accommodated that comment by only referencing the  
2 minimum program.

3 VICE CHAIRMAN BONACA: But I thought the  
4 GALL was also a means of providing alternatives to  
5 minimum programs.

6 MR. DOZIER: What the GALL report  
7 primarily gives you is one acceptable program. It may  
8 not in all cases be the minimal program, but it is an  
9 acceptable program that primarily we have in the past  
10 through Oconee and Calvert Cliffs, if we could say it  
11 on a generic basis that this was an acceptable  
12 program, that is what you really see in the GALL  
13 report.

14 We don't want to limit the creativity of  
15 the licensee. If they have a more effective  
16 methodology, of course in the application they can  
17 propose that on a plant-specific basis for us to  
18 review. The limitation being that they couldn't  
19 reference back to the GALL report in that case.

20 MEMBER WALLIS: What does "fully credited"  
21 mean? I don't understand that.

22 MR. DOZIER: As I was talking about  
23 earlier, for example, we would have the component,  
24 some carbon steel component here. Then we'd have the  
25 aging effect would be boric acid corrosion. Then we

**NEAL R. GROSS**

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

1 would credit two programs. We would say ISI was  
2 effective in finding it, and also would say boric acid  
3 corrosion. We would put two. In this case, we only  
4 have one.

5 MEMBER WALLIS: Credited means that the  
6 programs take care of your concerns with the issue?  
7 Is that what you mean?

8 MR. DOZIER: Yes.

9 MEMBER WALLIS: It resolves the issue  
10 then?

11 MR. DOZIER: It resolves the issue, yes.  
12 It would be fully acceptable. By fully credited, I  
13 guess I should have made to this have said fully  
14 acceptable to the staff.

15 MR. GRIMES: Actually, you can drop the  
16 fully and it still means the same thing.

17 MR. DOZIER: In the next bullet, the  
18 earlier versions, for example, the pressurized bottom  
19 head, we had those as plant-specific evaluations. In  
20 that case, the applicant could propose a program.  
21 Well, during our revisions and incorporation of the  
22 comments, we started really focusing on trying to give  
23 as much information to the applicant as we could. In  
24 other words, now for the bottom head we credit the  
25 chemistry program and ISI and tell the applicant that

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 we're only concerned with the Iconel 182 welds. So it  
2 gives the applicant more direction on really what the  
3 staff's interest is.

4 In the GALL report, of course you'll have  
5 a component. You'll have many aging effects.  
6 Sometimes in our public comments from the earlier  
7 version, there may be one of the aging effects that  
8 there was some controversy on whether or not that was  
9 really a significant aging effect or not, or really  
10 applicable.

11 In some cases we would remove based on the  
12 comment and further evaluation, we would remove some  
13 of the aging effects. Does that mean the component  
14 went away? No. That meant just the aging effect.

15 In the last bullet, of course GALL is a  
16 useful tool for the applicant to reference during the  
17 license renewal application. We based ours on the  
18 Ocone and Calvert Cliffs, and may not have gotten the  
19 full range of components that they could possibly be  
20 done on a generic basis.

21 So NEI provided us with some additional  
22 components that they would like to have in the GALL  
23 report and the programs. We evaluated those and  
24 accommodated those types of requests.

25 Also, in the case of there was comments

1 from, for example, Union of Concerned Scientists.  
2 They had a few components to add. We also  
3 accommodated those requests.

4 So there were many comments, and these are  
5 just some of the ways that we evaluated and  
6 accommodated the comments. Is there any questions?  
7 If not, I'd like to turn it over to David.

8 MEMBER WALLIS: So there were no serious  
9 comments that really changed your mind about anything,  
10 were issues that couldn't be handled this way? I get  
11 the feeling everything worked out fine with the public  
12 comments?

13 MR. DOZIER: I may have made it sound a  
14 little easier than it was because there was -- we had  
15 several comments we went through. We even had to go  
16 through the escalation process up to the branch chief.  
17 So everything wasn't easy. But we tried to address  
18 the best we could.

19 Barry has something to address on that.

20 MR. ELLIOT: We have open issues. Don't  
21 think we don't have open issues. We have open issues.  
22 We are still going, you know, trying to resolve those  
23 open issues. This is just the issues that we were  
24 able to resolve here, but there are still open issues  
25 between the NRC and industry.

**NEAL R. GROSS**

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

1 VICE CHAIRMAN BONACA: I hope the GALL  
2 report doesn't become a minimum requirement document.  
3 I mean it wasn't intended to be that way.

4 MR. ELLIOT: We don't look at it as a  
5 minimum requirement document either.

6 VICE CHAIRMAN BONACA: I'm only saying  
7 that there were some comments that said encouragement  
8 for the staff to put in only the minimum that's  
9 accepted for some programs.

10 MR. ELLIOT: I can clarify, the in-service  
11 inspection discussion a little bit. The reason we put  
12 the boric acid corrosion in is because we weren't  
13 satisfied with the in-service inspection program  
14 section 11 for corrosion, so we put in this program.  
15 That's why we're taking credit for it, because we told  
16 them that this is what we wanted.

17 VICE CHAIRMAN BONACA: I understand. My  
18 comment only is because I view over time these would  
19 be probably the main document reference both by the  
20 applicants and the staff. So we have seen the first  
21 applications involving a significant effort of the  
22 applicants to be creating. I mean first BG&E had to  
23 do a lot by itself. Here this is becoming more and  
24 more important because it is going to be the baseline  
25 for the applications.

**NEAL R. GROSS**

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

1 MR. GRIMES: Dr. Bonaca, I am compelled to  
2 say that by virtue of the Commission performance goals  
3 on effectiveness efficiency and knowing that necessary  
4 burden and so forth, we often describe the regulatory  
5 requirements as the minimum requirement. That's just  
6 by virtue of the regulator is expected to only require  
7 what is necessary and sufficient for plant safety.

8 So it is appropriate to say these are the  
9 minimum requirements. We would hope that applicants  
10 would establish inspection and maintenance programs  
11 that go well beyond in terms of the scope and the  
12 practices. But that is not to say that we don't feel  
13 very strongly that we have put a lot of attention into  
14 the detail about making sure that we have what we need  
15 to make sure that these are effective aging management  
16 programs. So to that extent, it is an important  
17 baseline.

18 I think it's also important to point out  
19 that we have tried to avoid making this a catalog of  
20 options because that reduces the opportunity to  
21 standardize and achieve efficiencies by having one way  
22 to do it that everyone sort of gravitates to. So we  
23 did consciously try to avoid going well into what are  
24 all of the different ways that you can manage the  
25 aging effects, because that would then work against

**NEAL R. GROSS**

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

(202) 234-4433

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

1 the efficiency aspect of the guidance.

2 We certainly expected that we are going to  
3 have some departures from this, but we'll try to  
4 discourage that.

5 VICE CHAIRMAN BONACA: I understand. For  
6 example, on the issue of scoping, that you don't have  
7 in the presentation here, we discussed that before,  
8 NEI pointed out that all you need is to have a  
9 methodology and then the results of the whole process,  
10 including screening. When you do that, you really  
11 have a problem also with navigating through the  
12 application.

13 Now I expressed a concern we had last  
14 time. I believe that the ACRS probably will encourage  
15 more documentation to make it possible for an  
16 interested individual or the public to find out what  
17 components are in or out. It's not too much to ask.

18 Now I recognize in the SRP you had to  
19 recognize that that was the requirement of the rule,  
20 so you had to admit it. But you can see how that, in  
21 my judgement, is a minimum requirement for  
22 documentation. By meeting the minimum requirement,  
23 you meet the rule but maybe you don't fulfill the  
24 needs of the public and of the staff and the ACRS  
25 Subcommittee when they try to review these documents.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 MR. GRIMES: Point well taken.

2 VICE CHAIRMAN BONACA: Okay. We can move  
3 on.

4 MR. DOZIER: Okay. I would like to turn  
5 it over to David Solorio -- Ed Kleeh, I'm sorry.

6 MR. KLEEH: Good morning. My name is  
7 Edward Kleeh. I am representing the License Renewal  
8 Branch. With me from the Office of NRR, the Division  
9 of Engineering are Mr. Barry Elliot, Mr. James Davis  
10 is coming up, Mr. Frank Grubelich, and from the Office  
11 of Research is Mr. Mike McNeil.

12 I will present the five NEI continued  
13 dialogue items by stating both the NEI and NRC  
14 position.

15 Item one is individual plant examination,  
16 IPE, or individual plant examination for external  
17 events, IPEEE, has a source document to consider for  
18 scoping. NEI considers it inappropriate for an  
19 applicant to establish a licensing renewal scoping and  
20 screening criteria that relies on plant-specific  
21 probabilistic analysis like IPE's and IPEEE's since  
22 they are not part of the current licensing basis. Not  
23 only reflect the estimated core damage frequency for  
24 the plant configuration at that time.

25 NEI contends that IPE's and IPEEE's may

1 contain recommendations to modify the plant, revise  
2 procedures, or develop training to further reduce the  
3 estimated core damage frequency, but only implemented  
4 after 10 CFR 50.59 or 10 CFR 50.90 reviews.

5 The standard review plan for license  
6 renewal, page 2.1-3, states that although the license  
7 renewal rule is deterministic, that probabilistic  
8 methods on a plant-specific basis may help access the  
9 relative importance of structures and components  
10 subject to an aging management review by drawing  
11 attention to specific vulnerabilities.

12 Reviewing an IPE or IPEEE can help a  
13 reviewer determine what equipment is risk significant  
14 and relied on for mitigation of design-basis events.  
15 It provides additional understanding to permit safety  
16 determinations.

17 VICE CHAIRMAN BONACA: Is this the NEI  
18 position still?

19 MR. KLEEH: No.

20 VICE CHAIRMAN BONACA: At which point did  
21 it become yours?

22 MR. KLEEH: When I got to the part about  
23 with the standard review plan, that was the NRC  
24 position.

25 MEMBER WALLIS: So the NEI position is

1 that some information should be ignored?

2 MR. KLEEH: Yes.

3 MR. GRIMES: This is Chris Grimes. Let me  
4 explain. This set of issues are issues for which we  
5 have two positions that appear to conflict, but we're  
6 not sure. So instead of appealing the issues, the NEI  
7 working group simply asked of the steering committee  
8 that the staff be available to continue the dialogue  
9 so that we can understand whether or not we have any  
10 disagreement. I think that it is fair to say that on  
11 the IPE issue, the industry's concern is more one of  
12 proximity, having the IPE described in a staff review  
13 that is supposed to be certifying the current  
14 licensing basis relative to the scope of equipment in  
15 an aging management review.

16 Their concern is that this device might be  
17 used in some way to subvert the current licensing  
18 basis.

19 CHAIRMAN APOSTOLAKIS: But I'm a bit  
20 confused though. The current rule is deterministic.  
21 It really looks at passive components. The IPEs have  
22 declared the passive components as being so reliable  
23 that they will not put them in the accident sequences.

24 So how is it relevant? If I look at the  
25 dominant sequences that an IPE gives me, that will

**NEAL R. GROSS**

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

1 have valves not closing or opening and pumps and so  
2 on. How does that help me? I mean the deterministic  
3 rule says that I should be looking at the passive  
4 components. The others are already under the  
5 maintenance rule and so on, so it really doesn't help  
6 you very much. So I don't even know why it's a  
7 dialogue item.

8 MR. KLEEH: I have an inspection  
9 background. When you use IPEs and IPEEEs, they tend  
10 to give you a relative importance of what systems have  
11 a safety significance. You can classify and  
12 prioritize them. That's mainly what the NRC is trying  
13 to do here. They are trying to use all the tools  
14 available to be able to classify the safety  
15 significance of systems that they are going to  
16 consider to be scoped under the license renewal rule.

17 MR. GRIMES: The guidance instructs the  
18 reviewer to use EOPs, the IPE, and other information  
19 about the plant capabilities or lack of capabilities  
20 in order to have them use devices that help them to  
21 poke at the current licensing basis to determine the  
22 completeness of the scope.

23 IPEs are useful primarily because for  
24 those that still think in a systems paradigm they know  
25 what are the important functions of the system from an

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 IPE that they then go in and look for that intended  
2 function coming out of the scoping and screening.

3 So to the extent that it could be useful  
4 for the staff reviewers but the industry concern about  
5 there ought to be more guidance in how not to abuse  
6 it.

7 CHAIRMAN APOSTOLAKIS: So it's the next  
8 step we discussed this morning, beyond what Hatch did.

9 MR. GRIMES: Yes.

10 CHAIRMAN APOSTOLAKIS: But you still  
11 wouldn't look at the active components. Right? You  
12 would look at the systems, but then you would look  
13 only at what's passive. So there is progress. I'm  
14 telling you, in five years, there is going to be a  
15 PRA.

16 MR. GRIMES: I hope Dr. Bonaca doesn't  
17 expect that in our commitments for future  
18 improvements.

19 CHAIRMAN APOSTOLAKIS: NEI is concerned  
20 that this might subvert the process?

21 MR. GRIMES: By virtue of these being  
22 continued dialogue items, I think we need to offer NEI  
23 an opportunity to more clearly articulate what their  
24 real concern is. That's why instead of taking these  
25 issues to appeal at the conclusion of the last

1 steering committee meeting, the working group simply  
2 said we would like the staff to continue to talk with  
3 us. So we need to better understand what it is they  
4 want us to do differently.

5 CHAIRMAN APOSTOLAKIS: Now if the IPE,  
6 IPEEEs are used only to add things to scope, then I  
7 can see their concern. But if you use a risk-informed  
8 approach to define SSCs that are within scope, then it  
9 is a different story. They shouldn't really object to  
10 that. So I guess they are afraid that the first thing  
11 is going to happen, like the first 25 years of PRA,  
12 just add to the regulations but never take anything  
13 out.

14 MR. KLEEH: Item two.

15 MEMBER SHACK: I'm glad you made that  
16 point, George. It's one we haven't heard before.

17 MEMBER WALLIS: The thing that intrigued  
18 me was the first 25 years. When did the first 25  
19 years start, George?

20 CHAIRMAN APOSTOLAKIS: I'm sorry?

21 MEMBER WALLIS: When did the first 25  
22 years start?

23 CHAIRMAN APOSTOLAKIS: They are not  
24 biblical years.

25 Please go ahead.

1 MR. KLEEH: Item two. Operating  
2 experience with cracking of small board piping. NEI's  
3 position is that inserts inspections ISI and chemistry  
4 control are adequate as aging management programs.  
5 Operating experience does not justify doing more.

6 Now we get to the NRC position. GALL  
7 recommends a volumetric one-time inspection for  
8 evidence of no cracking to verify the effectiveness of  
9 chemistry control. The one-time inspection augments  
10 the aging management program consisting of primary  
11 water chemistry and in-service inspections for class  
12 I components.

13 The ASME Code, Chapter 11, requires  
14 service examinations of class I, small bore piping  
15 with less than a four-inch nominal diameter every ten  
16 years.

17 Are there any questions on that item?

18 MEMBER LEITCH: Does this issue only  
19 relate to class I small-bore piping?

20 MR. KLEEH: Yes.

21 MEMBER LEITCH: Thank you.

22 MEMBER SIEBER: And it doesn't relate to  
23 fatigue-induced cracking?

24 MR. KLEEH: It relates to all kinds of  
25 cracking.

1 MEMBER SIEBER: Not just chemistry?

2 MR. KLEE: The cracking is the issue, not  
3 the chemistry.

4 Item three is management of loss of free-  
5 load of reactor vessel internals bolting using the  
6 lose parts monitoring system.

7 NEI believes that ISI visual examinations  
8 are adequate for management of loss of pre-load on  
9 reactor vessel internals bolting.

10 The NRC position is that GALL recommends  
11 that loss of pre-load in reactor vessels internal  
12 bolting be managed by ISI in the loose parts  
13 monitoring system. The NRC staff accepted  
14 Westinghouse Owners Group topical report WCAP 14-5-77  
15 which recommends that the loose parts monitoring  
16 system as one of the surveillance techniques used to  
17 detect loss of pre-load and other aging effects on  
18 certain reactor vessel internals components as part of  
19 several aging management programs.

20 The ASME code, Section 11, category BN-3  
21 requires visual inspections of core support structures  
22 every ten years.

23 Are there any questions on this item?

24 MEMBER WALLIS: How do you tell if the  
25 bolts are loose?

1 MR. KLEEH: How do you tell if the bolts  
2 are loose?

3 MEMBER WALLIS: By a visual inspection.  
4 Isn't that what you mean about loss of pre-load?

5 MR. KLEEH: That is what NEI is  
6 suggesting.

7 MEMBER WALLIS: How does visual inspection  
8 tell you if you've lost a pre-load?

9 MR. KLEEH: I don't think I am in a  
10 position to support their argument.

11 MR. GRUBELICH: Frank Grubelich,  
12 Mechanical Engineering Branch.

13 We have seen in the baffle bolt cracking  
14 experience where industry has said that they have not  
15 seen this cracking of the baffle bolts that was  
16 experienced over in Europe. However, we haven't seen  
17 it because what they were doing was a visual  
18 inspection. The crack occurs between the juncture of  
19 the bolt shank and the head.

20 Subsequently, the log took three lead  
21 plants, Westinghouse lead plants, and they did UT  
22 examinations. In fact, they found some cracking.

23 So our position really is to use loose  
24 parts monitoring. There has been experience with  
25 that, and that is a program that is an ASME standard.

**NEAL R. GROSS**

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

1 It has been published.

2 MR. GRIMES: This is Chris Grimes. But  
3 I'll point out that there is an opportunity for  
4 regulatory coherence here because staff just approved  
5 a GE topical that concluded loose parts monitoring was  
6 not necessary.

7 MR. ELLIOT: Along that line, this is a  
8 PWR issue. In the boiling water reactors, we credit  
9 ISI and water chemistry for the bolting of the  
10 internals. This is only a PWR issue.

11 MR. GRUBELICH: Part of the discussion  
12 with the PWR is that the point that they were making  
13 is that the flows in the BWRs are relatively low so  
14 that they can't carry the loose parts, and that they  
15 also have limited or restricted flow passages so that  
16 the larger parts will not get into the core.

17 MEMBER WALLIS: I don't understand the  
18 connection. Maybe I should be quiet. If you have a  
19 loose bolt, it doesn't necessarily wander around. It  
20 has to come out to wander around.

21 MR. GRUBELICH: You can have both cases.  
22 It can be loose. It can stay in place.

23 MEMBER WALLIS: I'd think you would be  
24 concerned about it being loose and staying in place.

25 MR. GRUBELICH: Right.

1                   MEMBER WALLIS: You won't catch that by  
2 seeing whether it was rattling around somewhere else.

3                   MR. GRUBELICH: Correct. But you also  
4 worry about the part that gets loose and gets into the  
5 core area.

6                   MR. MCNEIL: There's another difference  
7 between the Ps and the Bs. That is, that at the  
8 damage levels that are common in Bs, the radiation-  
9 induced creep is less severe, so you would have less  
10 loss of pre-load simply for the creep effect than you  
11 would in a P. I'm trying to explain the discrepancy  
12 between the position of the GE and the PWR system.

13                   MEMBER SIEBER: But the baffle bolts are  
14 on the outside of the core barrel, right, or the  
15 baffle? So they either go to the bottom of the  
16 reactor vessel or into the steam generator head.

17                   MR. GRUBELICH: There are two different  
18 baffle bolts. There's one on the inner surface, which  
19 is actually adjacent to the peripheral surface of the  
20 fuel -- then on the backside, there is what is called  
21 a core barrel former bolt. So you have both cases.

22                   MEMBER SIEBER: Okay.

23                   MR. KLEEHE: Item number four is operating  
24 experience with cracking bolting. NEI's position is  
25 that crack initiation/growth due to stress corrosion

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 cracking through carbon steel closure bolting is not  
2 an aging mechanism.

3 Section 2 of the ASME code specifies the  
4 ASA 193 grade B bolting at minimum yields 105 pounds  
5 per square inch, and no maximum yield strength.

6 MR. MCNEIL: I think that figure of 105  
7 pounds per square inch has to be wrong.

8 MEMBER WALLIS: 105 ksi. Must be  
9 thousands.

10 MR. KLEEH: That's what I said.

11 MR. MCNEIL: I'm sorry. I thought you  
12 said 105 pounds.

13 MR. KLEEH: If I did, it's supposed to be  
14 105 thousands, and no maximum yield strength.

15 The minimum yield strength should be  
16 sufficient for normal design loads. The maximum yield  
17 strength preferred by the staff of 150 thousand pounds  
18 per square inch or less ensures the bolt is not too  
19 hard, meaning brittle, so as to be susceptible to  
20 stress corrosion cracking, which is more likely with  
21 moisture in the air and if the brittleness of the bolt  
22 increases.

23 GALL recommends that cracking  
24 issues/growth be managed by the EPRI bolting integrity  
25 program.

1 Are there any questions on this item?

2 MEMBER POWERS: I guess you were just a  
3 little too quick for me. The staff has come back and  
4 said that they don't want a high strength steel is  
5 because of the stress corrosion cracking limitations?  
6 And NEI is saying they are perfectly willing to let  
7 things stress corrosion cracks?

8 MR. KLEEH: I think what they are saying  
9 is they don't believe that stress corrosion cracking  
10 is going to occur. James Davis can elaborate on that.

11 MR. DAVIS: They just want to drop that  
12 out of GALL. They wanted to drop that issue out of  
13 GALL. We have a lot of evidence from the past  
14 operating experience that if your yield strength gets  
15 over 150 ksi, they will crack in air. As I said to  
16 the subcommittee, I'm not yielding on this point.

17 MEMBER POWERS: I guess I wouldn't either.

18 MEMBER SHACK: No pun intended.

19 MEMBER POWERS: You're not the only one  
20 that has the experience of cracking in the air on  
21 high-strength bolts.

22 VICE CHAIRMAN BONACA: Good. Fire  
23 protection.

24 MR. KLECH: The final item is inspection  
25 of fire protection systems. BI's position is that the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 National Fire Protection Association, NFPA, codes are  
2 adequate for managing aging effects in fire water  
3 systems. The NFPA codes do not provide guidance for  
4 assessing internal corrosion of fire water systems  
5 which are not routinely subject to flow.

6 The NRC's position is that GALL recommends  
7 the single system monitoring, internal inspection and  
8 flow testing of fire water systems to ensure the  
9 corrosion including microbiologically effluence  
10 corrosion mix.

11 Are there any questions on this one?  
12 That concludes the presentation.

13 Mr. Dave Solorio will now take over.

14 MR. GRIMES: While Dave is moving up to  
15 the podium, I want to clarify. These were the -- this  
16 was the subset of industry comments on the improved  
17 renewal guidance that ended up being quote unresolved.  
18 They were originally characterized as potential appeal  
19 items, but when it came time for the industry to  
20 appeal the issues to higher management, they concluded  
21 that they did not want to hold up GALL to try and  
22 resolve these issues, rather they simply wanted the  
23 staff to continue a dialogue because perhaps we  
24 misunderstand their point or they misunderstand our  
25 point.

**NEAL R. GROSS**

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

1 Barry pointed out this distinction about  
2 loose parts monitoring for PWRs and BWRs. On its  
3 face, has to be explained in a clearer way and perhaps  
4 they simply don't understand the staff's position.

5 But we will continue to have a dialogue  
6 and we'll report on what we learn in the future. And  
7 with that, David is going to address one-time  
8 inspections.

9 MR. SOLORIO: Good morning. My name is  
10 Dave Solorio. I work in the Office of Nuclear Reactor  
11 Regulation in the License Renewal and Standardization  
12 Branch.

13 I'm here today to speak on the subject of  
14 one-time inspections for Calvert, Oconee, Arkansas,  
15 Hatch and GALL.

16 With me here today is Omesh Chopra from  
17 Argon National Laboratories. Omesh is a Senior Member  
18 from the ONO team that assistant with the development  
19 of GALL and was the lead reviewer for many of the more  
20 difficult chapters in GALL.

21 I also have to my left here Robert Prato  
22 and to my right, Butch Burton, also from the License  
23 Renewal and Standardization Branch. Bob is the ANO  
24 Project Manager and Butch is the Hatch Project  
25 Manager.

1 I asked Bob and Butch to sit up here with  
2 me today because they worked so hard in getting me  
3 information to get ready for this. I thought that  
4 they should share in the glory also.

5 (Laughter.)

6 Last week, I made a presentation to the  
7 ACRS Subcommittee on license renewal regarding the  
8 one-time inspections for Calvert and Oconee and GALL.  
9 The subcommittee liked it and requested that we come  
10 back for this full committee to expand it to also  
11 cover Hatch and ANO.

12 I also have another slide after this,  
13 Slide No. 9 that summarizes the one-time inspections  
14 for Hatch and ANO. And also, I want to mention in  
15 case you're wondering what all the acronyms -- I  
16 haven't had a chance to turn to page 10. There's a  
17 definition. They have all the acronyms. I will note  
18 that I left off sodium hydroxide. I apologize for  
19 that.

20 I guess I want to provide some orientation  
21 here. First off, for those who might not have seen  
22 this before, the left column here are the categories  
23 of the systems as they'd be represented in GALL and  
24 the Standard Review Plan. I felt that a fairly  
25 efficient way to try to group things so that we could

**NEAL R. GROSS**

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

(202) 234-4433

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

1 try to draw some comparisons.

