

NUCLEAR REGULATORY COMMISSION

ORIGINAL

Title: Advisory Committee on Reactor Safeguards
510th Meeting

Docket Number: (not applicable)

Location: Rockville, Maryland

Date: Thursday, March 4, 2004

PROCESS USING ADAMS
TEMPLATE: ACRS/ACNW-005

Work Order No.: NRC-1348

Pages 1-91/185-242

Closed Session
pp 92-184

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4 510th FULL COMMITTEE MEETING
5 ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
6 (ACRS)

7 + + + + +

8 THURSDAY,

9 MARCH 4, 2004

10 + + + + +

11 ROCKVILLE, MARYLAND

12 + + + + +

13 The Advisory Committee met at 8:30 a.m. at
14 the Nuclear Regulatory Commission, Two White Flint
15 North, Room T2B3, 11545 Rockville Pike, MARIO V.
16 BONACA, Chairman, presiding.

17 COMMITTEE MEMBERS:

18 MARIO V. BONACA Chairman
19 GRAHAM B. WALLIS Vice-Chairman
20 STEPHEN L. ROSEN At-Large
21 GEORGE E. APOSTOLAKIS Member
22 F. PETER FORD Member
23 THOMAS S. KRESS Member
24 GRAHAM L. LEITCH Member
25 DANA POWERS Member

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1 COMMITTEE MEMBERS: (cont.)

2 VICTOR R. RANSOM Member

3 WILLIAM J. SHACK Member

4 JOHN D. SIEBER Member

5 ACRS STAFF PRESENT:

6 RALPH ARCHITZAL

7 RAJ AULUCK

8 STEVE BAJOREK

9 STEVE BLOOM

10 KEN CHANG

11 JOESEPH COLACCINO

12 KIMBERLEY CORP

13 ANDRE DRUZO

14 BARRY J. ELLIOT

15 GEORGE GEORGIEV

16 FRANK GILLESPIE

17 JIN-SIEN GUO

18 MICHELLE HART

19 M. HARTZMAN

20 JOHN HONCHARIK

21 Y. GENE HSII

22 NAEEM IQBAL

23 DAVID JENG

24 WALTON JENSEN

25 STEVEN JONES

1 ACRS STAFF PRESENT: (cont.)
2 P. T. KUO
3 CAROLYN LAURON
4 ARNOLD LEE
5 SAM LEE
6 Y. C. LI
7 TILDA LIU
8 LAMBROS LOIS
9 JIM LYONS
10 JOHN S. MA
11 RICHARD McNALLY
12 JIM MEDOFF
13 SAM MIRANDA
14 S. K. MITRA
15 DUC NGUYEN
16 BOB PALLA
17 LAUREN QUINORES-NAVARRO
18 J. H. RAVAL
19 NICK SALTOS
20 JOHN SEGALA
21 PAUL SHEMANSKI
22 JAELE STAREFOS
23 JIM STRUNISHA
24 RAM SUBBARATNAM
25 SUMMER B. SUN

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- 1 ACRS STAFF PRESENT: (cont.)
- 2 EDWARD THROM
- 3 JOHN TSAO
- 4 JENNIFER UHLE
- 5 LEN WARD
- 6 STEVE WEST
- 7 JERRY WILSON
- 8 CHENG-IH (JOHN) WU
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I-N-D-E-X

	<u>Agenda Item</u>	<u>Page</u>
1		
2		
3	3) Opening Remarks by the ACRS Chairman	6
4	3.1) Opening Statement	6
5	3.2) Items of current interest	7
6	4) License Renewal Application for the	7
7	H. B. Robinson Steam Electric Plant,	
8	Unit 2	
9	4.1) Remarks by the Subcommittee	9
10	Chairman	
11	4.2) Briefing by and discussions with	9
12	representatives of the NRC staff	
13	and Carolina Power and Light	
14	5) CLOSED SESSION	
15	6) License Renewal Application for the	187
16	Virgil C. Summer Nuclear Station	
17	6.1) Remarks by the Subcommittee	
18	Chairman	
19	Adjourn	242
20		
21		
22		
23		
24		
25		

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

(8:29 a.m.)

3) OPENING REMARKS BY THE ACRS CHAIRMAN3.1) OPENING STATEMENT

CHAIRMAN BONACA: Good morning. This meeting will now come to order. This is the second day of the 510th meeting of the Advisory Committee on Reactor Safeguards.

During today's meeting, the Committee will consider the following: license renewal application for the H. B. Robinson steam electric plant, Unit 2; interim review of the AP1000 design; license renewal application for the Virgil C. Summer nuclear station; proposed criteria for ACRS evaluation of the effectiveness (quality) of the NRC safety research programs; preparation of ACRS reports