2 I also want to provide a disclaimer for  
3 anyone attending this briefing for the first time who  
4 are unfamiliar with the concept of one-time  
5 inspections. We're not saying these systems are only  
6 inspected one-time. In fact, in the majority of cases  
7 there's an existing Aging Management Program already  
8 looking at a lot of these systems.

9 I also wanted to mention that GALL has  
10 consistently applied the lessons learned of Calvert  
11 and Oconee regarding one-time inspections. In fact,  
12 as you've heard earlier, many of these one-time  
13 inspections from Calvert and Oconee were incorporated  
14 into GALL, when appropriate, as a starting point. In  
15 developing GALL, we had the experience of Argonne and  
16 Brookhaven National Laboratories helping us get this  
17 information into the GALL report and we also had staff  
18 members associated with the first license renewal  
19 reviews and the on-going reviews looking at the one-  
20 time inspections that were incorporated.

21 GALL also had the benefit of two public  
22 rounds of comments and an outcome of the public's  
23 participation as GALL now specifies a plant-specific  
24 Aging Management Program be proposed for Calvert and  
25 Oconee, might have proposed the one-time inspection.

**NEAL R. GROSS**

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

(202) 234-4433

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

1           A plant specific Aging Management Program  
2 could be a one-time inspection or it could be an on-  
3 going program, an existing program.

4           At a glance, you can see there's a few  
5 differences in the number of one-time inspections  
6 between Gall and the four plants --

7           VICE CHAIRMAN BONACA: Before you chance  
8 that, on the issue of the -- it would be valuable for  
9 us to understand why you have one-time inspection of  
10 pressurizer and one steam generator for Oconee, but  
11 there is no inspection for Calvert. Now I know  
12 Calvert has also steam generator inspections.

13           MR. SOLORIO: I will talk to that.

14           VICE CHAIRMAN BONACA: Also, why does the  
15 GALL report -- if you could give us some indication.  
16 I understand pretty much the same programs.

17           MR. SOLORIO: I will do that in a minute.  
18 All I was going to do was put this up briefly to kind  
19 of give everyone an orientation. There's some  
20 differences there. I'm going to go back to this and  
21 then I'm going to talk about what you wanted in a few  
22 more minutes here.

23           Actually, what I intended to do was go  
24 across for reactor vessel internals, all four plants,  
25 and kind of give you an idea of what they're doing and

**NEAL R. GROSS**

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

1 I will cover that.

2 VICE CHAIRMAN BONACA: Okay.

3 MR. SOLORIO: So there's some differences.  
4 There's numerous reasons that explain those  
5 differences. I'm going to go over a few of those  
6 reasons and then I'm going to talk about -- get to  
7 your question, sir.

8 One reason there are differences is that  
9 GALL provides one method for managing the aging, that  
10 the staff has determined is acceptable. Applicants  
11 can and have proposed different Aging Management  
12 Programs different than GALL such as the case of ANO's  
13 risk-informed ISI inspection for small-bore piping or  
14 aging management for every piping. The staff has  
15 concluded that these are acceptable alternatives.

16 Another reason for differences is that  
17 there are plant-specific differences or system  
18 nomenclature differences. For example, Oconee has  
19 several features which are a little too unique, that  
20 we thought were a little too unique to be included in  
21 GALL. That would be some of these systems down here.  
22 They have a Cowamee Dam and it's our emergency power  
23 supply. I know a lot of you have seen it. I have  
24 heard some of you have been there. It was a little  
25 too generic to be included in GALL, so you won't see

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 a similar one-time inspection in GALL.

2 Also, Oconee doesn't have Oconee with one  
3 set of steam generators. Isn't going to have a steam  
4 generator blow down system, therefore, you're not  
5 going to see it. At Oconee, another example would be  
6 is that their fire protection system isn't labeled  
7 fire protection. It's actually two other systems.  
8 Low-pressure service water and  
9 high-pressure service water are used to provide fire  
10 protection function there. And so you look at that  
11 and you say where's fire protection for Oconee. Well,  
12 it's there. I could have labeled it as fire  
13 protection, but then I thought that perhaps someone  
14 would have asked me what about those systems? So I  
15 left it as it was.

16 Another reason was that in many cases  
17 Calvert and to a lesser degree Oconee proposed  
18 one-time inspections without being asked because of  
19 either plant-specific operating experience or because  
20 they wanted to ensure themselves of the effectiveness  
21 of their existing programs, or because they didn't  
22 suspect aging was occurring, but given the remote  
23 potential, they determined it was conservative to look  
24 up anyhow.

25 Another reason was that there were many

1 public comments, as you've heard earlier, received by  
2 the staff on GALL and the staff might have concluded  
3 that a one-time inspection was not necessary if an on-  
4 going Aging Management Program was considered to be  
5 adequately managed on aging.

6 I think last week we talked about changes  
7 to the ECCS, one-time inspection for PWRs because it  
8 was determined that if a licensee had a chemistry  
9 program that matched a GALL chemistry program, the  
10 conditions and the contaminant control and filtering  
11 should be sufficient to preclude the need for a one-  
12 time inspection.

13 Then I'm just going to get to two more  
14 examples and then I'll get to the question that was  
15 asked. In the case of Hatch, there's a really unique  
16 reason. There could be some differences here. It's  
17 because Hatch took a somewhat unique approach to how  
18 they scoped by function, not by system. And as a  
19 result several systems were grouped together in  
20 unusual ways, for example, one of the in-scope  
21 functions for the feedwater and main steam systems was  
22 reactor coolant pressure boundary. This function is  
23 identified under the nuclear boiler system such as  
24 here. I'll just leave that up.

25 The nuclear boiler system is lifted on the

**NEAL R. GROSS**

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

1 first row here. Therefore, main feedwater and main  
2 steam are actually identified as part of the RCS  
3 function instead of the steam and power conversion  
4 function, so you won't see something down here for  
5 main steam and feed water at Hatch.

6 In the case of ANO, another reason you can  
7 -- you obviously see a number of differences there,  
8 but some of the reasons for why there are differences  
9 is that ANO is frequently doing periodic inspections,  
10 rather than one time inspections. Also, ANO proposed  
11 different types of Aging Management Programs such as  
12 the risk-informed ISI inspections for small-bore  
13 piping as I mentioned earlier.

14 VICE CHAIRMAN BONACA: So you are saying  
15 that those activities are captured under programs  
16 which already exist and are broader, so therefore you  
17 don't have to have a one-time inspection for that  
18 specific result. That really accounts for the big  
19 difference in numbers of one-time inspections you show  
20 there?

21 MR. SOLORIO: Yes sir.

22 VICE CHAIRMAN BONACA: "SH" stands for  
23 what?

24 MR. SOLORIO: Pardon me?

25 VICE CHAIRMAN BONACA: "SH" under

1 Arkansas.

2 MR. SOLORIO: Sodium hydroxide.

3 VICE CHAIRMAN BONACA: Okay.

4 MR. SOLORIO: It's our containment. It's  
5 also my understanding that that subject of one-time  
6 inspections for ANO was previously brought up during  
7 the subcommittee meeting, so you may already have  
8 appreciation for some of the differences of ANO.

9 Now I'd like to go over a few examples to  
10 explain the transparencies in a little more detail.

11 MEMBER POWERS: Let me ask one question.  
12 If a licensee has a super water chemistry program, I  
13 mean it's a humdinger, it really cleans the water up  
14 well, does that preclude the need to do a one-time  
15 inspection?

16 MR. SOLORIO: Well, if the reviewer was  
17 going to use GALL, GALL would tell the reviewer that  
18 if the chemistry program is equivalent to the GALL  
19 chemistry program, there may not be a need unless  
20 there's some specific plant operating experience which  
21 might suggest otherwise.

22 MEMBER POWERS: The reason I worry about  
23 that is I guess there's some evidence that maybe as we  
24 clean water up we unleash new corrosion mechanisms  
25 because the impurities that are causing are not being

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 tied by complexing or being captured by some of the  
2 impurities in the water and so  
3 clean-up, good chemistry does not necessarily mean you  
4 don't have corrosion.

5 MR. SOLORIO: Yes, although in a situation  
6 as that, perhaps there might be operating experience  
7 at that plant that would suggest that their chemistry  
8 program, even though it sounds like a whammo-bammo one  
9 isn't perfect and there might be a good reason -- and  
10 you would expect an applicant to describe that in the  
11 application.

12 MEMBER POWERS: Yes.

13 VICE CHAIRMAN BONACA: I'd like to ask a  
14 question about Arkansas. I mean the one-time  
15 inspections are confirmatory in nature, typically. I  
16 mean you are doing it once to verify that, in fact, an  
17 aging effect is not taking place, okay, that's  
18 confirmatory. A program is to address the possible  
19 aging effect that you believe is going to happen, so  
20 you have a programmatic inspection that you do.

21 So if I look at Arkansas, for example,  
22 they believe, evidently that some aging may occur of  
23 the components that other applications say they're not  
24 going to happen and so they only have one-time  
25 inspection and Arkansas has programs to inspect many

**NEAL R. GROSS**

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

1 times. Have you thought about that?

2 Let's take an example of small-bore  
3 piping. The other applicants are saying there's no  
4 aging effect coming from it, therefore, we're going to  
5 look at it once and then forget about it. Arkansas  
6 says no, we're going to have it under a program.  
7 We're inspecting under ISI. So they must believe  
8 that that's necessary.

9 Can you comment on that? I mean --

10 MR. ELLIOT: Arkansas took a little bit of  
11 a unique approach where when they first initiated  
12 their Aging Management Review they identified the  
13 components and the environments and then they  
14 identified all of the maintenance activities that they  
15 do on all the programs that are in place. A specific  
16 program addresses specific aging effect as to whether  
17 or not it's not likely to happen. They still took  
18 credit for that program, where I think some of the  
19 other applicants may not have done that. They may  
20 have said that this is not a practical aging effect,  
21 there's no need for us to commit to doing anything,  
22 therefore, we'll do a one-time inspection to verify  
23 that it is not happening.

24 VICE CHAIRMAN BONACA: So that you don't  
25 want to place their commitment on the ISI for --

**NEAL R. GROSS**

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

(202) 234-4433

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

1 MR. ELLIOT: Yes. It shouldn't be taken  
2 as a recognition that they need to do it. It's just  
3 the fact that they feel that they had a program in  
4 place. There's no harm for them to take credit for it  
5 and instead of going through an exercise with the  
6 staff on arguing whether or not it's likely to happen,  
7 they decided that they would leave it in and commit to  
8 it.

9 MR. GRIMES: Dr. Bonaca, I think it's also  
10 important to recognize with risk-informed  
11 in-service inspection there were benefits that were  
12 provided by risk-informing the scope, concluded that  
13 there were some things they had been inspecting and do  
14 not now need to inspect. And so when you say that  
15 Arkansas felt that they needed to do this, Arkansas  
16 felt that they needed to have a  
17 risk-informed in-service inspection program and so it  
18 does have the advantage of picking up small-bore  
19 piping, but at the same time it was compensated for it  
20 by reducing inspections in other areas.

21 MR. SOLORIO: Going to page 8, first row  
22 for reactor vessel internals, reactor coolant system.  
23 For small-bore piping, Calvert and Oconee plan to  
24 conduct a one-time inspection. GALL calls for a one-  
25 time inspection. On page 9, you'll see that ANO isn't

1 there, but that's because they're doing a periodic  
2 inspection, so they are still looking at small-bore  
3 piping.

4 For Hatch, small-bore piping inspections  
5 are the subject of an open item. There is still  
6 continued dialogue on that one so I guess you can ask  
7 Butch in a few more months how that ended up.

8 Moving on to reactor vessel internals.  
9 Calvert has a one-time inspection for CEA shroud  
10 bolts. Oconee does not have a one-time inspection for  
11 similar functioning type of bolts at Oconee because of  
12 a different material. There's not the same concern.  
13 GALL calls out for a plant-specific evaluation for  
14 reactor vessel internal bolts of this nature.

15 ANO has committed to a one-time inspection  
16 of reactor vessel internals that includes bolts,  
17 baffle bolts. Hatch covers aging management of  
18 reactor vessel internals in accordance with BWRVIP  
19 program. I understand that that's been reviewed and  
20 if you want to ask more questions, that's part of the  
21 reason I've put you up here, to help with that.  
22 So generally, you can see how the subject of bolting  
23 isi being covered there.

24 Moving on to steam generators, Calvert has  
25 a comprehensive program that includes inspections of

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 steam generator tube supports at the U-bend area.  
2 Oconee has a different design, but still has a one-  
3 time inspection for some supports due to gamma  
4 radiation concerns that they have. GALL recalls a  
5 plant-specific evaluation. ANO supports -- ANO has  
6 existing programs that cover and support inspections  
7 and of course, Hatch doesn't have steam generators, so  
8 it's not applicable.

9 Moving on to the pressurizer. Calvert and  
10 Oconee have committed to conduct a one-time inspection  
11 of susceptible cladding locations. GALL requires a  
12 plant-specific evaluation. ANO has committed to  
13 conduct periodic pressurizer examinations, polymetric  
14 examinations. It's my understanding also that ANO and  
15 Oconee are planning to perform one-time inspection of  
16 their pressurizer heaters in conjunction with a BNW  
17 Owners Group program or initiative. Of course, again,  
18 Hatch doesn't have a pressurizer.

19 Those are the examples I was going to go  
20 over just because of time, we're running late. Of  
21 course, you can ask questions.

22 MEMBER WALLIS: There doesn't seem to be  
23 much correlation between the entries from the various  
24 plants on the GALL Report.

25 MR. SOLORIO: Well, I mean I really would

1 have to take --

2 MEMBER WALLIS: I don't think we could  
3 possibly go into them all. There just doesn't seem to  
4 be that much correlation. I wondered if there was  
5 some general conclusion you can draw from those.

6 MR. SOLORIO: I was going to -- look at  
7 aux systems. CC is component cooling. That's  
8 actually covered by the CCCS in GALL.

9 Service water and salt water, Calvert.  
10 Service water at Oconee. That is an open cycle.

11 MEMBER WALLIS: It's just given another  
12 name in GALL?

13 MR. SOLORIO: Yes.

14 MEMBER WALLIS: Okay.

15 MR. SOLORIO: I'm sorry. Fire protection  
16 here is equal to LPSW and HPSW there. It's equal to  
17 fire protection here.

18 MEMBER WALLIS: So it's just a translation  
19 problem.

20 MR. SOLORIO: That was a big problem  
21 trying to correlate things between the units,  
22 especially with Oconee for me, anyway.

23 MEMBER WALLIS: It looks like a real  
24 conspiracy against the laity.

25 (Laughter.)

1 MR. SOLORIO: I would just like to  
2 conclude my remarks by saying that GALL has  
3 consistently applied the lessons learned of Calvert  
4 and Ocone and also to a large degree at ANO because  
5 the GALL reviewers were also working with ANO too to  
6 cover the one-time inspection subject. While there  
7 are some differences, I hope I was successful in  
8 explaining that they're due to plant-specific nature,  
9 nomenclature, design, periodic versus one time. So  
10 that's how I would conclude this part of the  
11 presentation.

12 I have one more slide to discuss.

13 (Slide change.)

14 Transparency, page 11, here, provides a  
15 conclusion for our presentation. We hope that we've  
16 impressed upon you a lot of work has been done and  
17 while there could be more work done to address the  
18 five continued dialogue issues, we believe that these  
19 documents should be provided as final so that future  
20 applicants and the staff can benefit from the  
21 stability and efficiency they'll provide. Therefore,  
22 we request your endorsement for issuing the final  
23 documents to begin their implementation.

24 MEMBER LEITCH: Would the -- on the five  
25 issues that we talked about earlier, would the final

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 documents be issued with being silent on those areas  
2 or with the NRC position on those areas? Is there yet  
3 hope of resolving those issues prior to the issuance  
4 of the final document?

5 MR. GRIMES: We would expect to issue the  
6 final documents with the NRC position on those issues.  
7 We've agreed that we can continue to discuss them, but  
8 we've taken a position that we're prepared to defend  
9 in terms of what's necessary and sufficient and even  
10 though the industry would like to continue the  
11 dialogue, we're only going to defend the position that  
12 we're putting forth in the guidance right ow.

13 MEMBER LEITCH: And then I suppose from  
14 reading the preamble of the GALL that if industry, if  
15 on a plant-specific basis they want to take exception  
16 to that, they can always do that and argue that on a  
17 case by case basis.

18 MR. GRIMES: That's correct. And that's  
19 consistent with any regulatory guidance. Applicants  
20 can always propose to depart from the guidance or  
21 depart from standards and justify it on a  
22 plant-specific basis.

23 MEMBER SIEBER: It sort of seems to me  
24 that there's a lot of flexibility in the Standard  
25 Review Plan and GALL and so forth and when I review

**NEAL R. GROSS**

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

(202) 234-4433

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

1 from my location, the plant application and compare  
2 them with all the regulatory guidance that's out  
3 there, particularly in scoping where some is done by  
4 function, other plants do it by system, it's very  
5 difficult and it just seems to me that it's difficult  
6 to navigate through all this and fully understand what  
7 is going on without access to the FSAR and plant  
8 drawings and in some cases system descriptions, so my  
9 impression is that this is not all that transparent  
10 from the standpoint of public analysis and public  
11 consumption.

12 Do you agree with that, Dr. Bonaca?

13 VICE CHAIRMAN BONACA: Yes.

14 MEMBER SIEBER: In other words, I had  
15 difficulty going through all this and understanding  
16 what fit into what boxes and what plant called what  
17 system or what function by what initials and it's just  
18 hard to do, it really is.

19 MR. GRIMES: And I would like to emphasize  
20 we've recognized that and as a matter of fact, I think  
21 the illustration of the language barriers that we  
22 continue to face, that Dave described in the one-time  
23 inspection area clearly indicates that there are  
24 things that we could do to improve the transparency of  
25 the process.

1                   But we've been working on this explanation  
2 since before the draft Standard Review Plan was issued  
3 for trial use in 1997 and so while there are a lot of  
4 things that we could do to improve the clarity and  
5 understanding and communication between the interested  
6 parties, the working affected in interested parties or  
7 WAIPs as I like to refer to them, we think that the  
8 substantial -- excuse me, I think that the substance  
9 that we've accomplished in cataloging what's really  
10 important to a decision about the effectiveness of  
11 Aging Management Programs and guidance to the  
12 reviewers on how to wind their way through the various  
13 current licensing bases and different plant  
14 nomenclatures, we think that we've captured a lot of  
15 that and even though there is still navigational  
16 difficulties, that gets me to the response to Dr.  
17 Bonaca's original request and that is I fully expect  
18 to incorporate another round of lessons learned some  
19 time after the demonstration project.

20                   I'm still not clear in my mind what that  
21 time frame is, probably less than a year after the  
22 original issuance. So we don't have time line or  
23 frequency clearly established. I think that the  
24 summer will give us some idea about how soon we might  
25 see the first update to this guidance.

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

(202) 234-4433

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

1 I also don't know at this point whether or  
2 not we're talking about achieving so much transparency  
3 with the original demonstration that we totally  
4 reissue the guidance in plain language, or whether or  
5 not we're going to continue to nibble away at it and  
6 simply issue supplements to the GALL, SRP and  
7 regulatory guide until such time as we really make  
8 substantial improvements and the NRC's ability to  
9 speak in plain language.

10 The major lesson at this point that I  
11 think that we've learned since the original attempts  
12 to figure out how to draw a license renewal  
13 conclusion, almost exactly a decade ago, with the 1991  
14 rule and I'd say at this point that yes, there's still  
15 a lot more that we can do, but there's so much that  
16 we've accomplished that we would like the ACRS to  
17 endorse the promulgation of this guidance in final  
18 form so that we can start now working on tweaking it  
19 to make it better.

20 MEMBER LEITCH: By this guidance, we mean  
21 not only the GALL report, the Standard Review Plan,  
22 but also the Reg. Guide?

23 MR. GRIMES: And its endorsement of NEI  
24 Guide 95-10, Revision 3.

25 MEMBER LEITCH: Are the differences

1 between the Reg. Guide and 95-10, Rev. 3 resolved or  
2 is there still some --

3 MR. GRIMES: There were no differences.  
4 The Reg. Guide proposes to endorse 95-10, Revision 3  
5 without exception.

6 MEMBER LEITCH: Okay.

7 MR. GRIMES: There is guidance in the  
8 Regulatory Guide that gets to some administrative  
9 details about electronic filing and packaging and so  
10 forth, but the Regulatory Guide does not take  
11 exception to the NEI Guide and we have verified that  
12 Revision 3 incorporates the substantive changes  
13 associated with the Standard Review Plan so that those  
14 two guides are not going to obviously conflict with  
15 each other.

16 MEMBER LEITCH: Okay. One other thing I'd  
17 like to comment on is we haven't talked to anything  
18 about the format of the GALL, but I think this format  
19 is far superior to what we saw four months ago. I  
20 don't know who's responsible for revising it, but it's  
21 much more user friendly than -- to me at least, than  
22 the two-page spread out thing. It's a lot easier to  
23 review.

24 VICE CHAIRMAN BONACA: With that, are  
25 there any more comments or questions for the

1 presenters? For Mr. Grimes? If none, I'll give it  
2 back to you, Mr. Chairman.

3 CHAIRMAN APOSTOLAKIS: Thank you, Dr.  
4 Bonaca. Thank you, gentlemen.

5 We have the first session of the  
6 afternoon, Safety Issues Associated with the Use of  
7 Mixed Oxide and High Burnup Fuels. There will not be  
8 a presentation by the staff. The subcommittee  
9 chairman will brief us for about 20 to 30 minutes. So  
10 what I propose we should do is start our discussions  
11 after the briefing of the Commission meeting in May,  
12 okay? We will not need a transcription. Would you  
13 please come back at 2:50 because we still have a  
14 session that needs to be transcribed.

15 And with that, we'll reconvene at 1:10.

16 (Whereupon, at 12:10 p.m., the meeting was  
17 recessed, to reconvene at 2:50 p.m., Thursday, April  
18 5, 2001.)

19  
20  
21  
22  
23  
24  
25

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

(2:50 p.m.)

1  
2  
3 VICE CHAIRMAN BONACA: We lost our  
4 chairman, therefore we --

5 MEMBER SHACK: That's why we have a vice  
6 chairman.

7 VICE CHAIRMAN BONACA: That's correct. So  
8 I am starting the meeting again and next presentation  
9 that we have right now is the Thermal Hydraulic Issue  
10 Associated With the AP1000 Passive Plant Design and I  
11 believe that Dr. Wallis is leading this discussion.

12 Dr. Wallis?

13 MEMBER WALLIS: Thank you very much.

14 MEMBER POWERS: Will it touch on the  
15 momentum equation?

16 MEMBER WALLIS: I guess we can ask  
17 questions about anything we choose to ask about.

18 The subcommittee met with Westinghouse and  
19 spent about three times as long as we're going to  
20 spend today, but the purpose was really a preliminary  
21 presentation by Westinghouse to let us know what  
22 AP1000 is, how they approached its design and how  
23 they're approaching their application for licensing.  
24 They view this as an informational meeting and they do  
25 not expect us to write a letter at this time.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 I would point out that the staff has yet  
2 to begin their review of AP1000. So it's a big  
3 premature for us to reach some conclusions without  
4 some input from the staff.

5 Without more delay, I'd like to invite  
6 Westinghouse to proceed.

7 MR. WILSON: Good afternoon. I'm Jerry  
8 Wilson. I'll begin the meeting. I'm with the NRC's  
9 Future Licensing Organization and I thought I'd start  
10 out with a little bit of overview on the AP1000  
11 review.

12 Last year, Westinghouse approached us and  
13 said they were thinking about seeking design  
14 certification for their AP1000 design, but before  
15 doing that they wanted to determine what the scope and  
16 cost of that effort would be and more specifically, to  
17 get agreement on --

18 MEMBER WALLIS: Someone has changed the --  
19 I'm sorry, Jerry. Someone has changed -- I introduced  
20 you falsely. Someone changed the agenda on me. I'm  
21 sorry.

22 MR. WILSON: That's all right, Dr. Wallis.

23 MEMBER WALLIS: Maybe you should correct  
24 the record.

25 MR. WILSON: No one would accuse me of

1 being a representative of Westinghouse.

2 MEMBER WALLIS: Maybe you should tell the  
3 record who you really are.

4 MR. WILSON: As I said, I'm Jerry Wilson  
5 and I'm with the NRC staff in the Future Licensing  
6 Organization.

7 Westinghouse had specific issues that they  
8 wanted agreement on to determine -- that would affect  
9 the scope and duration of a review for design  
10 certification and so we set up a three-phased approach  
11 to do this. The first phase was to determine the  
12 issues we should look at for the  
13 pre-application review and estimate the effort to do  
14 that. We completed Phase 1 last July. Met with the  
15 ACRS in August. Got a letter from the ACRS. And also  
16 in August of last year, Westinghouse decided to  
17 proceed with Phase 2.

18 Now in Phase 2, Westinghouse requested  
19 that we evaluate these four issues. Is the test  
20 program that was performed for AP600 sufficient to  
21 support the AP1000 application? They've submitted two  
22 reports as you see here on the overhead. We're in the  
23 process of getting ready to start that review. NRR is  
24 going to be the lead in this review and we're seeking  
25 assistance from Office of Research.

**NEAL R. GROSS**

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

(202) 234-4433

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

1           The next issue is applicability of the  
2 AP600 analysis codes to the AP1000 design review.  
3 Westinghouse has yet to submit the code applicability  
4 report to us. We see this as a key part of our review  
5 and that's the part that will make our assessment when  
6 we officially start the review and so we're waiting to  
7 get that information.

8           They also are seeking additional use of  
9 design acceptance criteria beyond what was done in  
10 AP600. They made a submittal on that area and the  
11 staff has begun its review in that regard.

12           Finally, we have to look at the exemptions  
13 that were granted on AP600 to see if they would still  
14 be granted on an AP1000 review.

15           Now we've estimated that it's going to  
16 take approximately 9 months to do this review.  
17 Although we haven't officially started the review, I  
18 would for planning purposes tell the committee that I  
19 anticipate in approximately 6 months we'll be back  
20 with our recommendations on the Phase 2 results. We'd  
21 like a letter from the committee at that time. We'll  
22 also be preparing a letter, a SECY paper to the  
23 Commission, advising them of our recommendations on  
24 Phase 2 and once we hear from the Commission on that,  
25 then we plan to send a letter to Westinghouse, giving

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 them NRC positions.

2 And Mr. Chairman, that's all I had for  
3 this overview. If there's any questions I can take  
4 them now.

5 If not, then I'll turn the meeting over to  
6 Mr. Corletti of Westinghouse.

7 MEMBER WALLIS: Thank you very much.

8 MR. CORLETTI: Thank you. Good afternoon.  
9 My name is Mike Corletti. I'm with Westinghouse  
10 Electric Company. Thank you for having us today.

11 (Slide change.)

12 MR. CORLETTI: Our agenda, we're going to  
13 be speaking, you see here, I'm going to be talking  
14 about really our purpose for this  
15 pre-certification review and give you an integral NSSS  
16 overview, overview of the NSSS. Then Terry Schulz  
17 will be talking about our passive safety systems  
18 design and analysis. He'll be focusing on the plant  
19 description and analysis report that we submitted in  
20 December, that included a description of the AP1000  
21 and preliminary safety analyses that were performed,  
22 using the codes that were developed and approved for  
23 AP600.

24 Bill Brown will then be discussing our  
25 PIRT and Scaling Report that we submitted last month.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 We really see that as the first key deliverable for  
2 the codes and testing issue because before we can get  
3 to the detailed review of the code, we really have to  
4 come to agreement that the tests that were used to  
5 validate the codes for AP600 are also applicable to  
6 the AP1000. And that report provides scaling to --  
7 our scaling approach is outlined in that report. I  
8 believe you've all received that.

9 Finally, Mr. Gresham will get up and speak  
10 with regards to our planned approach for codes. Our  
11 plan is to the use the codes that were approved for  
12 AP600 and we owe a code applicability report that is  
13 due out mid-month and Mr. Gresham will speak to that.

14 Finally, the other issue is that of design  
15 acceptance criteria and Richard Orr will speak about  
16 our approach for design acceptance criteria and also  
17 talk a little bit about some seismic analysis that had  
18 been completed already for AP1000.

19 (Slide change.)

20 MR. CORLETTI: As Dr. Wallis said, this  
21 meeting is basically an informational meeting. It was  
22 not our intent to ask for a letter at this time and  
23 really to introduce ACRS to AP1000 design, how we've  
24 gone about designing the plant based on AP600. The  
25 objectives of the pre-cert review, I believe Jerry's

1 covered those already and then our proposed approach  
2 resolving these issues.

3 (Slide change.)

4 MR. CORLETTI: We came to the staff last  
5 year about around this time talking about the AP1000.  
6 We had worked on it for some time since we had  
7 completed AP600. When we completed AP600 in the  
8 commercialization of that, the market has changed  
9 significantly from the time that AP600 was initiated  
10 and this is what is driving towards developing the  
11 AP1000. Basically with the approach of using the  
12 AP600 as a basis, we can use the design, the detail  
13 design that we developed on AP600 and really, we're  
14 developing the AP1000 within what we're calling the  
15 space constraints of the AP600.

16 (Slide change.)

17 MR. CORLETTI: You'll see here -- no you  
18 won't. When we say the space constraints of the  
19 AP600, you see here's the AP600 and AP1000 side by  
20 side. So if you look at a plan view, the plants are  
21 essentially the same, the same structurals generally.  
22 The steam generators are somewhat larger to account  
23 for the higher core power. But really, from this view  
24 it looks, it basically is the same view.

25 (Slide change.)

1 MR. CORLETTI: When you look at the  
2 section view, the containment has grown to accommodate  
3 both steam generator removal and the larger mass  
4 energy releases associated with the larger core power.

5 (Slide change.)

6 MR. CORLETTI: On the AP600 or AP1000,  
7 basically we're also trying to use the same components  
8 as much as possible, use proven components that have  
9 been used at Westinghouse plants and others. By using  
10 this approach, we retain the basis for the cost  
11 estimate, the number of components are the same, the  
12 same configuration essentially. Some of the  
13 capacities are increased, but the number of components  
14 and the way they're all put together are essentially  
15 the same.

16 With our approach we're also -- the key to  
17 this is for AP1000, is to meet the regulatory  
18 requirements that we encounter for the passive plant,  
19 so really, we're adopting all the passive plant issues  
20 and also part of that is preserving the large safety  
21 margins that the passive plant had with AP600 and in  
22 our reports that we've sent in today, or up to this  
23 date, have tried to demonstrate that with a  
24 preliminary safety analysis that we've shown to  
25 illustrate the large safety margins that we're

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 preserving with AP1000.

2 MEMBER WALLIS: So 1000 was just chosen as  
3 a nice round number, rather than some optimum and why  
4 isn't it 1200 or 1500?

5 (Slide change.)

6 MR. CORLETTI: Well, basically, the next  
7 slide here, next two slides, we wanted to stick with  
8 a proven core design and so we went to -- for AP1000  
9 we went to a 14-foot core, longer fuel assemblies. We  
10 have 14-foot cores in our South Texas designs and also  
11 in Doel and Tihange, two plants that are in Belgium.  
12 And those plants, actually have 157 fuel assemblies  
13 which are the same as AP1000 so the core design is  
14 essentially the same. Now those plants, the Belgium  
15 plants are at 3000 megawatts thermal. AP1000 has  
16 been, the core power has been increased to the same  
17 level from a power density as our operating three loop  
18 plants.

19 So that was what basically sized -- we  
20 didn't want to make the vessel bigger in diameter. We  
21 made the vessel longer to accommodate the longer fuel  
22 assemblies, but we didn't want to make it, to grow in  
23 diameter, because that would have affected the  
24 structures.

25 MEMBER WALLIS: Not longer than South

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 Texas?

2 MR. CORLETTI: Not longer than South  
3 Texas. We wanted to keep within an experienced basis  
4 that we had with South Texas.

5 (Slide change.)

6 MR. CORLETTI: You see some of the key  
7 comparisons of the 600 and 1000. As I said, the  
8 reactor power is increased from 933 megawatts up to  
9 3400 megawatts thermal. The hot leg temperature has  
10 been increased from 600 to 615, but that again is  
11 within our operating experience.

12 The number of fuel assemblies is  
13 increased. Also the number of control rods is  
14 increased from 45 to 53. The reactor vessel ID is the  
15 same. It's the same ID, again, it's grown in length.

16 The steam generator, the steam generator  
17 surface area has been increased to 125,000 square  
18 feet. It just so happens that as we begin the AP1000,  
19 our steam generator design group had just completed  
20 design and actually has set the steam generators to  
21 the Arkansas units which were a generator of about  
22 1500 megawatts per generator, about this size. We  
23 based the design largely on that design. Since then,  
24 we've merged with Combustion Engineering which has  
25 more experience with designing steam generators at

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 this power level. The team has been working together  
2 to finalize the design of the AP1000 steam generator.

3 Essentially, we'll have the same  
4 performance requirements with the low moisture  
5 carryover of the delta 75 that we had on the AP600,  
6 Iconel 690 thermally-treated tubes.

7 MEMBER LEITCH: Are there any AP600s  
8 actually under construction now?

9 MR. CORLETTI: No sir.

10 MEMBER LEITCH: So your plans for the  
11 AP1000 don't depend upon building any AP600s,  
12 necessarily?

13 MR. CORLETTI: That's right. We're still  
14 basing it on proven components. We're not relying on  
15 this to be a follow-on to AP600. It would be  
16 available, essentially if a customer wanted to  
17 purchase a plant, we believe we can the schedule that  
18 we could do almost either one within the same time  
19 frame.

20 MEMBER LEITCH: Okay, thanks.

21 MEMBER POWERS: Why the 690 alloy for the  
22 steam generator?

23 MR. CORLETTI: That is what we've been  
24 using on their most recent steam generators.

25 MEMBER POWERS: That does not speak highly

1 for it. I mean it's not immune to stress corrosion  
2 cracking.

3 Why not go with the 800 alloy?

4 MR. CORLETTI: I believe that the  
5 operating experience with the 600 has been very good,  
6 690. And they basically have not seen the need to  
7 change. They've had very low incidents of any tube  
8 plugging with this material. It has excellent  
9 operating experience.

10 MEMBER SIEBER: Do you have any Inconel 600  
11 anywhere in the reactor coolant system pressure  
12 boundary?

13 For example, it's extensively used in  
14 current PWRs on the head, some weld filler materials,  
15 etcetera, pressurizer.

16 MR. CORLETTI: No. I cant speak to -- I  
17 can't speak to that. We've been using the approved  
18 materials that we used on the AP600 which more the  
19 Inconel 690 and I know the materials that they selected  
20 were basically in accordance with the latest EPRI  
21 guidelines on materials selection.

22 MEMBER SIEBER: On the other hand, your  
23 Tihange temperatures went up by 15 degrees which puts  
24 it into the sensitivity zone, so the operating  
25 conditions are different than the AP600. I'm just

**NEAL R. GROSS**

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

1 wondering if you made a change to materials in any way  
2 to account for that?

3 MR. CORLETTI: No. It will be the same as  
4 AP600.

5 MEMBER SIEBER: Okay. You also state that  
6 the reactor vessel diameter is the same?

7 MR. CORLETTI: Yes sir.

8 MEMBER SIEBER: But there is 12 extra fuel  
9 assemblies in there? How do you accomplish that?

10 MR. CORLETTI: I don't have that, but  
11 basically on the outer periphery, at the north,  
12 southeast and west of the core, there was room for  
13 three additional assemblies. It's essentially the  
14 same as our three loop plants now that have 157  
15 assemblies. They were eliminated on AP600.

16 MEMBER SIEBER: Okay. So that should  
17 improve the neutronics efficiency a little bit as  
18 opposed to making a 14-foot core reduces your  
19 neutronics efficiency? Does that come out as a sort  
20 of a fuel cost balance or do you know?

21 MR. CORLETTI: I don't know.

22 MEMBER SIEBER: Thanks.

23 MEMBER WALLIS: Well, the power rating per  
24 area of fuel is higher?

25 MR. CORLETTI: Yes, it is. AP600 had a

1 very lower power density core. You see it's 4.1  
2 kilowatts per foot. We've increased it up to the  
3 level that we have in our operating three loop plants.

4 MEMBER WALLIS: That's the main way in  
5 which you get the extra power?

6 MR. CORLETTI: Yes sir. And increasing  
7 the length. One of the consequences to go to the  
8 higher power, we had to increase the capacity of the  
9 reactor coolant pump. The reactor coolant pump is  
10 increased from 51,000 gpm to 75,000 gpm flow rate and  
11 the head is increased from 240 feet to 350 feet of  
12 head.

13 In order to minimize the impact to the  
14 motor, we've gone to a variable speed controller.  
15 That's only used during shutdown. When you start the  
16 pumps up in cold water, that is the largest draw on  
17 the motor and that's typically what the reactor  
18 coolant pumps, Westinghouse's reactor coolant pumps  
19 are sized for. With the variable speed controller it  
20 allows you to start the pumps at low speed in the cold  
21 conditions. When the fluid is heated up to operating  
22 conditions, then that is disengaged.

23 MEMBER SIEBER: Is that an electronic  
24 controller?

25 MR. CORLETTI: Yes.

1 MEMBER LEITCH: Mike, you said used during  
2 shut down. Do you mean start up?

3 MR. CORLETTI: Right. That's right. Shut  
4 down operations is anything called low temperature.

5 And then again, the pressurizer has been  
6 increased with respect to the AP600.

7 MEMBER SIEBER: Do you expect that the  
8 higher flow rates you have at the additional steam  
9 generator tube vibration or fuel vibration?

10 MR. CORLETTI: The fuel vibration you have  
11 to look at the upper guide supports.

12 MEMBER SIEBER: Right.

13 MR. CORLETTI: Because the one that's  
14 right in front of the hot leg is the most and we have  
15 looked at that and we've looked at where we were on  
16 AP600 and we do have sufficient margin, but that is  
17 the most susceptible.

18 On the steam generator tubes, we've  
19 increased the number of tubes, so that the velocities  
20 through the tubes is not appreciably larger.

21 MEMBER SIEBER: Thank you.

22 MEMBER LEITCH: Mike, to go back to the  
23 question of hot leg temperature. I noticed that South  
24 Texas has a hot leg operating temperature of 624 with  
25 Inconel 690. That's apparently a fairly new steam

**NEAL R. GROSS**

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

1 generator, is that --

2 MR. CORLETTI: Yes. We just replaced that  
3 steam generator.

4 MEMBER LEITCH: I was wondering, is that  
5 design temperature or --

6 MR. CORLETTI: That's the operating  
7 temperature. And the units at Doel and Tihange are at  
8 very high hot leg temperatures also. There's many  
9 units, I think you see in the table there that have  
10 operating temperatures.

11 DR. ROSEN: The South Texas Unit 1 steam  
12 generators have been replaced. The Unit 2s have not  
13 yet been replaced. They'll be replaced in 2002.

14 MEMBER WALLIS: Any other questions for Mr  
15 Corletti?

16 MR. CORLETTI: Thank you. The next  
17 presentation is on the passive safety systems and  
18 Terry Schulz is going to present that and basically  
19 our design approach to designing the AP1000.

20 Thank you.

21 MR. SCHULZ: Good afternoon. My name is  
22 Terry Schulz and I will be talking about the passive  
23 safety systems and our design approach to those  
24 systems and try to give you some insights into how we  
25 have come to the sizes and capacities that we've

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 selected.

2 (Slide change.)

3 MR. SCHULZ: First of all, the approach is  
4 to use the same configuration, as Mike pointed out, as  
5 AP600, same arrangement. However, in the passive  
6 systems we know we have to increase the capacities in  
7 some areas and we've selectively looked at where we  
8 think we need to do that to maintain adequate safety  
9 margins.

10 We've considered both deterministic and  
11 PRA conditions and we've also given consideration for  
12 applying margin, as we did in AP600 to where there was  
13 test or computer code uncertainties.

14 The process we used is an iterative  
15 process and we've actually done this a couple of times  
16 already, where we looked at basically a hand  
17 calculation type, sizing, estimating of the  
18 performance using first principle type hand  
19 calculations which are largely independent of test and  
20 analysis.

21 These calculations are typically not a  
22 transient, but a point in time that we select based on  
23 our experience and understanding of the plant. Then  
24 we kind of check that and verify it using the computer  
25 codes, again, at this point in time AP600 computer

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 codes, the same ones we used in the SSAR analysis.  
2 These are not intended or portrayed to be Chapter 15  
3 final analysis. They're kind of check calculations.  
4 They're obviously able to look at the transients, the  
5 integrated effects of the plant response. We've not  
6 done all the events we would eventually do in a SSAR,  
7 but we've looked at what we consider limiting events.

8 And another factor that does affect our,  
9 in some cases what we chose to do, was constraints in  
10 the plant. As Mike pointed out, physical constraints  
11 in the plant can affect the design, the design  
12 approach that we have.

13 MEMBER WALLIS: Did your thermal draw  
14 code analysis lead to significant changes in the  
15 design or did the eventual thing look just like what  
16 you had in your hand calculations?

17 MR. SCHULZ: Well, for example, in the  
18 passive RHR, our initial idea was to increase the pipe  
19 size and not to change the heat exchanger because that  
20 was minimizing the change to the plant and we thought  
21 we had -- and that would give us maybe a 25 percent  
22 increase in capacity, heat removal capacity which is  
23 not nearly as much as the power increase, but we  
24 thought we could compensate for that by having much  
25 more mass in the steam generator. And for some

**NEAL R. GROSS**

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

(202) 234-4433

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

1 events, in fact, that was adequate.

2           However, for other events like a steam  
3 generator tube rupture, it didn't work as well as we  
4 wanted it to, so we introduced another change, was to  
5 increase the capacity of the heat exchanger. So in  
6 fact, there are cases where -- when we went through  
7 the computer analysis, we learned things that we  
8 didn't have in hand calculations and in some cases it  
9 was just other events that we hadn't considered when  
10 we did the hand calculations. In other cases, the  
11 hand calculations are, of course, very simple,  
12 relative to the computer and not as accurate.

13           MEMBER WALLIS: Well, yes, okay.

14           (Slide change.)

15           MR. SCHULZ: The first feature I would  
16 like to talk about is the passive RHR and the  
17 configuration of this heat exchanger and system is  
18 exactly the same as AP600 in terms of valves, the  
19 arrangement of the pipe of the heat exchanger, the  
20 elevations, in fact, are the same. We did increase  
21 the pipe size from 10 inch to 14 inch and we increased  
22 the surface area by adding longer horizontal tubes and  
23 a few more tubes. I think the heat exchanger surface  
24 area increased about 22 percent.

25           (Slide change.)

1 MR. SCHULZ: We did some hand calculations  
2 on both the AP600 and AP1000 which -- and this hand  
3 calculation is actually fairly sophisticated in this  
4 case and using the same correlations we use in our  
5 computer codes. It's to calculate the heat transfer  
6 in the AP1000. It is almost as much as the power  
7 increase with the changes of both the pipe size and  
8 the surface area. Not quite, and you see the time to  
9 match decay heat is a little bit longer. If you also  
10 consider what's going on in the secondary side of the  
11 plant, Mike Corletti pointed out we have these larger  
12 steam generators.

13 We've also applied more water mass on the  
14 secondary side per megawatt than AP600. So at the  
15 beginning of a transient, we've got like 36 percent  
16 more water per megawatt. At the end of the transient  
17 when we've boiled off some of that water, we have  
18 almost twice as much water. So even though our heat  
19 exchanger is a little bit smaller, the net effect of  
20 having more mass in the steam generator means that  
21 we've got even more margin relative to heat removal  
22 capabilities.

23 So from this point of view in terms of say  
24 a hand calculation, we expect the plant to have  
25 increased margins.

1 (Slide change.)

2 MR. SCHULZ: In addition, we have done a  
3 number of transient analyses. I'll show you the feed  
4 line rupture. We also looked at loss of feedwater in  
5 steam generator tube rupture. It's a little hard to  
6 tell which plant is which here, but you can see this  
7 is plotting the saturation pressure versus the -- on  
8 the high side there and the hot leg and cold leg  
9 temperatures down below. And the general trends are  
10 similar. The AP1000 temperatures are a little bit  
11 higher, so the subcooling margin is slightly less, but  
12 it is still very significant, 140 degrees at least in  
13 AP1000.

14 Current operating plants, this temperature  
15 tends to go back up and come within a few degrees of  
16 saturation, not that that is an unacceptable  
17 situation, but it's a measure of safety that we use in  
18 this type of a transient. So our conclusion here is  
19 that AP1000 behaves very much like AP600 in terms of  
20 a transient response.

21 (Slide change.)

22 MR. SCHULZ: The next thing I'd like to  
23 move on to is to talk about the passive safety  
24 injection features. And this includes the  
25 accumulators, the core makeup tanks, the ACS system

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 and the IRWST and recirculation.

2 Again, the configuration, if you look at  
3 this same sketch for AP600, they look exactly the  
4 same. A number of valves, the way the valves are  
5 connected is exactly the same. The elevations are  
6 almost the same except for the pressurizer is a little  
7 taller, so some of those valves are up a little  
8 higher.

9 The core make up tank has been increased  
10 in size about 25 percent and the flow capability has  
11 been adjusted by adjusting a flow tuning orifice so  
12 that the flow is also 25 percent more. So we're  
13 getting a bit more core makeup tank flow. Accumulator  
14 capability has not been changed and I'll speak to that  
15 in just a minute. Fueling water storage tank, the  
16 injection lines, the containment recirculation lines  
17 and the ADS stage 4 pipes have all been made bigger to  
18 make, to increase the capability of IRWST injection  
19 and recirculation. I'll talk about each of these in  
20 turn.

21 (Slide change.)

22 MR. SCHULZ: At the time I have this up I  
23 want to also have this slide up here so I can -- so I  
24 have on the left slide here, a margins assessment,  
25 again a hand calculation type thing, for each of the

1 key features, the accumulator, for example, core make  
2 up tank and so on, where we've tried to get a measure  
3 of how AP600 and AP1000 compare.

4 For the accumulator, we did a kind of  
5 ratio on power density and time to refill the core and  
6 ratio to peak clad temperature. So this is not a  
7 sophisticated, large LOCA analysis. It's a simple  
8 ratio of the fact that AP1000 has the higher power  
9 density. We expect the core to heat up faster in the  
10 reflood stage. And so we think that the peak clad  
11 temperature might be something around 1940 degrees as  
12 opposed to 1640 for -- and these are basically -- the  
13 AP600 number is the best estimate LOCA with  
14 uncertainty as quantified in the SSAR for AP600.

15 And as I mentioned the flow capability of  
16 the accumulator was not changed. And the tank itself  
17 is constrained by concrete walls on the sides and the  
18 floor. It's already a spherical shape so it would  
19 have been pretty challenging to make that tank bigger.

20 The other factor is that there are a  
21 number of operating plants that have large LOCA peak  
22 clad temperatures that are as high and higher than the  
23 1900 and of course, the licensing limit is 2200. So  
24 we feel comfortable with that result.

25 The core makeup tank, I mentioned we

**NEAL R. GROSS**

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

1 increased it by 25 percent both in flow and volume.  
2 What you see here is a comparison of the flow  
3 capability of the core makeup tank as opposed to a  
4 calculated requirement at the point in time when the  
5 accumulator would empty in a direct vessel injection  
6 line break.

7 This is, in our experience, the most  
8 limiting condition for core makeup tank because in a  
9 direct vessel injection line break, one of the tanks  
10 spills, the other one injects and so it has to perform  
11 the whole duty. And you see here the margin of the  
12 design versus this requirement is a little bit less on  
13 AP1000, but it still looks comfortable in this  
14 situation.

15 ADS stages 1, 2 and 3 we have not changed  
16 for the AP1000. It's exactly the same, pipe sizes and  
17 valve sizes. And we think that that is adequate for  
18 AP1000 because at the higher pressures that this  
19 system is important at in terms of the initial  
20 depressurization, we can get adequate flow. So even  
21 though the AP1000 has more power and a bigger reactor  
22 coolant system volume, that this system will perform  
23 adequately and in our computer analysis shows that.

24 On the other hand at ADS stage 4, we've  
25 significantly increased the capacity. I mentioned the

**NEAL R. GROSS**

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

1 pipe sizes go up from 10 inches to 14 inch for each of  
2 the ADS stage 4 lines and there's four of those. And  
3 if you look at with the same delta P across the  
4 system, the flow would go up about 89 percent versus  
5 AP600. That's, of course, not saying it's enough, but  
6 it's giving you a feeling for how much flow capability  
7 we've added to the system.

8 Now the ADS stage 4 works very closely  
9 with IRWST injection and later on, containment  
10 recirculation. Both of those, we've also increased  
11 substantially by making the pipe sizes bigger and in  
12 the case of containment recirculation, we've done one  
13 other thing which is to change the alignment of the  
14 normal RHR system.

15 The normal RHR system is not a safety  
16 system. It doesn't have to work, but it is suggested  
17 in our emergency procedures that the operator should  
18 turn it on because it adds a level of defense. It  
19 also, in the case of a direct vessel injection line  
20 break, would tend to increase the rate at which the  
21 IRWST drains down because it's going to spill more  
22 flow if it's running than if it's not running.

23 This is all accounted for in AP600, but in  
24 AP1000 we changed the normal water supply from the  
25 IRWST which is inside containment, to another supply

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 outside containment. So if the pump works, it will  
2 actually make things better instead of making things  
3 a little worse. And that gave us a somewhat less  
4 severe condition for AP1000. So it's another change  
5 we made to improve the situation for that design.

6 (Slide change.)

7 MR. SCHULZ: If you look at -- and again,  
8 we've done the analysis of several small LOCAs for  
9 AP1000. This is a direct vessel injection line break.  
10 And it's showing you the upper plenum mixture levels.  
11 It's kind of a little hard to show this. This spike  
12 early on is actually AP600. AP1000 doesn't behave  
13 quite the same way and it doesn't mainly because  
14 AP1000 is a little bigger plant and it's the same  
15 break size, so you don't get quite as much rapid blow  
16 down early on.

17 Later on, the response is actually fairly  
18 similar, not exactly the same. AP600 has a little dip  
19 in here when fourth stage is trying to get the  
20 pressure down for IRWST injection. AP1000 actually  
21 has IRWST injection starting a little bit earlier, but  
22 it's not continuous. That's why you're getting some  
23 of these spikes.

24 MEMBER WALLIS: Those periodic spikes,  
25 what are they for? What are they due to?

1 MR. SCHULZ: You're getting intermittent  
2 IRWST injection and when you get the --

3 MEMBER WALLIS: Then it gets starved and  
4 then you --

5 MR. SCHULZ: So when you get injection,  
6 the level goes up, but --

7 MEMBER WALLIS: But it seems to go down --

8 MR. SCHULZ: You can't quite keep the  
9 pressure down, so the injection slows down and the  
10 water level comes back down again. We saw things like  
11 that at OSU and it's something that the plant, AP600  
12 is doing some of it also, not as pronounced.

13 MEMBER WALLIS: You see spikes like that,  
14 though you wonder about the peer program because the  
15 turn around, it's like the stock market. It's headed  
16 for disaster there and then somehow it turns around,  
17 but the accuracy with your computer program has  
18 something to do with the depth of the spike there.

19 MR. SCHULZ: Yes, yes.

20 MEMBER WALLIS: That makes one a little  
21 bit concerned. Things happen so quickly in the spike.

22 MR. SCHULZ: We've got several feet here  
23 and this time scale, of course, is a very long time  
24 scale.

25 But that's something that certainly,

**NEAL R. GROSS**

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

1 should be looked at in more detail when we get into  
2 real safety analysis.

3 DR. ROSEN: What does ADS stand for?

4 MR. SCHULZ: Automatic depressurization  
5 system. I moved my slide. But there are valves  
6 connected to the pressurizer which are stages 1, 2 and  
7 3. These are all sequenced to give you a staged  
8 depressurization. Stage 4 is actually connected on  
9 the hot legs and goes directly to containment. Stage  
10 1, 2 and 3 go from the pressurizer into a sparger in  
11 the IRWST. And those valves are all staged so that  
12 the transient on the reactor coolant system is less  
13 severe.

14 MEMBER WALLIS: Going back to the spikes,  
15 this is sort of the place where you'd like to do some  
16 sensitivity studies to see if you have a sort of  
17 somewhat different disengagement model for the vapor,  
18 whatever the model is. I was sensitive of these  
19 things to those features in the code and you want to  
20 know there are some assumptions you make which would  
21 make those more exaggerated.

22 (Slide change.)

23 MR. SCHULZ: Yes. In summary, in terms of  
24 safety margins, I haven't talked about the loss of  
25 flow, but that's when the reactor coolant pump inertia

**NEAL R. GROSS**

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

1 is important. And you can see AP1000 may be a little  
2 bit less margin than AP600, but both will be  
3 comfortably more than the typical operating plant.

4 Same with the feedline break subcooling  
5 margin which I talked about. Steam generator tube  
6 rupture analysis, AP600 displayed a significantly  
7 enhanced behavior relative to operating plants which  
8 did not require any operator action to mitigate a  
9 steam generator tube rupture. We've done some  
10 preliminary analysis on AP1000 and had the same  
11 result. We don't need operator reactions to mitigate  
12 a steam generator tube rupture.

13 Small LOCA, we've done several. Not the  
14 full spectrum, but several breaks for AP1000 and we're  
15 getting no core uncovering for these smaller breaks like  
16 AP600. I've already talked about large break LOCA.  
17 That's the same result you saw before.

18 MEMBER LEITCH: Isn't that 300 degree  
19 increase and decladding temperature surprising? I  
20 mean when I look at the data I was surprised by that  
21 much of an increase.

22 MR. SCHULZ: Realize where this is coming  
23 from. This is basically taking AP600 very carefully  
24 detailed calculated re-flood temperature rise and  
25 rationing that temperature rise based on the higher

**NEAL R. GROSS**

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

1 power density of AP1000 and that's where that number  
2 is coming from.

3 MEMBER WALLIS: It's not a thermal  
4 hydraulic code calculation?

5 MR. SCHULZ: It's not a thermal hydraulic  
6 code calculation, but we would expect it to go up.  
7 Now whether that's where we end up, we won't know  
8 until we actually do the detailed large break LOCA  
9 analysis. But this kind of a manipulation is we've  
10 done it before on new plant designs and it's something  
11 you can get a reasonable handle.

12 MEMBER LEITCH: Yes, I see. Thank you.

13 MEMBER WALLIS: If it wasn't the criteria,  
14 do you think you might tweak your design to get the  
15 desired PCT rather than finding what PCT you just  
16 happened to get?

17 MR. SCHULZ: Well, we actually considered  
18 running the accumulators faster. We can do that.  
19 However, they also empty quicker and there's other  
20 transients, especially in PRA space where the  
21 accumulator is say the only means of defense at high  
22 pressure because we've had common mode failure of the  
23 core makeup tanks which is not a design basis  
24 consideration, but it is something we consider in the  
25 PRA.

1           And running the accumulator faster there  
2 is not good in terms of the balance of safety here  
3 between large break LOCA and small break LOCA. So  
4 after considering that the PRA sequences, we felt that  
5 it was better to run the accumulator the same speed  
6 and take a little less margin in large break LOCA and  
7 again, it says good or better than a lot of operating  
8 plants. So we don't feel uncomfortable with the large  
9 break LOCA.

10           MEMBER WALLIS: But generally speaking,  
11 you are asking for somewhat less margin in all of  
12 these areas than you have with AP600?

13           MR. SCHULZ: No. I don't think that's  
14 true.

15           MEMBER WALLIS: Aren't all the numbers --

16           MR. SCHULZ: Well, small break LOCA, we're  
17 basically saying they're the same. If you look at the  
18 capability at stage 4 at IRWST injection and  
19 recirculation, we think we've actually added more  
20 margin into the design and so we'd expect that  
21 performance to be probably a little better.

22           Some of the other cases, yes. Feedline  
23 break is a little bit less, but again, it's much  
24 better than operating plants.

25           I need to wrap up pretty quickly here.

1 (Slide change.)

2 MR. SCHULZ: The containment comparison,  
3 as Mike showed, we've made the containment higher.  
4 It's about 22 percent bigger in free volume. We've  
5 also increase the design pressure from 45 psig to 59  
6 psig. It's a steel shell containment so we're getting  
7 that pressure increased by increasing the thickness a  
8 little bit, changing the material and we've also  
9 increased the amount of water that's on top of the  
10 containment so that we can account for the increase in  
11 decay heat.

12 MEMBER POWERS: Did you change your  
13 configuration around there, the hatchway?

14 MR. SCHULZ: You're talking about the  
15 containment hatch?

16 MEMBER POWERS: Right.

17 MR. SCHULZ: We actually ended up making  
18 the hatch smaller.

19 MEMBER POWERS: It looks like it.

20 MR. SCHULZ: Yes. This hatch is sized to  
21 remove a steam generator. Because our steam  
22 generators got so big that we've decided that's not  
23 practical to remove the steam generators out the side  
24 and we would have to cut a hole in the top of the  
25 containment and remove it through the containment

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 shell.

2 MEMBER POWERS: So your vulnerable  
3 location around the hatchway is not so bad now?

4 MR. SCHULZ: That's right.

5 MEMBER SIEBER: The containment itself has  
6 no sizeable concrete structure on the outside, I take  
7 it?

8 MR. SCHULZ: It's a steel pressure vessel  
9 that's 1-3/4th inch thick. There is a separate shield  
10 building, a concrete shield building that's offset  
11 from that and that actually in our case provides the  
12 air inlet which comes down outside of a baffle that's  
13 in between, turns and goes up closer, with closer  
14 spacing relative to the containment and that's part of  
15 our passive containment heat removal.

16 MEMBER SIEBER: How thick is the concrete  
17 in the wall there?

18 MR. SCHULZ: It's about 3 feet.

19 MEMBER SIEBER: So it has the equivalent  
20 shielding capability for severe accident capability?

21 MR. SCHULZ: Oh yes, for severe accident,  
22 missile shields, radiation shielding, yes.

23 MEMBER SIEBER: Thank you.

24 DR. ROSEN: Have you actually done a steam  
25 generator removal study for the AP1000?

1 MR. SCHULZ: I think so, yes. Yes, we  
2 have. Yes.

3 (Slide change.)

4 MR. SCHULZ: And the final slide I have  
5 here speaks to the containment performance. We looked  
6 at both large LOCA and large steam line break. The  
7 large LOCA has a very similar response to AP600 where  
8 the first peak is significantly below the design  
9 pressure. The second peak is also well below design  
10 pressure, assuming more realistic steam generator  
11 energy input. This was an issue discussed a lot on  
12 AP600. Our SSAR results show a much higher second  
13 peak, but it has a very overly conservative sort of  
14 unmechanistic transfer of heat from the steam  
15 generator into the reactor coolant system.

16 The steamline break is limiting in this  
17 plant. However, it's a much simpler analysis in that  
18 it happens early and the passive containment cooling  
19 is not really much of a factor in this peak. So how  
20 well the passive system performs is it's just more  
21 simple volume and some passive heat sinks involved.

22 Are there any questions?

23 MEMBER SIEBER: Do you use sprays to  
24 control the containment pressure?

25 MR. SCHULZ: No. There are no sprays in

1 the plant from a design basis point of view. So all  
2 the heat removal is through the passive containment  
3 cooling system and the passive heat sinks in the  
4 plant. There is a connection to the fire system, but  
5 it's a sort of PRA-type severe accident capability  
6 that takes manual alignment and it's a long-term type  
7 operation. It would not be effective in a short-term  
8 peak pressure situation.

9 MEMBER WALLIS: Okay, shall we move on?

10 MR. SCHULZ: Yes.

11 MEMBER WALLIS: Thank you very much.

12 MR. SCHULZ: You're welcome.

13 (Slide change.)

14 MR. BROWN: Okay, we'll move on to --

15 MEMBER WALLIS: This is an open session,  
16 is it?

17 MR. BROWN: Yes, there is nothing  
18 proprietary here.

19 I am Bill Brown from Westinghouse and I'll  
20 be going over the AP1000 PIRT and scaling assessment  
21 that was done.

22 (Slide change.)

23 MR. BROWN: We had already submitted our  
24 report and last month here we met with the Thermal  
25 Hydraulic Subcommittee and I made a rather lengthy

**NEAL R. GROSS**

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

1 presentation on that of which I will try to go through  
2 quickly.

3 The main goals here was to try to  
4 determine the extent to which AP600 could be used for  
5 AP1000 and our main goal was to be able to use this  
6 database for code validation in accordance with 10 CFR  
7 Part 52.

8 The basic steps we used was first, take  
9 the PIRTs which identify all the phenomena, have them  
10 reviewed again by several experts for application to  
11 AP1000 and then take the results of these and look at  
12 the high ranked, important phenomena and then assess  
13 that relative to AP1000.

14 (Slide change.)

15 MR. BROWN: This gives you a quick idea of  
16 some of the experts that we talked to, Dr. Bajorek,  
17 Dr. Bankoff, Dr. Hochreiter from Penn State, Dr.  
18 Peterson from UC and Dr. Larson and Mr. Wilson from  
19 INEEL. The main result of this was that we really  
20 found that there was very, very few changes  
21 whatsoever. Large break LOCA indicated that core  
22 entrainment was a little bit higher and in the small  
23 break LOCA we found that entrainment again in the ADS-  
24 4 two-phase pressure drop was increased and we had no  
25 changes whatsoever for the containment and/or for the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 non-LOCA transients. So essentially, we're looking at  
2 really virtually no change for the AP1000.

3 (Slide change.)

4 MR. BROWN: We addressed quite a  
5 significant amount of phenomena here and this gives  
6 you kind of a flavor for the types of things that we  
7 looked at: reactor vessel inventory, core exit  
8 quality, ADS floor, injection through the sump and the  
9 CMT, containment pressure, the heat and mass transfer  
10 to sinks on containment. We looked at these more from  
11 what I would call a system level top down and then  
12 sort of bottom up we looked at some more detail or  
13 local phenomenon such as entrainment, surge line  
14 pressure drop, phase separation and so on.

15 (Slide change.)

16 MR. BROWN: The basic approach in the  
17 scaling that we used for assessment was we focused in  
18 on the high-ranked phenomena especially for the areas  
19 in AP600 where certainly major interest would seem to  
20 be the small break LOCAs since we were interested in  
21 the core cooling and the vessel inventory, and then of  
22 course, containment pressure and steam line break.

23 Areas in which we already have data that  
24 are found in convention PRW data bases such as large  
25 break LOCA phenomena, blowdown and steam generator

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 recirculation, things like these, we didn't really  
2 look at these. We looked at the things which were  
3 unique to the passive plants and which we were  
4 interested in making sure that we could use the data  
5 from AP600. And we did not go in and assess things  
6 that were of low importance. We focused on the high  
7 level.

8 (Slide change.)

9 MR. BROWN: So we started from using our  
10 AP600 scaling analysis as our basis. We tried, of  
11 course, to learn from what we had discovered from  
12 AP600 and tried to look at the major features which  
13 were different such as the things you've heard before  
14 earlier discussed about core power, volume, the  
15 automatic depressurization system area and how these  
16 things would compare.

17 And what we essentially found for the  
18 separate effects type test we really look at the  
19 operating conditions and the geometric similarities  
20 with those. When we got into things such as the  
21 integral effects tests, we really had to do some  
22 supplemental scaling analysis.

23 (Slide change.)

24 MR. BROWN: To give you an idea, a flavor  
25 of the type of -- again, the number of tests that we

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 looked at in AP600 which was something in the  
2 neighborhood of a \$40 million program, quite  
3 extensive, we had a couple of integral effects tests,  
4 SPES, OSU, ROSA-AP600 which was NRC funded.

5 We had a large scale test facility for  
6 containment and we had a whole host of separate  
7 effects tests for the automatic pressurization system,  
8 the core makeup tanks, the passive RHR heat exchanger  
9 and numerous containment tests for the heat and mass  
10 transfer for the plates that we had and their vertical  
11 surfaces in containment, the water distribution and so  
12 on. And for all of these, we provided an assessment  
13 and for several of these we actually did a new scaling  
14 analysis for.

15 MEMBER KRESS: I don't recall the  
16 University of Wisconsin Condensation Test.

17 MR. BROWN: Yes, that was the condensation  
18 tests that were done at -- with the Coradini people up  
19 there.

20 MEMBER KRESS: The effects of non --

21 DR. ROSEN: That was the flat-plate tests.

22 MR. BROWN: Yes, that was the flat-plate  
23 tests, yes, right.

24 MEMBER WALLIS: I was thinking about the  
25 scaling analysis. You showed us a lot of comparisons

**NEAL R. GROSS**

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

1 with just sort of this effect versus that effect and  
2 their imbalance about the same in the experiment is in  
3 the real thing and there was a number that should be  
4 1 and it's 1.1 or something you showed us. But those  
5 were sort of pair by pair and something like OSU, OSU  
6 actually tries to model the whole thing and you've got  
7 many things that interact during the whole transient.  
8 I think your scaling analysis was more pair by pair,  
9 so you wouldn't be able to -- OSU was design to model  
10 AP600 everywhere.

11 MR. BROWN: It's an integral effects test.

12 MEMBER WALLIS: OA models AP1000 every --  
13 it may have -- this pair of effects may be in balance,  
14 but when you put the whole thing together, it's not  
15 going to be quite a model of AP1000, is it?

16 MR. BROWN: There will be as any of the  
17 integral effects test facility, there are things of  
18 lower importance of which are not in exact balance and  
19 part of the premise of this was that we had  
20 established by going through AP600 very painfully that  
21 there was a number of things in there which don't  
22 become important and some of them simply because  
23 they're not active.

24 For example, once the automatic  
25 depressurization system goes off, the passive RHR, the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 core makeup tanks, for example, can essentially be  
2 drained and it was found both numerically doing the  
3 analysis as well as though the tests that the energy  
4 removal of these components is very small. You can go  
5 ahead and scale them, but they're not very  
6 significant.

7 MEMBER WALLIS: That was not very clear.  
8 You looked to scaling as CNTs and injection from the  
9 IRWST, all of these. If you scaled each one of those  
10 phenomena, but in the whole transient, they're all  
11 interdependent. At the starting point for one phase  
12 is where you've finished at the previous phase, the  
13 effects go through the transient. Really, you have to  
14 run the code or something to get the whole system  
15 effect.

16 MR. BROWN: We do break the scaling up  
17 into phases, yes. We do not have, if you're looking  
18 for an analysis which would start from time zero and  
19 look at the whole snapshot, yes, we do, we do break  
20 them up.

21 MEMBER WALLIS: OSU is sort of trying to  
22 scale everything after a certain time.

23 MR. BROWN: We find OSU is particularly  
24 good once the system is low pressure. It's a low  
25 pressure facility and not surprisingly you find that

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 it's very well scaled once the system is depressurized  
2 to low pressure.

3 MEMBER WALLIS: The thing I'm getting at  
4 is that the interactions between the systems, other  
5 than in pairs really has to be modeled by something  
6 like a thermal hydraulic code for scaling analysis  
7 balances.

8 MR. BROWN: Yes, you get to the point with  
9 scaling where you very quickly and I think Dr. Zuber  
10 found this out in AP600, although he had the vision of  
11 this, you pretty quickly get to the point that in  
12 order to be able to work with the set of equations  
13 that very quickly you put the complexity in where you  
14 now need a code to solve them and you no longer have  
15 a scaling analysis.

16 But one of the things that I think we've  
17 gone to be able to help that out is one knowing, for  
18 example, that no all, even though we have all of these  
19 passive components, potentially available, not all of  
20 them are operating at each phase during a small or  
21 LOCA transient. Not all of them are always  
22 significant. And you can also determine that by  
23 scaling and the testing to bear that out. I mean, for  
24 example, we have a small break LOCA, that's a one inch  
25 or a two inch break.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1           It's very important during the blow down  
2 phase and during natural circulation, once you open up  
3 this huge hole, we call on automatic depressurization  
4 system there. Suddenly, the mass and energy out of  
5 this break becomes nothing, so I could continue to  
6 scale this for you, but we find it's not significant  
7 and that's why I didn't bother focusing that in this  
8 report. We focused on the things that were important  
9 when they were important.

10           And we have reams and reams of notebooks  
11 in AP600 that were submitted and we went through that  
12 process significantly. I attempted to do that and put  
13 all the components in each particular phase that were  
14 all active. In many cases, I painfully found out that  
15 many of them were just simply not important.

16           There was questions like, for example,  
17 momentum distribution effects once the ADS system went  
18 off and we pretty much found that maybe other than the  
19 surge line which leads up to the ADS 1, 2, 3, it's  
20 pretty much their pressure distribution around the  
21 system. It's not very significant while the system is  
22 in critical flow.

23           Okay?

24           MEMBER LEITCH: There's a statement in the  
25 executive summary of the blue book here that puzzles

**NEAL R. GROSS**

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

1 me a little bit. Basically it says that starting with  
2 the AP600 and then demonstrating through scaling that  
3 the -- I'm sorry, starting with the AP1000 and then  
4 demonstrating through scaling that the AP600 program  
5 applies to the AP1000 and therefore that the AP600  
6 analysis codes are applicable to the AP1000.

7 It seems to me that you're saying through  
8 scaling the test programs are comparable or can be  
9 scaled?

10 MR. BROWN: Yes.

11 MEMBER LEITCH: And then you say and  
12 therefore the analysis codes can be scaled. That's  
13 not intuitive obvious to me.

14 MR. BROWN: I guess we need to restate to  
15 what was probably intended is that if we have a set of  
16 scaled facilities and through scaling we determine  
17 that they cover the most important phenomena that we  
18 expect to see in the full-scale test and we have  
19 demonstrated through scaling that these test facilities  
20 are applicable to the  
21 full-scale plant and therefore we say now if the codes  
22 which in AP600 they were, the codes were then  
23 validated to that database, and if the scaling still  
24 exists between the test facilities to AP1000  
25 therefore, we should be able to use those 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](http://www.nealrgross.com)

1 validated codes because now we're validating to the  
2 same data base and we're saying as long as it's still  
3 applicable and that's the key, if through scaling it's  
4 still applicable, therefore the codes are also now  
5 validated for an AP1000.

6 So you're basically saying if my codes can  
7 predict the test facility and the test facility is  
8 sufficiently scaled to the plant, I can use them to  
9 predict the plant performance. That's the philosophy.  
10 That's what was done in AP600 and we're taking the  
11 same philosophy here.

12 MEMBER LEITCH: Okay.

13 (Slide change.)

14 MR. BROWN: So the major results that came  
15 up here, similar to AP600, we were able to find at  
16 least one integral effects test facility for each  
17 phase of a small break LOCA transient which was able  
18 to address the important phenomena to AP600 to that it  
19 was suitable for code validation and we found  
20 specifically that, for example, the SPES facility was  
21 acceptable through the high pressure phase of a  
22 transient, but it became distorted after the ADS 4  
23 which is our biggest flow path would open up and goes  
24 to subsonic.

25 But on the other hand, we were able to

1 cover that because we've got OSU which is good at the  
2 low pressure phases.

3 MEMBER KRESS: When you say distorted, the  
4 time rate of change of things are different.

5 MR. BROWN: Yes, like for example, you do  
6 get a -- because of the vent area relative to the  
7 volume, for example, you can get a distortion with  
8 that.

9 MEMBER KRESS: But you go through the same  
10 set of phenomena.

11 MR. BROWN: Yes, you do.

12 MEMBER KRESS: So you don't distort the  
13 phenomena.

14 MR. BROWN: Yes.

15 MEMBER KRESS: You just distort the --

16 MR. BROWN: The timing.

17 MEMBER KRESS: The way timing goes.

18 MR. BROWN: Yes. And I think that's  
19 sometimes a bit of an issue with the consultants at  
20 times with the scaling and I would say that really if  
21 you want to go back and take out time in here, we're  
22 very well scaled. I mean even better. But when you  
23 actually factor in the timing in here which I've done  
24 as well, you can find that maybe some of the  
25 facilities are better scaled with actually preserving

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 the time in which you would --

2 MEMBER WALLIS: This would really muddle  
3 the phenomenon, the timing wouldn't be important.

4 MEMBER KRESS: That's right. That's what  
5 you're saying. You know the timing is going to be  
6 different anyway for the scaled test.

7 MR. BROWN: It's hard to preserve.

8 MEMBER KRESS: You can't preserve the  
9 whole thing.

10 MR. BROWN: Right. It certainly helps if  
11 you can get the timing as well. That's certainly a  
12 bonus if you can do that, yes.

13 That's really the only difference. I  
14 think that's the best way to think about this plant  
15 really. You're really boiling down to things like  
16 volume and area and power and you're talking about  
17 timing. I mean really we're not talking about any  
18 different phenomenon. That's why our position on the  
19 codes are, we have the same phenomena. Our experts  
20 tell us we have the same phenomena. We have it  
21 covered in the tests and we're really talking about  
22 the rate at which it happens. That's it.

23 And if we can't model volumes and areas  
24 and powers, I think we probably better quick. It  
25 should be --

1                   MEMBER KRESS: You have to get to the  
2 momentum equation.

3                   (Laughter.)

4                   (Slide change.)

5                   MR. BROWN: We found also over our  
6 Separate Effects Test also again covered our ranges  
7 and we've got the same phenomena, so we think that  
8 those are applicable.

9                   With regard to some pass of the  
10 containment cooling system, with regard to this  
11 pressure transient issue which you just mentioned, Dr.  
12 Kress, we still found we have our large scale test  
13 facility for containment is very good for evaluating  
14 heat and mass transfer correlations, but because of  
15 the power to volume distortion, if you will, the  
16 timing of the pressure transient is not perfectly  
17 preserved to an AP600, so it's not a good  
18 representation of a pressure transient, but it  
19 certainly has the appropriate phenomenon to use for  
20 heat and mass transfer correlations.

21                   MEMBER KRESS: When you get a condensation  
22 on the walls of something like that, actually the rate  
23 of condensation gets to be important in terms of the  
24 effect of noncondensibles. I was -- my question on  
25 that is were your separate effects test able to cover

1 the same rate of condensation that you expect to get  
2 here, rate per unit area is what I am interested in.

3 MR. BROWN: Yes. We have the -- if you  
4 want to look at heat flux, we looked at things like  
5 the Reynolds number of the film, that type of thing.  
6 Yes, we're still -- in the AP600, we did a very good  
7 job, I think, of being able to cover the range because  
8 were trying to anticipate a very wide variation in  
9 these things. So there is a very significant range  
10 that's covered in those tests. Very large range. And  
11 it's in some of the tables in that report if you look  
12 back in the containment section you'll see the large  
13 range that was in there. I didn't think we had enough  
14 time to go through that here.

15 We also had done some CFD analysis which  
16 was very simple. It was a 2-D slab. We weren't  
17 trying to claim that this was -- you're shaking your  
18 head already.

19 MEMBER WALLIS: Unacceptable.

20 MR. BROWN: What we were trying to address  
21 here was the height to diameter effect. I mean  
22 because one of the questions I think that we asked  
23 ourselves right away was well, mixing and  
24 stratification was of interest in AP600. This is a  
25 very big plant. And we were increasing it by 25 more

**NEAL R. GROSS**

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

1 feet and we wanted to ask ourselves well, given  
2 whatever AP600 is, how do we compare to this? So we  
3 used this as a tool.

4 When we presented this to the Thermal  
5 Hydraulic Subcommittee, Dr. Wallis asked us if we  
6 could just simply rotate this in 3-D and see whether  
7 or not we could look at the three dimensional effects  
8 as well. I see he's still shaking his head.

9 MEMBER WALLIS: It's a different problem.  
10 I mean drawing of a plank is different from drawing a  
11 log. Cylindrical geometry is not a plane. It's  
12 different.

13 MR. BROWN: I agree. The attempt was to  
14 try to look at what the --

15 MEMBER WALLIS: I think the attempt was  
16 good. Now you have to -- right.

17 MR. BROWN: That's a start.

18 MEMBER KRESS: If you're just validating  
19 that your containment is well mixed, I think the  
20 ability to well mix 2-D is harder than to well mix the  
21 3-D and if you can do it with the 2-D, you ought to be  
22 able to do it with the 3-D.

23 What do you think, Graham?

24 MEMBER WALLIS: I don't know. Maybe  
25 you're more easily convinced than I am.

**NEAL R. GROSS**

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

1 MEMBER KRESS: I say that because --

2 MEMBER SHACK: It's only a 2-D problem.  
3 It's just an axis symmetric 2-D problem not a plane 2-  
4 D problem.

5 MEMBER WALLIS: So just use  
6 polycoordinates and solve the equations. It's simple.

7 MR. BROWN: All right. We can scale it.

8 MEMBER WALLIS: I don't know, what fluent  
9 does is simply says are you using polycoordinates or  
10 Cartesian. You say one or the other and it solves it.  
11 You just have to make that decision, that's all.

12 MR. BROWN: There's a lot of mesh  
13 generation, a lot of babysitting.

14 MEMBER WALLIS: Well, most CFD codes just  
15 generate the mesh for you. You should do it.

16 MEMBER KRESS: You should do it just to  
17 satisfy the naysayers. It's good for your soul.

18 MR. BROWN: Okay. Comment received.

19 MEMBER WALLIS: Hit me with the bottom  
20 line. Is it well mixed or just stratified?

21 (Laughter.)

22 MR. BROWN: Well, what we found, what we  
23 saw in the 2-D was we really saw virtually no  
24 difference. It was very well mixed. In fact, it was  
25 probably better mixed. It was almost -- when you got

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 to the near last several inches of the boundary there,  
2 you couldn't see any gradient whatsoever. It was very  
3 well mixed.

4 MEMBER KRESS: As I casually mentioned in  
5 the subcommittee meeting, you're better off if it's  
6 not --

7 MR. BROWN: Say it a little louder.  
8 Right, that was good.

9 (Laughter.)

10 We're really trying to say is if we allow  
11 the steam to even allow it to stratify, it's even  
12 better because we have this nice Raley-Bernard  
13 convection problem with this very cold surface on top  
14 of a hot surface, which you would expect would mix  
15 pretty well.

16 (Slide change.)

17 MR. BROWN: In conclusion then, we found  
18 that -- we think that the phenomena looks similar to  
19 AP1000. We think we have the test, both separate  
20 effects and we can find at least one integral effects  
21 test to cover each phase of the AP1000 small break  
22 LOCA transient and therefore our analysis codes can be  
23 validated here and therefore are applicable to AP1000  
24 and so therefore we should have a sufficient database  
25 for code validation in accordance with the

**NEAL R. GROSS**

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

1 requirements of 10 CFR Part 52.

2 MEMBER WALLIS: Now that may be a  
3 reasonable conclusion. It doesn't mean to say that  
4 you'll reach the same conclusions about AP1000 that  
5 you did about AP600 when you actually run the codes  
6 because it may turn out that these small changes in  
7 geometry and the mass, be more mass here than there  
8 and so on, actually have fairly significant effect on  
9 something that matters when you go from 600 to 1000.

10 MR. BROWN: I agree with you. And all  
11 we're saying is we can use the same tool to predict  
12 that, that's all we're trying to get across here. We  
13 agree that the answers could look a bit different and  
14 I would be a little worried if they didn't probably if  
15 they looked exactly -- we really expect that we're  
16 saying is we have the same similar phenomenon so  
17 therefore we can use the same tool.

18 MEMBER WALLIS: When we look at those  
19 answers and we look at sensitivities, it may be that  
20 you have to get something righter than 1000, let's say  
21 like entrainment from the vessel or something. You  
22 have to model something better with 1000 or maybe  
23 less, less well.

24 MR. BROWN: We need the approved Dr.  
25 Graham Wallis correlation first to do that because

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 what else is out there isn't --

2 MEMBER WALLIS: I haven't had correlations  
3 for some time.

4 MR. BROWN: We need another one.

5 (Laughter.)

6 MR. BROWN: What's out there right now.

7 Any other questions?

8 DR. ROSEN: The stage 4 operation of the  
9 ADS, how does one test that during normal operation of  
10 the plant?

11 MR. BROWN: Terry could probably address  
12 that, Terry Schulz.

13 MR. SCHULZ: This is Terry Schulz from  
14 Westinghouse. The stage 4 valves are squib valves.  
15 So they're not cycled in the plant. The ASME code  
16 addresses squib valves in terms of in-service testing  
17 and what they allow you to do is to remove  
18 periodically and this is on like a 5 to 8 year basis  
19 the propellant that would actually operate the valve  
20 and that's the main question about the operability of  
21 the valve because everything else is pretty passive  
22 and simple in terms of the operation.

23 And you remove that after it's been in  
24 service and you go into a test fixture and actually  
25 fire it in a test fixture and determine if it would

**NEAL R. GROSS**

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

1 have operated. And by doing this you can then and  
2 also in terms of the quality and QHX on the  
3 propellants that you trace through the life from when  
4 you first made the propellants until you've checked  
5 it, that's what you would do.

6 You would also do some inspections to make  
7 sure the pipes are not plugged up or something like  
8 that, but the geometry is very simple in the stage  
9 four. It's not very complicated at all, very short  
10 pipes, big pipes. The main thing is whether the valve  
11 would operate or not and that's addressed in ASME  
12 code.

13 DR. ROSEN: What size valves are those?

14 MR. SCHULZ: In AP600, they're 10-inch.  
15 On the AP1000, they're 14-inch.

16 DR. UHRIG: Terry, on the squib valves, do  
17 you do continuity testing on the circuitry from time  
18 to time?

19 MR. SCHULZ: I know we discussed that on  
20 AP600 and I'm trying to remember what we concluded.  
21 I think we concluded that we would at least  
22 periodically do that, like when we change the  
23 propellant. We would not do it continuously. I don't  
24 know if there's anything else we committed to do.

25 DR. UHRIG: I'm just wondering because you

1 say 5 to 8 years. I'm wondering just like every year  
2 or something, you might test the conduit of the  
3 circuit to make sure that's --

4 MR. SCHULZ: I'm not 100 percent sure of  
5 what we committed to there.

6 DR. UHRIG: Thank you.

7 MR. BROWN: Any other questions? Okay.  
8 Thank you.

9 (Slide change.)

10 MR. GRESHAM: Good afternoon. My name is  
11 Jim Gresham. I'm with Westinghouse and I have just a  
12 few slides here to give you an overview of the  
13 approach on codes and analysis for AP1000.

14 (Slide change.)

15 MR. GRESHAM: As has been mentioned at  
16 least twice already today, probably more, we're  
17 starting with the computer codes that were used for  
18 AP600 and approved for that application and just  
19 assessing the differences in the plant and design test  
20 and so forth. So from that starting point we're  
21 confirming the adequacy of these codes for the AP1000  
22 design and I have another slide that talks about the  
23 steps in that.

24 Any potential concerns that there are in  
25 that review we'll have to address and as well as that

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 in the AP600 review and in the AP600 FSER, there were  
2 some concerns with the codes mentioned. We are  
3 addressing all of those.

4 MEMBER WALLIS: I wonder how you can do  
5 this ahead of time. It seems to me that you have to  
6 actually exercise the code for AP1000 and see what  
7 kind of things you're getting from it and if you find  
8 something which concerns you, which didn't concern you  
9 with AP600 then you're going to have to say it's not  
10 quite the same. I don't think you have a carte  
11 blanche that says because it worked for 600, it must  
12 work for every aspect of 1000.

13 MR. GRESHAM: I would agree with that.  
14 Some of the items that were mentioned on AP600 I think  
15 we have to deal with up front. But you're right in  
16 that as you look at the analysis results you'll see  
17 things and you need to understand why.

18 MEMBER WALLIS: So I don't know that we  
19 can -- you can reach consensus on this as a starting  
20 point. I don't think we can reach consensus early on  
21 about acceptability until we see how it works.

22 MR. GRESHAM: Yes, I agree with that  
23 statement.

24 MEMBER WALLIS: Thank you.

25 (Slide change.)

1           MR. GRESHAM: The steps that we used or  
2 are using to confirm the adequacy of the codes is  
3 first to look at the important phenomenon that exists  
4 in the plant and this has been done through the PIRT  
5 in the scaling report which Bill already discussed  
6 with you.

7           We need to identify the correlations and  
8 the models that are used in each of the codes to  
9 analyze the important phenomena in the design and  
10 since we're starting with the AP600 approved codes and  
11 have confirmed the phenomena are the same, that's  
12 already been done in the AP600 design certification  
13 process. We're relying a lot on that information.

14           Then demonstrate that the test data are  
15 adequate and for validation of the codes and that has  
16 been demonstrated in the scaling in the PIRT work and  
17 then as I mentioned we have to demonstrate that the  
18 limitations that have already been identified are  
19 being adequately addressed.

20           MEMBER WALLIS: And to reiterate, there  
21 may be some other limitations that emerge when you  
22 start working on AP1000. We don't know if there will  
23 be, but there might be.

24           MR. GRESHAM: Yes, there might be and --

25           MEMBER WALLIS: Just the fact that you

1 have addressed the AP600 ones doesn't mean that you've  
2 found all the ones that might apply to 1000.

3 MR. GRESHAM: Yes. We have some  
4 confidence as we proceed through here because nothing  
5 is identified in the PIRT or the scaling work, but  
6 certainly all the way through here, we need to be on  
7 the look out for that.

8 (Slide change.)

9 MR. GRESHAM: There are several ways that  
10 we may choose to address these limitations. And these  
11 include, there may be one or more of any of these, but  
12 it's possible to change the design. Terry talked  
13 about some of the changes in the design that has led  
14 to actually more margin in some cases.

15 We may find the phenomena that we feel  
16 like we need to do some additional validation to test  
17 to understand the effects better and then complete the  
18 story relative to the codes.

19 Just by evaluating that there's a lot of  
20 margin in some area may be, may go toward addressing  
21 limitation in the code.

22 We will do in some cases additional  
23 analyses such as the CFD calculations that we already  
24 discussed to address a limitation for a code or in  
25 some portion of the code, either a portion of 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](http://www.nealrgross.com)

1 transient where different phenomena are occurring or  
2 a particular model that the code has to be able to  
3 show that we have some concerns about. And use this  
4 analysis not as the safety analysis in the SSAR, but  
5 as additional information to show the effects that  
6 will occur in the plant that are predicted to occur in  
7 the plant. And there may be some cases, we have not  
8 found any yet, but there may be some cases where we  
9 believe that we need to make changes to the codes.

10 MEMBER WALLIS: Well, there's carryover  
11 into the AS fall line, carryover -- do you have a  
12 bigger radius for it, do you have higher velocities,  
13 maybe? I don't know what you have.

14 MR. GRESHAM: It is larger. The ADS is  
15 10 to 14 inch.

16 MEMBER WALLIS: How well do you model that  
17 actual entrainment to the Aegis fall out?

18 MR. GRESHAM: Yes. I'm not sure about the  
19 velocities.

20 MEMBER KRESS: I was about to say it's  
21 still sonic velocity.

22 MEMBER WALLIS: No, no, it's actually at  
23 the hot leg.

24 MEMBER KRESS: It's about the same  
25 temperature.

**NEAL R. GROSS**

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

1 MEMBER WALLIS: It's about the same?

2 MR. SCHULZ: This is Terry Schulz from  
3 Westinghouse. The connection to the hot leg is  
4 actually an increase from like 12 inches to 18 inches,  
5 so it's gone up more than the power has gone up.

6 MEMBER WALLIS: So you've got more than  
7 the hot leg.

8 MEMBER KRESS: You get more flow.

9 MR. SCHULZ: No, the hot leg is 31 inches  
10 in diameter.

11 MEMBER WALLIS: It's a different diameter  
12 ratio of hot leg to ADS fall line?

13 MR. SCHULZ: Yes.

14 MEMBER WALLIS: So you might have to do  
15 something about modeling that. It is different  
16 geometry than the fall.

17 MR. SCHULZ: Yes.

18 (Slide change.)

19 MR. GRESHAM: We are working on a report  
20 to give to the staff, the Code Applicability Report  
21 where we will discuss the important phenomena,  
22 referencing back to the work that was done on the PIRT  
23 in the scaling, to provide a description of the codes  
24 that we're using to analyze the different accidents  
25 for AP1000 and look at the code applicability of the

**NEAL R. GROSS**

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

1 AP600 codes for application to AP1000 and much of the  
2 information is in the FSER and some of the documents  
3 that we provided in support of that and the  
4 limitations that were identified are also discussed in  
5 the FSER and we will go through each of these and  
6 describe how we believe that we're addressing those.

7 MEMBER WALLIS: Now you said you'd supply  
8 a code description. The staff has been actually  
9 asking for the code itself from other applicants and  
10 has been getting it and that's something that this  
11 committee is much in favor of, actually having the  
12 code itself examined and run by the staff. That gives  
13 assurance that it's user independent. You get the  
14 same answer and you can investigate things.  
15 Everything is in the open. It would be very desirable  
16 if that could happen here.

17 MR. GRESHAM: Well, we're asking the staff  
18 to look at the code applicability report when they get  
19 it and discuss --

20 MEMBER WALLIS: It's all based on  
21 submissions by Westinghouse.

22 MR. GRESHAM: Sure.

23 MEMBER SIEBER: When you're all through  
24 with the phenomenon logical modeling that you're doing  
25 here, you have the capability to determine the

**NEAL R. GROSS**

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

1 uncertainty in these phenomenon logical codes?

2 MR. GRESHAM: Not entirely, no. In the --  
3 we're using the best estimate, large break LOCA  
4 methodology using the COBRA track code for the large  
5 break and the quantification in the convolution of  
6 uncertainties is certainly involved in that.

7 In most of the other safety analyses,  
8 we're using a bounding approach where we're  
9 demonstrating that we have a conservative calculation  
10 of the consequences of the different accidents and so  
11 we're covering the uncertainties in that regard, but  
12 in terms of quantifying the uncertainties, we won't  
13 have that.

14 MEMBER SIEBER: So you really won't know  
15 how much margin you have either.

16 MR. GRESHAM: Just lots.

17 MEMBER SIEBER: I'm not sure that makes --  
18 lots and great are about the same kind of term.

19 (Laughter.)

20 MR. GRESHAM: Yes.

21 MEMBER SIEBER: So the answer is probably  
22 won't have very much way to quantify margin and  
23 uncertainty when you're --

24 MR. GRESHAM: That's right. We won't have  
25 a quantification.

1 MEMBER WALLIS: So on the issue of  
2 supplying the code to the staff, is that something  
3 which is still under negotiation?

4 MR. GRESHAM: Yes, it is.

5 MEMBER WALLIS: Have you folks seen the  
6 light yet?

7 MR. GRESHAM: It's still under  
8 negotiation.

9 Any other questions?

10 DR. ROSEN: The ADS, as I understood it,  
11 the stage 4 is different in AP1000?

12 MR. GRESHAM: Yes, it is.

13 DR. ROSEN: It's not in AP600?

14 MR. GRESHAM: No, it is in AP600, but it's  
15 larger in the -- I'm sorry, larger in the AP1000.  
16 Stages 1, 2 and 3 are the same size, but stage 4 is  
17 larger in AP1000.

18 DR. ROSEN: Does the AP1000 have a  
19 different estimated core damage frequency than the  
20 AP600?

21 MR. GRESHAM: I don't believe we've  
22 calculated that yet. We have not done the PRA.

23 MR. SCHULZ: This is Terry Schulz from  
24 Westinghouse. Jim is right. We have not calculated  
25 that number, but the design approach that we are

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 taking relative to PRA is to size the components and  
2 arrange the systems in terms of the same arrangements,  
3 same number of valves, same type of valves, so that  
4 the reliability of the system would be expected to be  
5 the same.

6 We're trying to from a preliminary design  
7 point of view, have the same success criterion in  
8 terms of the number of ADS valves, number of  
9 components required, so we've actually done some  
10 preliminary T & H analysis with multiple failures to  
11 try to check our success criteria. And that's not  
12 been done formally and that's not going to be part of  
13 this Phase 2 staff review of AP1000, but our design  
14 approach is to try to end up with the same core melt  
15 frequency by using the same configuration, same type  
16 of components and same success criteria.

17 DR. ROSEN: Of course, the ADS valves are  
18 larger for AP1000 than they are for AP600 so their  
19 reliability might be different.

20 MR. SCHULZ: That's usually not a strong  
21 factor in the quantified reliabilities of components  
22 within some limitations, of course.

23 MEMBER WALLIS: Can we move on?

24 MR. GRESHAM: Okay.

25 MEMBER WALLIS: We're a little bit behind,

**NEAL R. GROSS**

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

1 Mr. Chairman, but I think we have a little elasticity  
2 in the schedule that's coming up.

3 VICE CHAIRMAN BONACA: Yes, we do.

4 (Slide change.)

5 MR. ORR: My name is Richard Orr and at  
6 Westinghouse I'm responsible for the design of the  
7 structures and the seismic analyses and I'll cover  
8 very briefly some of the evaluation of the structural  
9 changes and then get into the discussion of the  
10 approach to design certification.

11 (Slide change.)

12 MR. ORR: As Mike and Terry have  
13 described, we have attempted to keep the configuration  
14 as close as possible for AP1000 to AP600. The  
15 configuration was described in a report submitted to  
16 NRC at the end of last year. From a structural point  
17 of view, the main differences are the height of  
18 containment and associated with that, the height of  
19 the shield building, so going from AP600 to AP1000,  
20 everything above this elevation moves up 25 feet.

21 In plan view, everything looks the same so  
22 the major change, as I say, is just this increase in  
23 elevation.

24 We have evaluated these differences and  
25 concluded that we can accommodate them in 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](http://www.nealrgross.com)

1 structural design.

2 MEMBER POWERS: Not everything is the  
3 same, down below there, though, is it? Aren't the  
4 steam generators --

5 MR. ORR: As far as structure is  
6 concerned, it is identical. The steam generators are  
7 bigger.

8 MEMBER POWERS: But that's not identical.

9 MR. ORR: Let me get directly to my next  
10 slide.

11 (Slide change.)

12 MR. ORR: In our evaluation of the  
13 changes, we have conducted a seismic analysis of the  
14 nuclear island and used methodology identical to  
15 AP600, adjusted the models for the changes for AP1000  
16 and this includes raising the shield building 25 feet,  
17 increasing the shield building roof, the PCS tank from  
18 540,000 to 800,000 gallons. We include in the  
19 analysis the containment vessel which is a little bit  
20 taller and an increased thickness. We include the  
21 structures inside containment.

22 The only changes in the structures there  
23 are the shield walls around the steam generator and  
24 pressurizer have been extended upwards a little bit  
25 for shielding. And we include in the analysis the

**NEAL R. GROSS**

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

1 reactor coolant loop which has been modified to  
2 include the bigger steam generators and the bigger  
3 pumps.

4 All of these items are included in this  
5 single model and I'm showing here some typical  
6 results. There's a lot more results. All I want to  
7 do is highlight three of them here that I've marked.

8 MEMBER WALLIS: Excuse me. North,  
9 southeast, west has something to do with steam  
10 generators.

11 MR. ORR: No. North, southeast, west is  
12 strictly an orientation we've established for the plan  
13 view of the AP600. North is towards the turbine  
14 building.

15 MEMBER WALLIS: So the difference is that  
16 the steam generators are on one side or something?  
17 What's different about it?

18 MR. ORR: About?

19 MEMBER WALLIS: The two axes, what's -- it  
20 looks sort of -- it's a symmetrical building, isn't  
21 it?

22 MR. ORR: No, the footprint, the shield  
23 building and the containment sit on a base mat and are  
24 integral with the auxiliary building.

25 MEMBER WALLIS: Okay, that's what makes

1 the difference.

2 MR. ORR: The long access is the  
3 north-south axis. The short access is the east-west  
4 axis.

5 If we look first of all at the seismic  
6 response at the highest elevation at the top of the  
7 shield building, the acceleration and this is for a  
8 three-tenths g input on a hard rock site, the  
9 acceleration response increases from 1.47g to 1.54, an  
10 increase of about 5 percent. And this is really the  
11 one that controls the design of the shield building  
12 roof and the 800,000 gallons of water. We have,  
13 indeed, done preliminary design of the shield building  
14 roof and demonstrated that yeah, we can add some  
15 sufficient reinforcement. There's no problem.

16 Next one I want to show is what we term  
17 base shear. This is sort of the shear force at grade  
18 elevation that is very significant in the design of  
19 the shear walls, the shield building and the walls in  
20 the auxiliary building. Here, the shear in the north-  
21 south direction which is the one that increases the  
22 most, increases from 37.5 to 46.8 which I think is 20  
23 percent if I recall, 25 percent, sorry.

24 And the other one I want to point out is  
25 the overturning moment, again, at grade elevation and

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 for about the north-south axis which is the shorter of  
2 the axes, it increases from 4100 to 5500 which is a 33  
3 percent increase.

4 We have looked at the effect of this on  
5 design of the structure. We find no problems in sort  
6 of the design of AP1000.

7 I should just point out one of these  
8 numbers is higher. About the east-west axis, I  
9 haven't identified that as a problem. This is the  
10 long axis of the building and it's much easier to  
11 accommodate in the design.

12 MEMBER SIEBER: None of this includes the  
13 effect of soil liquification?

14 MR. ORR: These are all for hard rock.

15 MEMBER SIEBER: Hard rock.

16 MR. ORR: We have a site interface  
17 established that says there shall be no soil  
18 liquefaction. That is something the combined license  
19 has to demonstrate for his site.

20 MEMBER SIEBER: So that means if you build  
21 a plant like this, you put it on franky piles or  
22 something like that to get the hard rock support?

23 MR. ORR: Not necessarily.

24 MEMBER SIEBER: That would be a way.

25 MR. ORR: A hard rock site is acceptable.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 Something like 50 percent of the existing nuclear  
2 plants are on rock.

3 MEMBER SIEBER: Yeah.

4 MR. ORR: A good soil site, there would be  
5 no problem. There are one or two soil sites that  
6 would sort of require fairly extensive foundation  
7 work, but then they did for the existing units that  
8 are there already.

9 MEMBER SIEBER: I was thinking that a lot  
10 of the sites may be half or built on river banks which  
11 is usually silt.

12 MR. ORR: Yes.

13 MEMBER SIEBER: Which is pretty liquid.

14 MR. ORR: The interface we established on  
15 AP600 and would be applicable here as well, is a shear  
16 way velocity for the soil greater than the thousand  
17 feet per second.

18 That excludes one or two of those real  
19 soft sites. It basically means you've got to dig it  
20 all out and replace it by competent material. Certain  
21 existing sites have had to do that.

22 MEMBER SIEBER: Right. Is there a  
23 difference between East Coast and West Coast where a  
24 plant like this might be precluded --

25 MR. ORR: We have established the seismic

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

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

1 input design level at three-tenths g which does  
2 exclude California for the standard design.

3 MEMBER SIEBER: Okay, thank you.

4 MEMBER KRESS: What moment can the  
5 containment stand before it buckles? Have you  
6 determined that?

7 MR. ORR: The critical condition for the  
8 containment is not internal pressure. It's the  
9 combination of external pressure and safe shutdown  
10 earthquake. External pressure is a situation where  
11 you basically trip the reactor on an extremely cold  
12 day and pull the temperature of containment down  
13 fairly rapidly and for AP600 that is something like  
14 negative pressure of 2.5 psi.

15 We designed for an external pressure of 3  
16 psi and then we combined that with the safe shutdown  
17 earthquake and we were able to demonstrate for AP600  
18 adequate margin. The critical location is at the base  
19 of containment. I think, if anything, we'll have a  
20 slightly greater margin because we've increased the  
21 shell thickness two inch and three quarter versus inch  
22 and five-eighths. So it's an evaluation that still  
23 needs to be done and it will be included in the Phase  
24 3 part of NRC's review, but I don't expect it to be an  
25 issue.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

1 DR. ROSEN: What is the diameter of this  
2 containment at the operating floor elevation?

3 MR. ORR: It's 130 feet. I did check the  
4 configuration. It's very, very similar to the  
5 dimensions of Comanche Peak. Comanche Peak is 135  
6 foot ID. This is 130 and then the shield building is  
7 further out and the total height is almost identical.

8 MEMBER SIEBER: What's the space between  
9 the containment liner and the inner surface of the  
10 concrete?

11 MR. ORR: From the inside surface of the  
12 containment vessel to the inside surface of the shield  
13 building is a nominal 4 feet 6 inches. So it's got to  
14 4 feet 4 and a quarter.

15 MEMBER SIEBER: All right, thank you.  
16 Which is enough for a stairwell, right?

17 MR. ORR: Oh yes, you can get in there.  
18 In fact, we have designed the air baffle to be removal  
19 for inspection and maintenance purposes.

20 For AP600, we did extensive seismic  
21 analysis and structural design. Clearly, sort of for  
22 AP1000 we do have some limited resources and there's  
23 some, much higher priority safety analysis being  
24 performed. So we have suggested, proposed to NRC that  
25 we would use design acceptance criteria for the

1 detailed structural design and seismic analyses at  
2 soil sites. This approach has been used on other  
3 certified designs, not quite to the same extent.

4 We would be using the same criteria and  
5 methodology and these will be documented in the AP1000  
6 design certification document and we will be  
7 identifying certain other key information,  
8 constructural configuration which we've described  
9 here. We will present results of the seismic analysis  
10 for hard rock and present a design of the containment  
11 vessel in the design certification document.

12 This approach was described in a report we  
13 submitted to NRC earlier this year. We have had one  
14 meeting with them to discuss it. The detailed design  
15 analysis would be performed by the combined license  
16 applicant, would be presented to the staff at the time  
17 of the combined license application, so it would be  
18 reviewed and accepted by NRC prior to start of  
19 construction.

20 Once the combined license is issued, then  
21 there would still be on-going construction and there  
22 would still be the same inspection and acceptance  
23 criteria as we have used for AP600.

24 Thank you. Any questions?

25 MEMBER WALLIS: Any questions? Any final

1 words from anyone?

2 MR. CORLETTI: We have no more words, so  
3 if you have any more questions.

4 MEMBER WALLIS: I thought you were going  
5 to give us some final words.

6 MR. CORLETTI: No, not really.

7 MEMBER WALLIS: A finale. Well, thank  
8 you, Westinghouse very much.

9 If the committee has no more questions,  
10 I'll hand this back to the chairman.

11 CHAIRMAN APOSTOLAKIS: Thank you, Graham.  
12 Thank you, gentlemen.

13 Now we're scheduled to break and work on  
14 preparing draft reports. I'm willing to break, but  
15 I'm not sure we need to prepare any reports. Is  
16 anybody working on a report? I would rather come back  
17 here and read the first draft of what we have and give  
18 some advice to the authors and then move on and  
19 revisit maybe the Commission meeting or do other  
20 things. So why don't we break until 4:50 and then  
21 we'll come back and read this.

22 (Whereupon, the proceeding went off the  
23 record at 4:35 p.m.)

24

25

CERTIFICATE

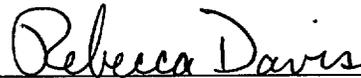
This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: ACRS Full Committee Meeting

Docket Number: (Not Applicable)

Location: Rockville, Maryland

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



---

Rebecca Davis  
Official Reporter  
Neal R. Gross & Co., Inc.

**NEAL R. GROSS**

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



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, D.C. 20555-0001

March 12, 2001

SCHEDULE AND OUTLINE FOR DISCUSSION  
481<sup>ST</sup> ACRS MEETING  
APRIL 5-7, 2001

THURSDAY, APRIL 5, 2001, CONFERENCE ROOM 2B3, TWO WHITE FLINT NORTH,  
ROCKVILLE, MARYLAND

- 1) 8:30 - 8:35 A.M. Opening Remarks by the ACRS Chairman (Open)
  - 1.1) Opening statement (GEA/JTL/SD)
  - 1.2) Items of current interest (GEA/SD)
  - 1.3) Priorities for preparation of ACRS reports (GEA/JTL/SD)
  
- 2) 8:35 - 10:30 A.M. Interim Review of the License Renewal Application for Edwin I. Hatch Nuclear Plant Units 1 and 2 (Open) (MVB/GML/SD/RBE)
  - 2.1) Remarks by the Subcommittee Chairman
  - 2.2) Briefing by and discussions with representatives of the NRC staff and Southern Nuclear Operating Company regarding the license renewal application for Hatch Units 1 and 2, associated staff's Safety Evaluation Report (SER), selected Boiling Water Reactor Vessel and Internals Project (BWRVIP) reports and the related staff's safety evaluations.
  
- 10:30 - 10:50 A.M. **\*\*\*BREAK\*\*\***
  
- 3) 10:50 - 12:00 Noon. Proposed Final License Renewal Guidance Documents (Open) (MVB/GML/SD/RBE)
  - 3.1) Remarks by the Subcommittee Chairman
  - 3.2) Briefing by and discussions with representatives of the NRC staff regarding the proposed final Regulatory Guide DG-1104 and Standard Review Plan associated with license renewal, Generic Aging Lessons Learned (GALL) report, and Nuclear Energy Institute (NEI) 95-10, "Industry Guidelines for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule."

Representatives of the nuclear industry will provide their views, as appropriate.
  
- 12:00 - 1:00 P.M. **\*\*\*LUNCH\*\*\***
  
- 4) 1:00 - 2:30 P.M. Safety Issues Associated with the Use of Mixed Oxide (MOX) and High Burnup Fuels (Open) (DAP/MME)
  - 4.1) Remarks by the Subcommittee Chairman ✓

2:50

- 4.2) Briefing by and discussions with representatives of the NRC staff regarding safety issues associated with the use of MOX and high burnup fuels in commercial light water reactors.

Representatives of the nuclear industry will provide their views, as appropriate.

**2:30 - 2:50 P.M. \*\*\*BREAK\*\*\***

- 5) 2:50 - 4:15 P.M. Thermal-Hydraulic Issues Associated with the AP1000 Passive Plant Design (Open/Closed) (GBW/PAB)
- 5.1) Remarks by the Subcommittee Chairman
- 5.2) Briefing by and discussions with representatives of the NRC staff and the Westinghouse Electric Corporation regarding the thermal-hydraulic issues associated with the AP1000 design.

[Note: A portion of this session may be closed to discuss Westinghouse proprietary information applicable to this matter.]

- 6) 4:15 - 5:15 P.M. Break and Preparation of Draft ACRS Reports  
Cognizant ACRS members will prepare draft reports, as needed, for consideration by the full Committee.
- 7) 5:15 - 7:00 P.M. Proposed ACRS Reports (Open)  
Discussion of proposed ACRS reports on:
- 7.1) Interim Report on the License Renewal Application for Hatch Units 1 and 2 (MVB/GML/SD/RBE)
- 7.2) Proposed Final License Renewal Guidance Documents (MVB/GML/SD/RBE)
- 7.3) Safety Issues associated with use of MOX and High Burnup Fuels (DAP/MME)
- 7.4) Thermal-Hydraulic Issues Associated with the AP1000 Design (GBW/PAB)

**FRIDAY, APRIL 6, 2001, CONFERENCE ROOM 2B3, TWO WHITE FLINT NORTH, ROCKVILLE, MARYLAND**

- 8) 8:30 - 8:35 A.M. Opening Remarks by the ACRS Chairman (Open) (GEA/JTL/SD)
- 9) 8:35 - 10:30 A.M. Draft Final Safety Evaluation Report for the South Texas Project Nuclear Operating Company (STPNOC) Exemption Request (Open) (JDS/GEA/MWW)
- 9.1) Remarks by the Subcommittee Chairman
- 9.2) Briefing by and discussions with representatives of the NRC staff and STPNOC regarding the staff's draft Final Safety Evaluation Report for the STPNOC exemption request to exclude certain components from the scope of special treatment requirements required by NRC regulations.

**10:30 - 10:50 A.M. \*\*\*BREAK\*\*\***

- 10) 10:50 - 11:45 A.M. Closure of Generic Safety Issue (GSI)-170, "Reactivity Transients and Fuel Damage Criteria for High Burnup Fuel" (Open) (DAP/MME)  
 10.1) Remarks by the Subcommittee Chairman  
 10.2) Discussion with representatives of the NRC staff, as needed, regarding the closure of GSI-170.
- 11:45 - 1:00 P.M. **\*\*\*LUNCH\*\*\***
- 11) 1:00 - 1:15 P.M. Subcommittee Report (Open) (WJS/MTM)  
 Report by the Chairman of the Materials and Metallurgy Subcommittee regarding risk-informing 10 CFR 50.46, which was discussed during a joint meeting of the ACRS Subcommittees on Materials and Metallurgy, Thermal-Hydraulic Phenomena, and Reliability and Probabilistic Risk Assessment on March 16, 2001.
- 12) 1:15 - 1:45 P.M. Future ACRS Activities/Report of the Planning and Procedures Subcommittee (Open) (GEA/JTL/JEL)  
 12.1) Discussion of the recommendations of the Planning and Procedures Subcommittee regarding items proposed for consideration by the full Committee during future ACRS meetings.  
 12.2) Report of the Planning and Procedures Subcommittee on matters related to the conduct of ACRS business, and organizational and personnel matters relating to the ACRS.
- 13) 1:45 - 2:00 P.M. Reconciliation of ACRS Comments and Recommendations (Open) (GEA, et al./SD, et al.)  
 Discussion of the responses from the NRC Executive Director for Operations to comments and recommendations included in recent ACRS reports and letters.
- 14) 2:00 - 3:00 P.M. Break and Preparation of Draft ACRS Reports  
 Cognizant ACRS members will prepare draft reports, as needed, for consideration by the full Committee.
- 15) 3:00 - 7:00 P.M. Proposed ACRS Reports (Open)  
 Discussion of proposed ACRS reports on:  
 15.1) South Texas Project Exemption Request (JDS/GEA/MWW)  
 15.2) Closure of GSI-170 (DAP/MME)  
 15.3) Interim Report on the License Renewal Application for Hatch Units 1 and 2 (MVB/GML/SD/RBE)  
 15.4) Proposed Final License Renewal Guidance Documents (MVB/GML/SD/RBE)  
 15.5) Safety Issues associated with use of MOX and High Burnup Fuels (DAP/MME)  
 15.6) Thermal-Hydraulic Issues Associated with the AP1000 Design (GBW/PAB)

**SATURDAY, APRIL 7, 2001, CONFERENCE ROOM 2B3, TWO WHITE FLINT NORTH,  
ROCKVILLE, MARYLAND**

- 16) 8:30 - 12:30 P.M. Proposed ACRS Reports (Open)  
(10:30-10:50 A.M. BREAK) Continue discussion of proposed ACRS reports listed under Item 15.
- 17) 12:30 - 1:00 P.M. Miscellaneous (Open) (GEA/JTL/JEL)  
Discussion of matters related to the conduct of Committee activities and matters and specific issues that were not completed during previous meetings, as time and availability of information permit.

**NOTE:**

- **Presentation time should not exceed 50 percent of the total time allocated for a specific item. The remaining 50 percent of the time is reserved for discussion.**
- **Number of copies of the presentation materials to be provided to the ACRS - 35.**

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
481<sup>st</sup> ACRS Meeting  
INTERIM REVIEW OF THE LICENSE RENEWAL APPLICATION (LRA) FOR  
EDWIN I. HATCH NUCLEAR PLANT, UNITS 1 AND 2  
APRIL 5, 2001  
ROCKVILLE, MARYLAND

- AGENDA -

	<u>TOPIC</u>	<u>PRESENTER</u>	<u>TIME</u>
I.	Opening Remarks	M. Bonaca, ACRS	8:35-8:40 a.m.
II.	Staff Opening Remarks	C. Grimes, NRR	8:40-8:45 a.m.
III.	Boiling Water Reactor Vessel Internals Project (BWRVIP) Topical Reports	G. Carpenter, NRR	8:45-9:15 a.m.
IV.	Southern Nuclear Operating Company (SNC) Presentation on the Hatch LRA	R. Baker, SNC	9:15-9:45 a.m.
V.	NRC Staff Presentation on the Interim Safety Evaluation Report (SER) on the Hatch LRA	W. Burton	9:45-10:30 a.m.

**NOTE:** Presentation time should not exceed 50 percent of the total time allotted for specific item. The remaining 50 percent of the time is reserved for discussion.

Number of copies of the presentation materials to be provided to the ACRS - 35.

**ACRS LICENSE RENEWAL SUBCOMMITTEE**  
**PLANT HATCH LICENSE RENEWAL APPLICATION**

**APRIL 5, 2001**

**WILLIAM BURTON**  
**PROJECT MANAGER**  
**NRR**

## **OVERVIEW**

### **BACKGROUND**

**APPLICATION SUBMITTED BY LETTER DATED FEBRUARY 29, 2000**

**BOILING WATER REACTOR. 2 UNITS**

**PLANT LOCATED ON ALTAMAHA RIVER IN APPLING COUNTY, GEORGIA.  
APPROXIMATELY 11 MILES NORTH OF BAXLEY, GEORGIA**

**UNIT 1: CURRENT LICENSE EXPIRES AUGUST 6, 2014. REQUESTS RENEWAL  
THROUGH AUGUST 6, 2034**

**UNIT 2: CURRENT LICENSE EXPIRES JUNE 13, 2018. REQUESTS RENEWAL THROUGH  
JUNE 13, 2038**

**CURRENT REVIEW STATUS**

## OVERVIEW

### COMPARISON TO PREVIOUS LICENSE RENEWAL APPLICANTS

FIRST BWR

FIRST TO USE BOILING WATER REACTOR VESSEL AND INTERNALS PROJECT (BWRVIP) REPORTS

FIRST TO USE FUNCTIONAL APPROACH VS SYSTEM APPROACH IN SCOPING PROCESS

FIRST TO APPLY AGING MANAGEMENT PROGRAM ATTRIBUTES TO DEMONSTRATE ADEQUACY OF AGING MANAGEMENT VS APPLYING ATTRIBUTES TO AGING MANAGEMENT PROGRAMS

**OPEN ITEMS**

**18 OPEN ITEMS IDENTIFIED IN SER**

**OPEN - 13**

**UNDER APPEAL - 4**

**CONFIRMATORY - 5**

## STATUS OF APPEAL ISSUES

**APPEAL MEETING HELD BETWEEN STAFF AND APPLICANT ON MARCH 29, 2001**

- ISSUE #1 - SHOULD THE DRAWDOWN TEST REQUIRED BY TECHNICAL SPECIFICATIONS BE CREDITED AS AN AMP TO CONFIRM MAINTENANCE OF REACTOR BUILDING IN-LEAKAGE LIMITS?**
- ISSUE #2 - SHOULD PIPING THAT IS CATEGORIZED AS SEISMIC III/I AT PLANT HATCH BE INCLUDED WITHIN THE SCOPE OF LICENSE RENEWAL?**
- ISSUE #3 - SHOULD HIGH-ENERGY LINE BREAK POSTULATIONS THAT ARE BASED ON FATIGUE USAGE FACTOR BE CONSIDERED AS A TLAA?**
- ISSUE #4 - SHOULD THE HOUSINGS FOR FANS, DAMPERS, AND HEATING AND COOLING COILS THAT ARE WITHIN THE SCOPE OF LICENSE RENEWAL BE CONSIDERED PASSIVE COMPONENTS SUBJECT TO AN AGING MANAGEMENT REVIEW?**

**REGULATORY PERSPECTIVE  
OF BWR VESSEL & INTERNALS PROGRAM  
GENERIC AGING MANAGEMENT PROGRAM**

April 5, 2001

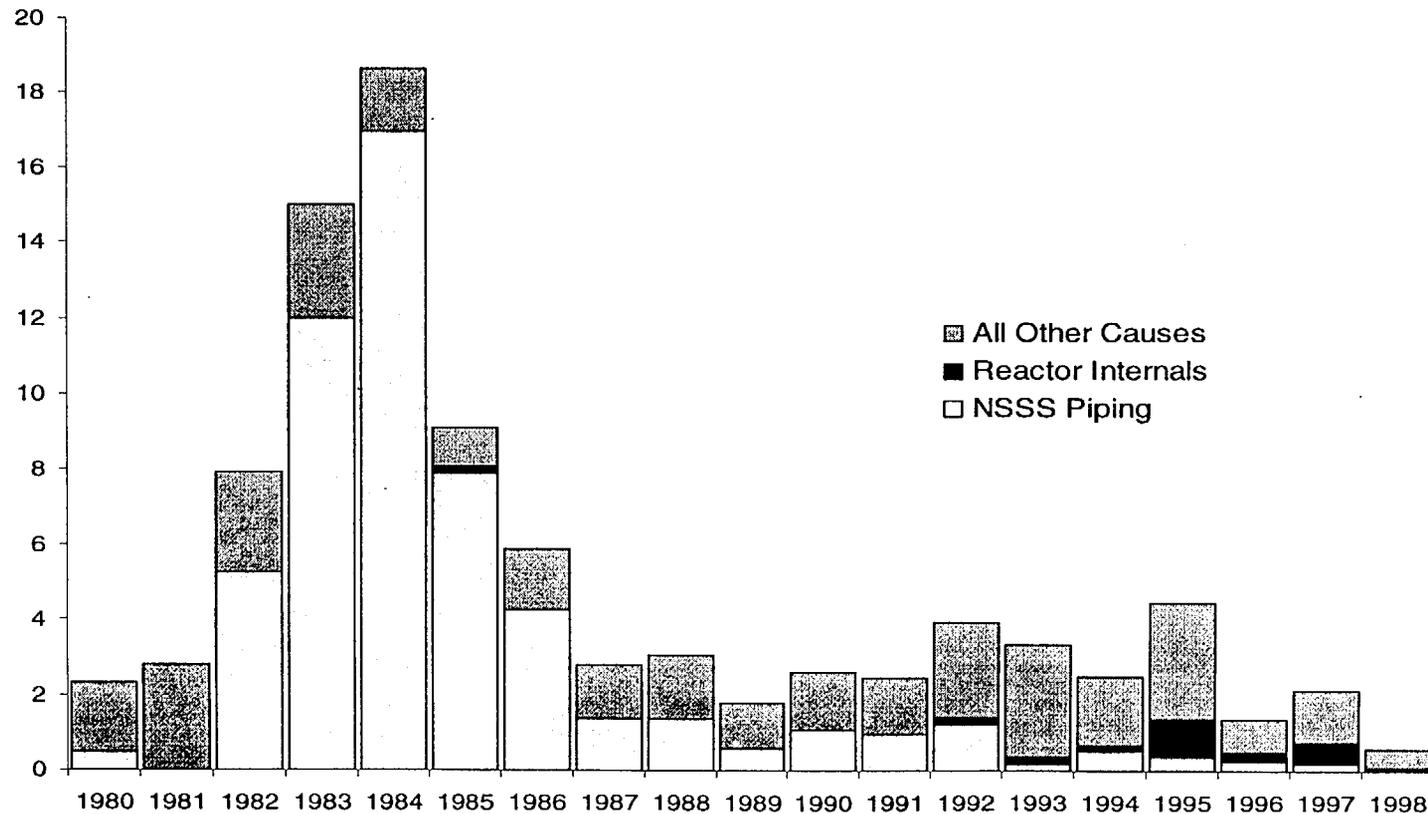
C. E. Carpenter, Jr.  
Materials & Chemical Engineering Branch  
Office of Nuclear Reactor Regulation

# OVERVIEW OF BWRVIP PROGRAM

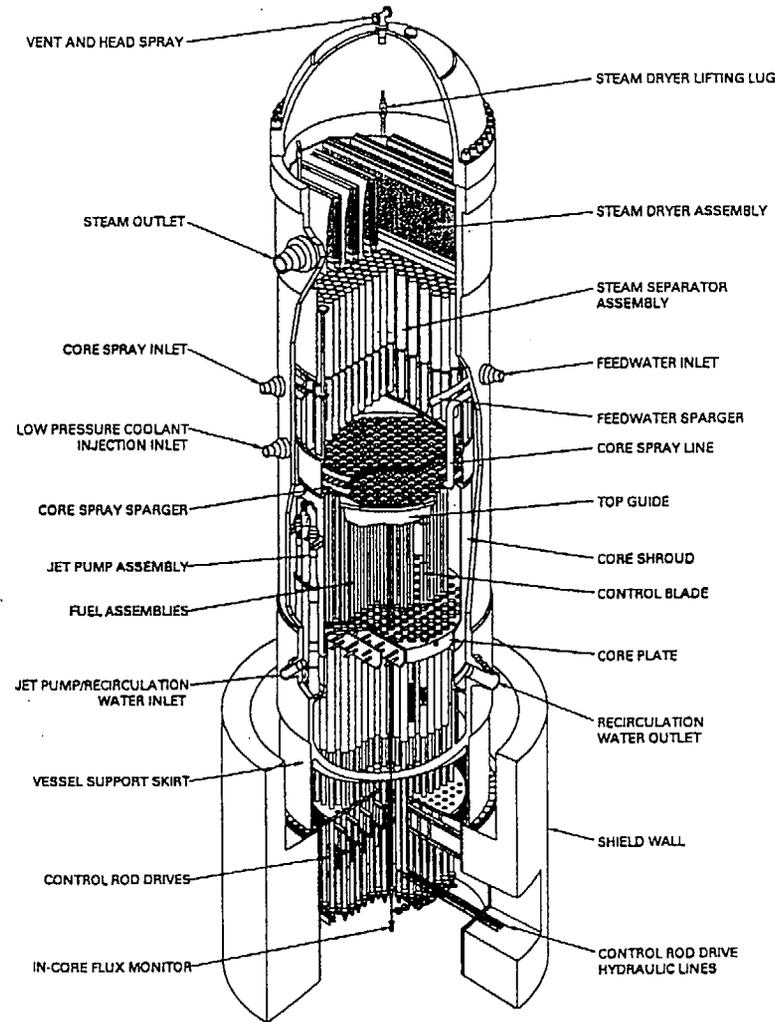
- **BWRVIP is a Voluntary Industry Initiative**
  - Began in 1994 to Address Core Shroud Cracking Issues
  - Now Addresses All BWR Internal Components, Reactor Vessel, and Class I Piping Material Condition Issues
  - Guidance Covers Current Operating Term and Extended Operating Period
  
- **BWRVIP Proactively Addressing Aging Degradation Issues That are Beyond Regulatory Requirements**
  - BWRVIP Identifying or Developing Generic Cost Effective Strategies Appropriate for Plant Specific Needs
  - Industry's Regulatory Interface for BWR Material Issues
  - Industry's Material Issues Information Clearinghouse

# Capacity Factor Losses in BWRs

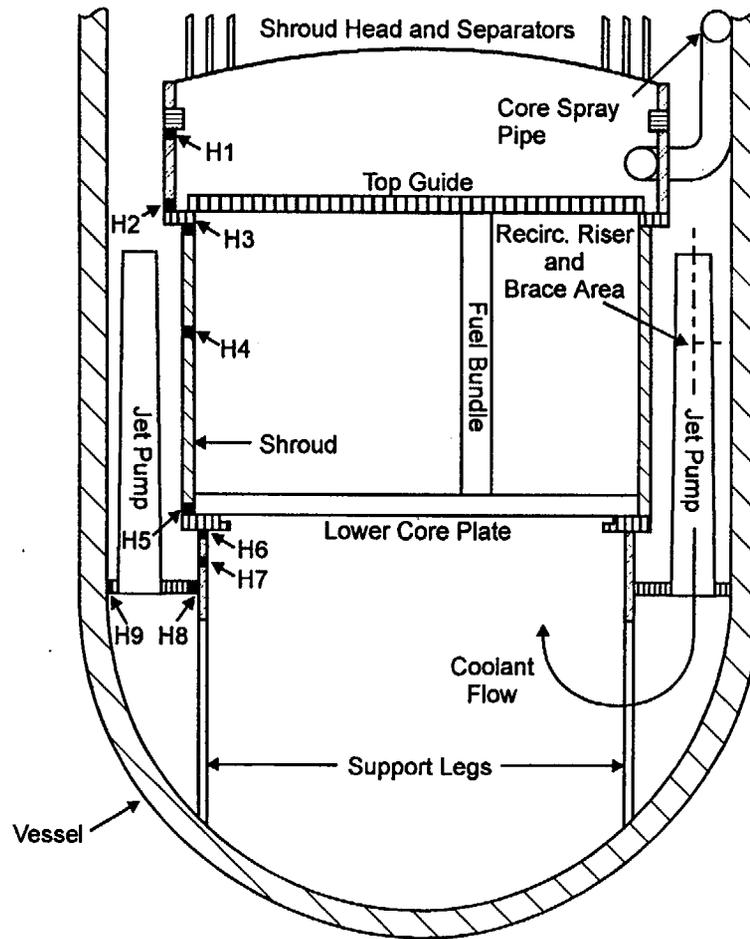
Capacity Factor Loss (%) Through December 31, 1998



# Typical Non-BWR/2 Reactor Assembly



# Configuration



# **BWRVIP U.S. MEMBER UTILITIES**

- Browns Ferry
- Brunswick
- Columbia (WNP-2)
- Clinton
- Cooper
- Dresden
- Duane Arnold
- Fermi
- FitzPatrick
- Grand Gulf
- Hatch
- Hope Creek
- LaSalle
- Limerick
- Monticello
- Nine Mile Point
- Oyster Creek
- Peach Bottom
- Perry
- Pilgrim
- Quad Cities
- River Bend
- Susquehanna
- Vermont Yankee

# **BWRVIP FOREIGN MEMBER UTILITIES**

- Chubu Electric Power Company
- Chugoku Electric Power Company
- Comision Federal de Electricidad
- Forsmark Kraftgrupp AB
- Iderdrola Generation
- Japan Atomic Power Company
- OKG Aktiebolag
- Tohoku Electric Power Company
- Tokyo Electric Power Company
- Taiwan Power Company

# BWRVIP REPORTS

- BWRVIP Scope Includes BWR Vessel, All Safety-Related Internal Components and Class I Piping
  - Core Shroud
  - Shroud Supports
  - Core Spray Internals
  - Jet Pump Assembly
  - Top Guide
  - Core Plate
  - Lower Plenum Components
  - Vessel ID Brackets
  - Standby Liquid Control
  - LPCI Couplings
  - Instrument Penetrations
  - RPV
- Guidelines Include
  - Inspection & Flaw Evaluation Methodology
  - Repair Design Criteria
  - Mitigation Guidance

# BWRVIP REPORTS

- Inspection and Flaw Evaluation (I&E) Guidelines
  - BWRVIP-18, Core Spray Internals
  - BWRVIP-25, Core Plate
  - BWRVIP-26, Top Guide
  - BWRVIP-27, Standby Liquid Control System / Core Plate  $\Delta P$
  - BWRVIP-38, Shroud Support
  - BWRVIP-41, BWR Jet Pump Assembly
  - BWRVIP-42, BWR LPCI Coupling
  - BWRVIP-47, BWR Lower Plenum
  - BWRVIP-48, Vessel ID Attachment Weld
  - BWRVIP-49, Instrument Penetration
  - BWRVIP-74, BWR Reactor Pressure Vessel
  - BWRVIP-76, BWR Core Shroud
    - Combines BWRVIP-01, -07 and -63

# BWRVIP REPORTS

- Repair / Replacement Design Criteria
  - BWRVIP-16, Internal Core Spray Piping & Sparger Replacement
  - BWRVIP-19, Internal Core Spray Piping and Sparger Repair
  - BWRVIP-34, Technical Basis for Circumferential Weld Overlay Repair of Vessel Internal Core Spray Piping
  - BWRVIP-44, Underwater Weld Repair of Nickel Alloy RPV Internals
  - BWRVIP-50, Top Guide / Core Plate
  - BWRVIP-51, Jet Pump
  - BWRVIP-52, Shroud Support and Vessel Bracket
  - BWRVIP-53, Standby Liquid Control Line
  - BWRVIP-55, Lower Plenum
  - BWRVIP-56, LPCI Coupling
  - BWRVIP-57, Instrument Penetrations
  - BWRVIP-58, CRD Internal Access Weld

# **BWRVIP REPORTS**

- **Crack Growth & Mitigation Reports**
  - BWRVIP-14, Evaluation of Crack Growth in BWR Stainless Steel RPV Internals
  - BWRVIP-59, Evaluation of Crack Growth in BWR Nickel-Base Austenitic Alloys in RPV Internals
  - BWRVIP-60, Evaluation of Crack Growth in BWR Low Alloy Steel RPV Internals
  - BWRVIP-62, Technical Basis for Inspection Relief for BWR Internal Components with Hydrogen Injection
  - BWRVIP-80, Evaluation of Crack Growth in BWR Shroud Vertical Welds

# BWRVIP REPORTS

- Other Reports
  - BWRVIP-03, RPV Internals Examination Guidelines
  - BWRVIP-06, Safety Assessment of BWR Reactor Internals
    - Supported by Deterministic Assessment of Consequences
  
- Safety Assessment Identified Components Necessary for Safe Operation Shutdown
  - Maintain Coolable Geometry
  - Maintain Rod Insertion Times
  - Maintain Reactivity Control
  - Assure Core Cooling
  - Assure Instrument Availability

# **BWRVIP PROGRAM**

- **General Format of I&E Guidelines**
  - Description of Component, Inspection History and Susceptibilities
  - Failure Consequences
  - Inspection Requirements (Scope and Frequencies)
  - Flaw Evaluation Methodologies
  - Reporting Requirements
  
- **Program Assures**
  - Inspections Performed Correctly and On Time by Qualified Personnel
  - Inspection Results and Flaws Properly Evaluated and Dispositioned
  - Repairs Meet Approved BWRVIP Criteria or Applicable Codes

# **BWRVIP CONCLUSIONS**

- BWRVIP Program is Broad in Scope
- BWRVIP Program Includes Appropriate Inspections, Evaluation Methodologies, Repair Criteria and Mitigation Methods to Assure BWR Internals Integrity
- Use of BWRVIP Program During License Renewal Period Provides Adequate Aging Management Program

# **STAFF'S REVIEW OF BWRVIP REPORTS**

- **Staff Has Completed Review of Almost All BWRVIP Reports**
  - **Staff Has Concluded that Implementation of BWRVIP Guidelines, as Modified to Address Staff Comments, Will Provide an Acceptable Level of Quality for Inspection and Flaw Evaluation of Subject Safety-Related Components**
  - **Independent RES Review (NUREG/CR-6677) Found That Comprehensive Inspection Programs Like BWRVIP Significantly Reduces Core Damage Frequency**

# **STAFF'S REVIEW OF BWRVIP REPORTS**

- Staff Completing Review of BWRVIP LR Appendices and Has Found That:
  - Referencing BWRVIP AMPs and Completing Action Items Will Provide Reasonable Assurance that Applicant Will Adequately Manage Aging Effects During Extended Operation Period
  - Generic AMPs Usage Will Significantly Reduce Staff Review of LR Applications

# AP1000 Pre-Application Review Advisory Committee on Reactor Safeguards

---



Jerry N. Wilson, PE  
Future Licensing Organization  
Office of Nuclear Reactor Regulation  
April 5, 2001

# Purpose of Pre-application Review

---

- ▶ Determine the scope and cost of a design certification review
- ▶ Obtain agreement on how AP600 can be used as a basis for the AP1000 design certification application
- ▶ Phase 1 complete - NRC letter of July 27, 2000 identified 6 issues that could have a significant impact on the cost and schedule of a design certification review and estimated effort for Phase 2
- ▶ Phase 1 results discussed with ACRS on August 29, 2000
- ▶ Phase 2 begun - Westinghouse requested the NRC to proceed with a portion of the Phase 2 review by letter dated August 28, 2000
- ▶ Phase 3 - Westinghouse submits application in 2002?

# Phase 2 Review Issues

---

- ▶ Applicability of AP600 Test Program to the AP1000 design

Plant Description and Analysis Report - December 2000

PIRT and Scaling Assessment Report - March 2001

- ▶ Applicability of AP600 Analysis Codes to AP1000 design

AP1000 Code Applicability Report - April 2001

- ▶ Acceptability of using Design Acceptance Criteria in selected areas

Seismic and Structural Design Activities - January 2001

- ▶ Applicability of the exemptions granted to the AP600 design

# Phase 2 Review Schedule

---

- ▶ Phase 2 review duration estimated at ~ 9 months
- ▶ Waiting for the analysis codes to “officially” start Phase 2
- ▶ Staff will prepare a NUREG report on the Phase 2 results
- ▶ Staff will request an ACRS letter on Phase 2 in ~ 6 months
- ▶ Staff will prepare a SECY paper on Phase 2
- ▶ Letter to Westinghouse that provides results of Phase 2 review

## ACRS Meeting

---

### Plant Hatch Units 1 & 2 License Renewal Application

Ray Baker - Hatch License Renewal Project Manager  
April 5, 2001



1

### ***PLANT HATCH LICENSE RENEWAL APPLICATION DISCUSSION TOPICS***

---

- ◆ Plant Hatch Operating Experience
- ◆ Plant Hatch License Renewal Programs
  - Existing Programs
  - Enhanced Programs
  - New Programs



2

## PLANT HATCH LICENSE RENEWAL PROGRAMS

### EXISTING PROGRAMS

- ◆ Reactor Water Chemistry Control
- ◆ CCW Chemistry Control
- ◆ Diesel Fuel Oil Testing
- ◆ *PSW & RHRSW Chemistry Control*
- ◆ Spent Fuel Pool Chemistry Control
- ◆ Demineralized Water and CST Chemistry Control
- ◆ Suppression Pool Chemistry Control
- ◆ Inservice Inspection Program
- ◆ Overhead Crane & Refueling Platform Inspections
- ◆ Torque Activities
- ◆ Component Cyclic or Transient Limit Program
- ◆ *PSW & RHRSW Inspection Program*
- ◆ Primary Containment Leakage Rate Testing Program
- ◆ BWRVIP
- ◆ RPV Monitoring Program
- ◆ Wetted Cable Activities

BLACK = Administrative Changes  
BLUE = *Minor Technical Changes*



3

## PLANT HATCH LICENSE RENEWAL PROGRAMS

### ENHANCED PROGRAMS

- ◆ Fire Protection Activities
- ◆ FAC Program
- ◆ *Protective Coatings Program*
- ◆ *Equipment and Piping Insulation Monitoring Program*
- ◆ Structural Monitoring Program

BLACK = ENHANCED SCOPE  
BLUE = *TECHNICAL ADDITIONS*



4

## **PLANT HATCH LICENSE RENEWAL PROGRAMS**

---

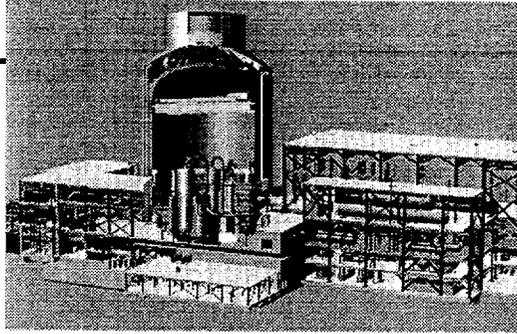
### **NEW PROGRAMS**

- ◆Galvanic Susceptibility Inspection
- ◆Treated Water Systems Piping Inspection
- ◆Gas Systems Component Inspection
- ◆CST Inspection
- ◆*Passive Component Inspection Activities*
- ◆*RHR Heat Exchanger Augmented Inspection and Testing Program*
- ◆*Torus Submerged Components Inspection Program*
- ◆Non-EQ Cable Management Program

BLACK = NEW

BLUE = SUBSTANTIALLY  
REVISED AND REPACKAGED





## AP1000 Pre-Certification Review

*Presentation to the*

Advisory Committee on Reactor Safeguards

April 5, 2001

## Agenda



- 2:50 Introduction G. Wallis
- 2:55 AP1000 Pre-Cert Review Overview J. Wilson
- 3:05 Introductory Remarks / NSSS Overview M. Corletti
- 3:15 AP1000 Passive Safety Systems Design and Analysis T. Schulz
- 3:35 Review of AP1000 PIRT and Scaling Approach W. Brown
- 3:55 Approach to the Application of Analysis Codes J. Gresham
- 4:00 Design Acceptance Criteria R. Orr
- 4:10 Discussion



## AP1000 Introduction / NSSS Overview

Mike Corletti  
AP600 Engineering



## Purpose of Today's Meeting

- Informational Meeting
  - Introduce ACRS to AP1000
  - Explain the objectives of the AP1000 Pre-Certification Review
  - Review our proposed approach to resolution of key issues:
- Feedback on our approach
- Expectations for future meetings

## AP600 Major Uprate - Objectives



- Increase Plant Power Rating to Reduce Cost
  - Obtain a capital cost that can compete in U.S. market \$900-1000/KWe for n<sup>th</sup> twin plant
- Retain AP600 Objectives and Design Detail
  - Increase the capability/capacity within "space constraints" of AP600
  - Retain credibility of "proven components"
  - Retain the basis for the cost estimate, construction schedule and modularization scheme
- Retain AP600 Licensing Basis
  - Meet regulatory requirements for Advanced Passive Plants
  - Accept AP600 policy issues

5

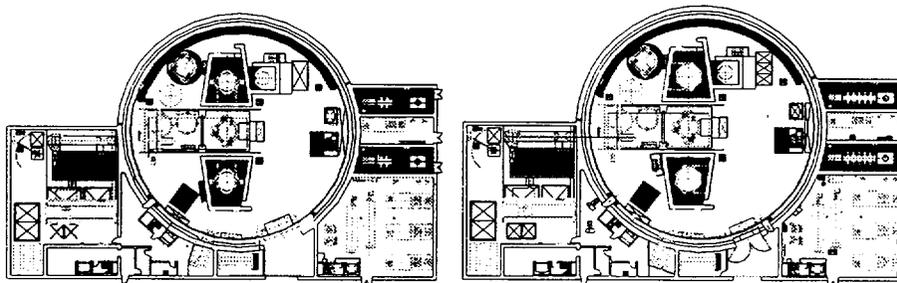
## AP1000 General Arrangement

Plan at Elevation 135'



AP600

AP1000



6

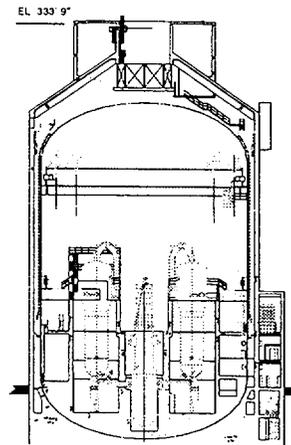
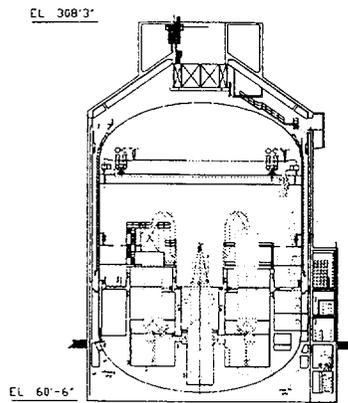
# AP1000 General Arrangement

Containment Section View



AP600

AP1000



7

## AP1000 Pre-Certification Objectives



- Obtain agreement on how AP600 Certification can be used as a basis for AP1000 Design Certification
  - Improve efficiency of licensing process
  - Identify path for leveraging AP600 Certification to AP1000
- How do we plan on meeting this objective?
  - 3-Phase Approach Suggested by NRC
    - Phase 1 - Identified 6 issues to evaluate in Pre-certification review
      - Issues that potentially have a large impact on design certification licensing cost and schedule
        - ACRS provided insights and guidance
    - Phase 2 - Pre-certification review of the issues identified
      - Two items deferred until Design Certification due to W budget constraints
        - Portions of AP600 SSAR retained for AP1000 - 80%
        - Application of AP600 PRA to AP1000
    - Phase 3 - Design Certification

8

## Phase 2 Review - Status of Issues



1. Sufficiency of AP600 Test Program to meet 10 CFR Part 52 requirements for AP1000
  - Plant Description and Analysis Report      December 2000
  - PIRT and Scaling Assessment Report      March 2001
  
2. Applicability of NRC-approved AP600 analysis codes for AP1000 Design Certification
  - Code Applicability Report      April 2001
  
3. Acceptability of using Design Acceptance Criteria in selected areas
  - Seismic and Structural Design Activities      January 2001
  
4. Applicability of Exemptions granted to AP600

9

## Comparison of Selected Parameters



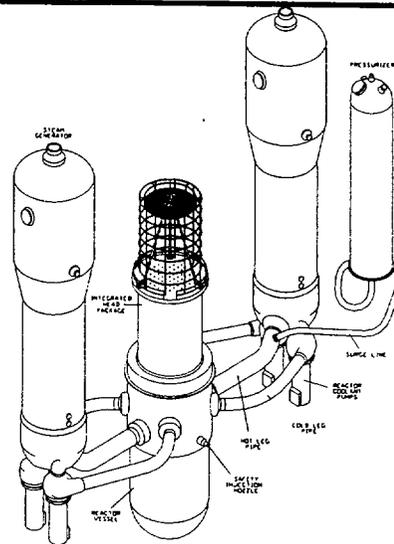
PARAMETER	AP600	AP1000
Net Electric Output, MWe	610	1090
Reactor Power, MWt	1933	3400
Hot Leg Temperature, °F	600	615
Number of Fuel Assemblies	145	157
Type of Fuel Assembly	17x17	17x17
Active Fuel Length, ft	12	14
Linear Heat Rating, kw/ft	4.10	5.71
Control Rods / Gray Rods	45 / 16	53 / 16
R/V I.D., inches	157	157
Steam Generator Surface Area, ft <sup>2</sup>	75,000	125,000
Reactor Coolant Pump Flow, gpm	51,000	75,000
Pressurizer Volume, ft <sup>3</sup>	1600	2100

10

## AP1000 Reactor Coolant System



- Proven Reactor Design
  - Based on W 14-ft Core Designs
    - Doel 4; Tihange 3; South Texas
- $\Delta$ 125 Steam Generators
  - Based on W/CE designs
    - ANO Replacement SG
- Reactor Coolant Pump
  - Based on AP600
    - Increased capacity
      - Variable speed controller
      - Increased inertia
- Simplified Main Loop
  - Same as AP600
- Pressurizer
  - 50% larger than operating units



11



## AP1000 Passive Safety Systems

Terry Schulz  
Advisory Engineer

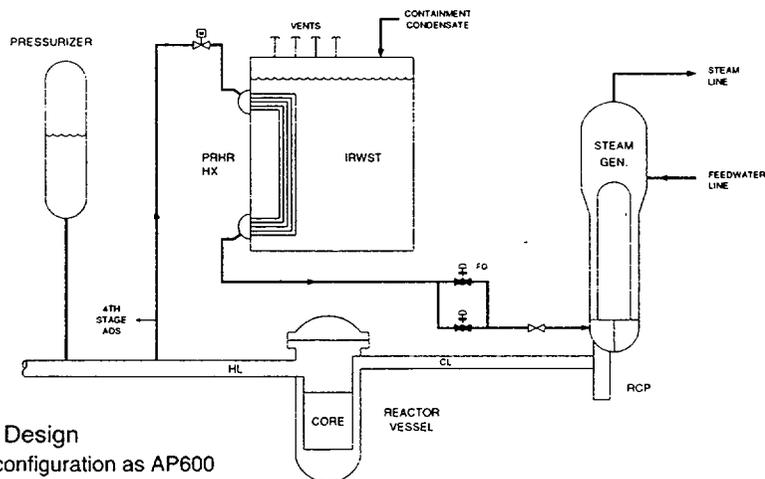
## AP1000 Passive Safety Systems Design



- **Use AP600 System Configuration / Arrangement**
- **Increase Capacities to Maintain Adequate Safety Margins**
  - Consider both deterministic and probabilistic criteria
  - Provide margin for uncertainty in AP600 tests / computer codes
- **Iterative Design / Sizing Process**
  - Hand calculation used to estimate needed capacity increases
    - First principle hand calculations, independent of test/analysis
    - Separate effects, window in time, based on AP600 experience
  - Plant computer code T&H analysis used to confirm / adjust capacities
    - AP600 SSAR computer codes with same assumptions
      - ◆ Not final Chapter 15 safety analysis
    - Integrated effects, transient, limiting events
  - Consider plant impacts, especially building layout impacts

13

## Passive Decay Heat Removal



- **PRHR HX Design**
  - Same configuration as AP600
  - Same elevations as AP600
  - Larger pipe sizes (14 vs 10")
  - Increased HX surface (more / longer horizontal tubes)

14

# PRHR Margin Assessment



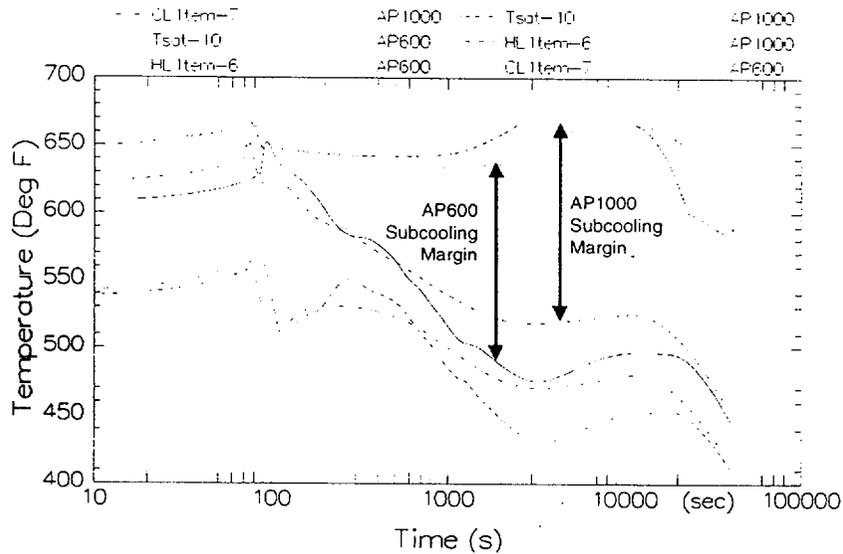
	AP600 <sup>(1)</sup>	AP1000 <sup>(1)</sup>
PRHR HX Surface Area	100%	122%
PRHR Flow Path Resistance	100%	33%
Calculated PRHR Heat Transfer (Nat Circ)		
, Heat transfer	>>> 100% <<<	>>> 172% <<<
, Time to match decay heat (min.)	38	44
SG Secondary Side Water		
, Initial water mass per MW	100%	136%
, Final water mass per MW	>>> 100% <<<	>>> 212% <<<

(1) Based on hand calculations.

- **AP1000 PRHR HX Expected to Provide Increased Margin**
  - PRHR HX heat transfer capacity increased almost by core power ratio (176%)
  - SG secondary mass increased greater than core power ratio

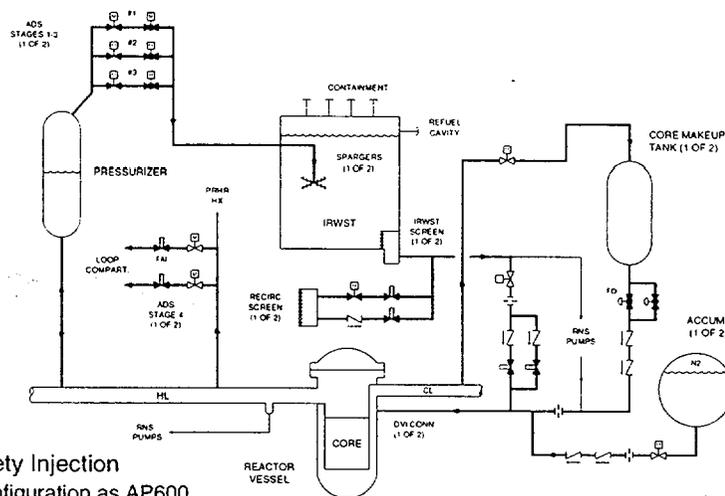
15

# Feedline Rupture - Comparison



16

# AP1000 Passive Safety Injection



- Passive Safety Injection
  - Same configuration as AP600
  - Same elevations as AP600
  - Larger CMT and CMT flow tuning orifice
  - Larger IRWST, Recirc, ADS 4 pipe sizes

# Passive Safety Injection Margins



	AP600	AP1000
Accumulator – Large LOCA Reflood PCT (F)	1644	~1940
CMT flow capacity vs required flow (Flow required to remove decay and sensible heat at time of accumulator empty in DVI LOCA )	138%	129%
ADS stage 1,2,3 flow capacity vs AP600	100%	100%
ADS stage 4 flow capacity <sup>(2)</sup> vs AP600	100%	189%
IRWST injection flow capacity <sup>(2)</sup> vs AP600	100%	184%
Containment recirc flow capacity <sup>(2)</sup> vs AP600	100%	213%

(1) These margin assessments were performed using hand calculations.

(2) These flow capabilities were evaluated at limiting post accident plant conditions.

- AP1000 Passive Safety Injection Expected to Provide Adequate Margin

## Passive Safety Injection Margins



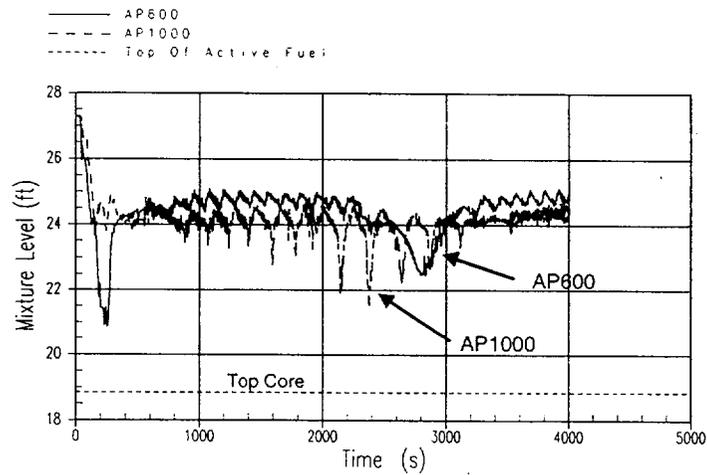
- Accumulator
  - Same flow capability, tank constrained by concrete walls/floors
  - Large LOCA should have similar / larger margin vs operating plants
- CMT
  - Tank volume & flow capacity increased 25% (same pipe size)
  - Maintains injection duration, helps IRWST / ADS 4 sizing
- ADS
  - Stages 1,2,3 - adequate for higher pressure operation
    - Not important for IRWST cut-in or long term recirc
  - Stage 4 - Significant increase in flow capability, larger pipe sizes
    - Important for IRWST cut-in and long term recirculation
- IRWST Injection
  - Significant increase in flow capability, larger pipe sizes
- Containment Recirculation
  - Significant increase in flow capability, larger pipe sizes
  - RNS changed to take initial suction from water supply outside cont.

19

## DVI LOCA Comparison



### Core/Upper Plenum Mixture Level



20

## Expected AP1000 Safety Margins

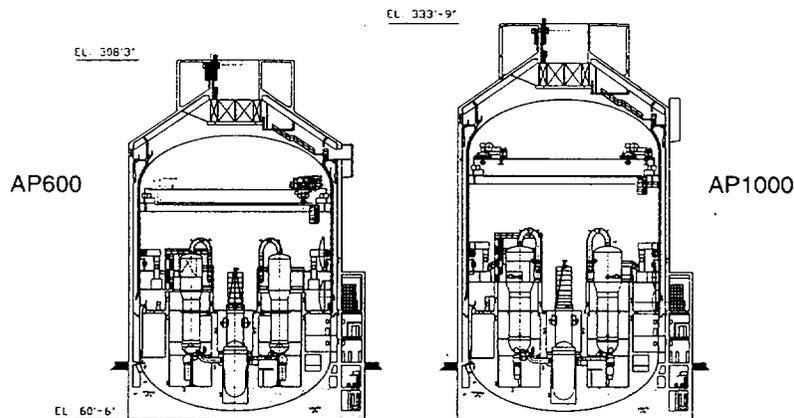


	Typical Plant	AP600	AP1000
Loss Flow Margin to DNBR Limit	~ 1 – 5%	15.8%	13.6% <sup>(1)</sup>
Feedline Break Subcooling Margin	>0°F	~170°F	~140°F <sup>(1)</sup>
SG Tube Rupture	Operator actions required in 10 min	Operator actions <b>NOT</b> required	Same as AP600 <sup>(1)</sup>
Small LOCA	3" LOCA core uncovers PCT ~1500 °F	≤ 8" LOCA <b>NO</b> core uncover	Same as AP600 <sup>(1)</sup>
Large LOCA PCT (with uncertainty)	2000 – 2200°F	1644°F	~1940°F

(1) Based on preliminary AP1000 T&H analysis using AP600 SSAR computer codes.

21

## AP1000 Containment Comparison



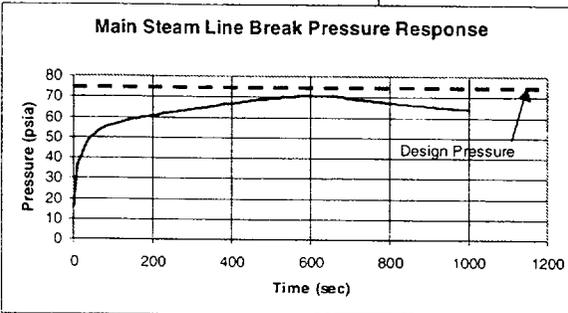
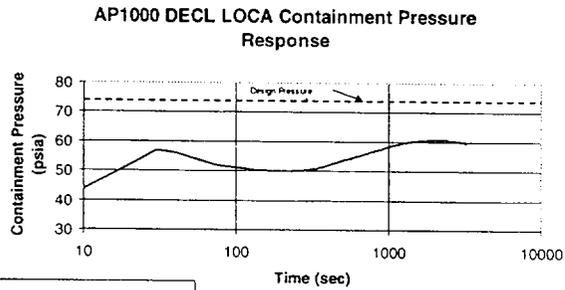
	AP600	AP1000
Total Free Volume	100%	122%
Design Pressure, psig	45	59
Shell Thickness	1 5/8"	1 3/4"
Material	A537 Class 2	SA738 Grade B
PCS Water Drain Vol (72 hr)	100%	162%

22

# Containment Analysis Results



- **AP1000 Containment Expected to Provide Increased Margins**
  - Similar response to AP600
  - Large LOCA has large margins
    - With more realistic SG energy input



- **Main steam line break is limiting**
  - Not sensitive to passive containment cooling performance

23



## AP1000 PIRT and Scaling Assessment

William Brown  
LOCA Integrated Services

## Main Goal and Steps of PIRT/Scaling Assessment



- Main goal of PIRT/Scaling assessment:
- Determine extent to which AP600 experimental test database is applicable to AP1000 to support safety analysis code validation in accordance with 10 CFR part 52.
  
- Main steps in PIRT/Scaling assessment:
- First, AP600 PIRTs reviewed by several experts for application to AP1000.
- Then, scaling of most important phenomena (high-ranked) obtained from PIRT review assessed relative to AP1000.

25

## PIRT Reviewers/Summary of Important Changes for AP1000



- PIRT reviewers included following experts:
  - Dr. S. M. Bajorek, Kansas State University
  - Dr. S. G. Bankoff, Northwestern University
  - Dr. L. E. Hochreiter, Penn State University
  - Dr. T. K. Larson, INEEL
  - Dr. P. F. Peterson, University of California
  - Mr. G. E. Wilson, INEEL
  
- Summary of important PIRT changes for AP1000:
- LBLOCA
  - Core entrainment/de-entrainment increased from Medium to High
- SBLOCA including long term cooling
  - Entrainment increased to High for IRWST/sump injection.
  - ADS-4 two-phase pressure drop increased to High for IRWST/sump injection.
- Containment SLB/DE CL LOCA and Non-LOCA
  - No important changes.

26

## Summary of Important Phenomena Addressed in Scaling Analysis



- Top-Down Scaling
  - Reactor vessel inventory
  - Core exit quality
  - RCS pressure
  - Core decay heat
  - ADS flow
  - ADS-4 two-phase pressure drop
  - CMT/IRWST injection
  - Sump injection
  - Natural circulation-PRHR
  - Pressurizer level
  - Containment pressure
  - Break mass/energy into containment
  - Containment volume/gas compliance
  - Heat/mass transfer to internal heat sinks
- Bottom-Up Scaling
  - Entrainment in HL/ADS paths
  - Hot leg/cold leg flow pattern
  - Surge line pressure drop
  - Phase separation at CL-CMT balance line tee
  - Core exit void fraction
  - Condensation on inside containment surfaces
  - Evaporation on outside surface containment shell
  - Water film stability/coverage on outside shell surface
  - Circulation/stratification inside containment

27

## Scope of Scaling Assessment



- Scaling assessment focuses on high-ranked phenomena for passive plants:
  - Small Break LOCA - core cooling/vessel inventory.
  - Steam Line Break - containment pressure.
- Phenomena found in conventional PWR plants for which test databases already exist need not be scaled for AP1000 such as:
  - LBLOCA phenomena.
  - Blowdown & S.G. circulation phenomena of SBLOCA.
  - Non-LOCA (except for CMT/PRHR phenomena).
- Scaling assessment of low-ranked/medium-ranked phenomena in AP600 scaling effort sufficient for AP1000.

28

## Basis and Approach for AP1000 Scaling Assessment



- AP600 scaling analyses serve as basis for AP1000.
- AP1000 scaling assessment leverages results, insights, lessons learned from AP600.
  - Processes not important or minor are not scaled.
  - Simplified models/equations used to highlight important features.
- Emphasize features different or scaled up from AP600 (core power, volume, ADS4 vent area etc).
- Scaling assessment accomplished via examination and comparison of range of operating conditions and geometric similarity between AP1000 and test facility. AP600 scaling analysis usually sufficient.
  - This is typically sufficient for separate effects tests.
- Where comparison between AP1000 and test facility not easily accomplished from examination described above, then assessment supplemented with scaling analysis.
  - This is typically needed for integral effects tests.

29

## AP600 Test Data Sources Included in Scaling Assessment



	Assessment	Scaling analysis
• Integral Effects Tests (IET)		
• SPES-2	√	√
• OSU	√	√
• ROSA-AP600	√	
• LST	√	√
• Separate Effects Tests (SET)		
• ADS (1-3)	√	
• CMT	√	
• PRHR	√	
• DNB	√	
• U.of Wisconsin Condensation	√	√
• Heated flat plate	√	√
• Water distribution	√	√
• Wind tunnel/bench experiment	√	
• Air-flow path $\Delta p$	√	
• Water film formation	√	√

30

## Major Results of Passive Core Cooling System Scaling Analysis



- Overall results similar to AP600.
- At least one IET facility can be identified for each phase of SBLOCA transient where important phenomena is acceptably scaled to AP1000 to provide database suitable for code validation:
  - SPES acceptable for high pressure phases of SBLOCA transient; distorted after ADS-4 flow transitions to subsonic.
  - OSU acceptable for low pressure phases of SBLOCA transient; distorted until ADS-4 is actuated.
- AP600 SETs acceptable for AP1000.
  - ADS test acceptable as ADS 1-3 valves/sparger same as AP600. Tested range of conditions covers AP1000.
  - CMT test covers range of conditions in AP1000.
  - PRHR test covers tested range of conditions in AP1000. Heat transfer correlation developed from test provides acceptable agreement with ROSA-AP600 results.

31

## Major Results of Passive Containment Cooling Scaling Analysis



- As with AP600, LST is distorted for code validation of AP1000 pressure transient
  - AP600 used bounding analysis for pressure transient
  - AP1000 uses same approach
- LST acceptable as separate effect test data base for validation of steady state heat/mass transfer correlations for AP1000
- Key dimensionless scaling groups for heat/mass transfer and liquid film stability/coverage are acceptably scaled in SETs.
- CFD analysis demonstrates AP1000 and AP600 similarly mixed inside containment.

32

## Overall Conclusion of AP1000 PIRT and Scaling Assessment



- AP1000 phenomena are similar to AP600
- AP600 tests are scaled adequately to the AP1000
  - Separate effects tests cover AP1000 ranges
  - At least one integral effects test facility can be used to cover each phase of AP1000 SBLOCA transient
    - Similar to AP600
- Analysis codes that are validated against AP600 test data are applicable to AP1000

AP600 test database is sufficient for code validation in accordance with requirements of 10 CFR Part 52

33



## Computer Codes to be Used for AP1000 Design Certification

J. A. Gresham, Manager  
LOCA Integrated Services

## AP1000 Safety Analysis Approach



- Start With Computer Codes Approved for Passive Plant Analysis in AP600 Design Certification
- Confirm Adequacy for Analysis of AP1000 Design
- Address Potential Concerns Identified in AP600 Review
- Reach Consensus on Acceptability

35

## Confirm Adequacy of Codes for AP1000 Design



- Identify important phenomena (via PIRTs) that must be addressed by code (Complete - AP1000 PIRT & Scaling Report)
- Identify correlations and models used in code to address important phenomena (Complete - AP600 Design Certification)
- Demonstrate that adequate test data base exists to support validation of correlations/models via scaling analyses (Complete - AP1000 PIRT & Scaling Report)
- Demonstrate that limitations identified in AP600 FSER are addressed for AP1000

36

## Approach to Address Limitations Identified in AP600 Review



- Design Modification
- Additional Validation against Tests
- Evaluation of Margin
- Supplementary Analyses
- Code Enhancements

37

## Contents of Code Applicability Report



- Important AP1000 phenomena and comparison to AP600 (PIRT)
- Code description
- Code acceptability for AP600 (FSER)
- Code limitations (FSER) and how each is addressed
- Applicability of Code to AP1000

38



## AP1000 Approach to Design Acceptance Criteria

Richard Orr  
Advisory Engineer



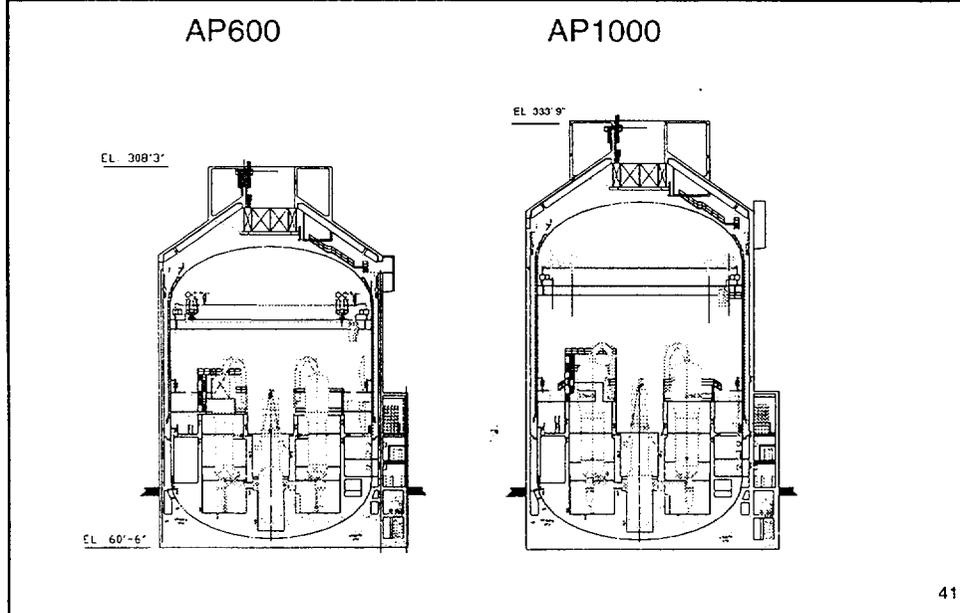
## AP1000 Structural Configuration

- AP1000 structural configuration is similar to AP600
  - The AP1000 configuration and its differences from AP600 are described in AP1000 Plant Description and Analysis Report (WCAP-15612)
- Principal differences
  - Increase in height of containment vessel and shield building
  - Increase in PCS tank inventory
- Differences have been evaluated and can be accommodated in the structural design

# AP1000 General Arrangement



## Containment Section View



# Summary of Seismic Responses



Maximum Absolute Nodal Acceleration, ZPA (g)						
Elevation	AP600			AP1000		
	N-S	E-W	VERT	N-S	E-W	VERT
Top of shield building	1.44	1.47	0.90	1.44	1.54	0.89
Top of containment vessel	0.94	1.21	1.49	0.96	1.03	1.42
Maximum Forces (x10' Kips)						
Elevation	AP600			AP1000		
	Axial	N-S Shear	E-W Shear	Axial	N-S Shear	E-W Shear
Aux. building - El. 100'	34.96	37.54	37.59	41.61	46.80	38.69
Containment vessel El. 100'	4.60	3.93	4.49	5.26	5.11	4.79
Maximum Moment (x10' K-ft)						
Elevation	AP600			AP1000		
	Torque	about N-S Axis	about E-W Axis	Torque	about N-S Axis	about E-W Axis
Aux. building - El. 100'	1396	4188	4045	1640	5564	6048
Containment vessel El. 100'	11	489	429	38	629	652

From WCAP-15614, Table B-1

## AP1000 Seismic and Structural



- WCAP-15614 describes proposed approach for AP1000 Design Certification using Design Acceptance Criteria
- Design Acceptance Criteria are used on other certified designs for structural and piping design
- Design criteria and methodology in AP1000 DCD will be similar to AP600 DCD
- Structural configuration, seismic analysis for hard rock and containment vessel design will be provided in AP1000 DCD

43

## AP1000 Detail Design



- Detail design and analysis will be completed by the Combined License applicant and audited by NRC staff during Combined License review prior to start of construction
- Final design and reconciliation is covered by ITAAC as used for AP600

44

*Full*

**ACRS LICENSE RENEWAL SUBCOMMITTEE**  
**PLANT HATCH LICENSE RENEWAL APPLICATION**

**APRIL 5, 2001**

**WILLIAM BURTON**  
**PROJECT MANAGER**  
**NRR**

## **OVERVIEW**

### **BACKGROUND**

**APPLICATION SUBMITTED BY LETTER DATED FEBRUARY 29, 2000**

**BOILING WATER REACTOR. 2 UNITS**

**PLANT LOCATED ON ALTAMAHA RIVER IN APPLING COUNTY, GEORGIA.  
APPROXIMATELY 11 MILES NORTH OF BAXLEY, GEORGIA**

**UNIT 1: CURRENT LICENSE EXPIRES AUGUST 6, 2014. REQUESTS RENEWAL  
THROUGH AUGUST 6, 2034**

**UNIT 2: CURRENT LICENSE EXPIRES JUNE 13, 2018. REQUESTS RENEWAL THROUGH  
JUNE 13, 2038**

**CURRENT REVIEW STATUS**

## **OVERVIEW**

### **COMPARISON TO PREVIOUS LICENSE RENEWAL APPLICANTS**

**FIRST BWR**

**FIRST TO USE BOILING WATER REACTOR VESSEL AND INTERNALS PROJECT (BWRVIP) REPORTS**

**FIRST TO USE FUNCTIONAL APPROACH VS SYSTEM APPROACH IN SCOPING PROCESS**

**FIRST TO APPLY AGING MANAGEMENT PROGRAM ATTRIBUTES TO DEMONSTRATE ADEQUACY OF AGING MANAGEMENT VS APPLYING ATTRIBUTES TO AGING MANAGEMENT PROGRAMS**

OPEN ITEMS

18 OPEN ITEMS IDENTIFIED IN SER

OPEN - 13

UNDER APPEAL - 4

CONFIRMATORY - 5

## STATUS OF APPEAL ISSUES

**APPEAL MEETING HELD BETWEEN STAFF AND APPLICANT ON MARCH 29, 2001**

- ISSUE #1 - SHOULD THE DRAWDOWN TEST REQUIRED BY TECHNICAL SPECIFICATIONS BE CREDITED AS AN AMP TO CONFIRM MAINTENANCE OF REACTOR BUILDING IN-LEAKAGE LIMITS?**
- ISSUE #2 - SHOULD PIPING THAT IS CATEGORIZED AS SEISMIC II/I AT PLANT HATCH BE INCLUDED WITHIN THE SCOPE OF LICENSE RENEWAL?**
- ISSUE #3 - SHOULD HIGH-ENERGY LINE BREAK POSTULATIONS THAT ARE BASED ON FATIGUE USAGE FACTOR BE CONSIDERED AS A TLAA?**
- ISSUE #4 - SHOULD THE HOUSINGS FOR FANS, DAMPERS, AND HEATING AND COOLING COILS THAT ARE WITHIN THE SCOPE OF LICENSE RENEWAL BE CONSIDERED PASSIVE COMPONENTS SUBJECT TO AN AGING MANAGEMENT REVIEW?**



**ADVISORY COMMITTEE ON REACTOR SAFEGUARDS**

**April 5, 2001**

**IMPROVED LICENSE RENEWAL GUIDANCE  
DOCUMENTS**

## AGENDA

<u>Topic</u>	<u>Presenter</u>
Introduction	Sam Lee, NRR
Examples of Public Comments	Jerry Dozier, NRR
NEI Continued Dialog Items	Ed Kleeh, NRR
One-Time Inspections	Dave Solorio, NRR

## **IMPROVED LICENSE RENEWAL GUIDANCE DOCUMENTS**

- **Generic Aging Lessons Learned (GALL) report (NUREG-1801)**
- **Standard Review Plan for License Renewal (NUREG-1800)**
- **Regulatory Guide for License Renewal (RG 1.188)**
- **Nuclear Energy Institute (NEI) industry guidance 95-10, Rev. 3**

## **TEAM EFFORT**

- **Office of Nuclear Reactor Regulation**
- **Office of Nuclear Regulatory Research**
- **Argonne National Laboratory**
- **Brookhaven National Laboratory**

## **FUTURE ACTIVITIES**

- **Submit documents to Commission for approval (April 30, 2001)**
- **Continue dialog with NEI on 5 items**
- **Participate in NEI demonstration project to implement improved guidance documents**

## **EXAMPLES OF PUBLIC COMMENTS**

**Resolved through repackaging, providing a minimum acceptable program, providing focus of concern, ensuring relevance, and completeness:**

- **Added PWR reactor vessel internals program description to resolve the neutron fluence threshold issue for reactor vessel internals**
- **Boric Acid Corrosion programs (GL 88-05) are fully credited to manage the effects of boric acid corrosion**
- **PWSSC of pressurizer Alloy 600 penetrations is adequately managed by the chemistry and ISI programs; the Inconel 182 welds are a plant specific evaluation**
- **Removed insignificant aging effects such as wear/loss of material for the core support pads and the guide tube cards**
- **Added components such as the incore neutron flux monitoring tubes and CRD head flange bolting**

## **NEI CONTINUED DIALOG ITEMS**

- **IPE/IPEEE as source document to consider for scoping**
- **Operating experience with cracking of small-bore piping**
- **Management of loss of preload of reactor vessel internals bolting using the loose parts monitoring system**
- **Operating experience with cracking in bolting**
- **Inspections of fire protection systems**

## ONE-TIME INSPECTIONS

<b>System</b>	<b>Calvert</b>	<b>Oconee</b>	<b>GALL</b>
Reactor Vessel, Internals, and Reactor Coolant System	RCS-SBP, RVI, PZR	RCS-SBP, OTSG, PZR	RCS-SBP
Engineered Safety Features	CIG, SI, CS	LPI, RBS	ECCS
Auxiliary Systems	CC, SRW, SW, FP, CVCS, CA, EDG, RM, NSSS-Sampling, CR & DGB HVAC, PC-HVAC, Instru Lines, AB-HVAC	CC, SRW, LPSW/HPSW, CAS, DJW, CW, CCW, RCPMOC, DW, LWD, <u>PS Systems</u> : CD, DA, GA, SSFASW, SSFDW, SSFSL	CCCS, OCCS, FP, EDG, SFS, SFCC, SDC, DFO
Steam and Power Conversion	FW, MS, ES, N&H, AFW	TGCW, TSP, Cond <u>PS Systems</u> : ASW	FW, STS, ES, Cond, SGB, AFW

## ONE-TIME INSPECTIONS

<b>System</b>	<b>ANO</b>	<b>Hatch</b>	<b>GALL</b>
Reactor Vessel, Internals, and Reactor Coolant System	RVI, PZR (htr bundles)	NBS, RRS	RCS-SBP
Engineered Safety Features	SH	SLC, RHR, CS, HPCI, RCIC, SGT, PCP&I, PLHR, PC	ECCS
Auxiliary Systems		CRD, CST, SAM, PSW, CC, EDG, HVAC, DFO, SW2	CCCS, OCCS, FP, EDG, SFS, SFCC, SDC, DFO
Steam and Power Conversion		EHC, MC&A	FW, STS, ES, Cond, SGB, AFW

AB-HVAC - Auxiliary Building Heating and Ventilation  
AFW - Auxiliary Feedwater  
ASW - Auxiliary Service Water  
CA - Compressed Air  
CAS - Chemical Addition  
CC - Component Cooling  
CCCW - Closed-Cycle Cooling Water  
CCW - Condenser Circulating Water  
CD - Carbon Dioxide system  
CIG - Containment Isolation Group  
Cond - Condenser or Condensate system  
CR & DGB HVAC - Control Room and Diesel Generator Building HVAC  
CRD - Control Rod Drive  
CS - Containment Spray  
CST - Condensate Storage Tank  
CVCS - Chemical and Volume Control System  
CW - Chilled Water  
DA - Depressing Air system  
DFO - Diesel Fuel Oil  
DJW - Diesel Jacket Water  
DW - Demineralized Water  
ECCS - Emergency Core Cooling System  
EDG - Emergency Diesel Generator  
EHC - Electro-Hydraulic Control

ES - Extraction Steam  
FP - Fire Protection  
FW - Feedwater system  
GA - Governor Air system  
HPCI - High Pressure Coolant Injection  
HPSW - High Pressure Service Water  
HVAC - Heating and Ventilation  
Instru Lines - Instrument Lines  
LPI - Low Pressure Injection  
LPSW - Low Pressure Service Water  
LWD - Liquid Waste Disposal  
MC&A - Main Condensor and Auxiliaries  
NBS - Nuclear Boiler System  
N&H - Nitrogen and Hydrogen system  
OCCW - Open-Cycle Cooling Water  
OTSG - Once Through Steam Generator lateral supports  
PC - Primary Containment (penetrations)  
PC-HVAC - Primary Containment HVAC  
PCP&I - Primary Containment Purge and Inerting  
PLHR - LOCA Hydrogen Removal  
PSW - Plant Service Water  
RBS - Reactor Building Spray

RCIC - Reactor Core Isolation Cooling  
RCPOC - Reactor Coolant Pump Oil Collection  
RCS-SB - Reactor Coolant System - small bore piping  
RHR - Residual Heat Removal  
RM - Radiation Monitoring  
RRS - Reactor Recirculation System  
RVI - Reactor Vessel Internals  
SAM - Sampling System  
SDC - Shutdown Cooling System (Older BWR)  
SFCC - Spent Fuel Cooling and Cleanup  
SFS - Spent Fuel Storage  
SGB - Steam Generator Blowdown  
SGT - Standby Gas Treatment  
SLC - Standby Liquid Control  
SRW - Service Water  
SSFDW - Standby Shutdown Facility Drinking Water  
SSFSL - SSF Sanitary Lift  
SSFASW - SSF Auxiliary Service Water  
STS - Steam Turbine System  
SW - Salt Water  
SW2 - Screen Wash  
TGCW - Turbine Generator Cooling Water  
TSP - Turbine Sump Pump

## **CONCLUSION**

- **ACRS endorsement is requested for issuing these final documents to begin implementation**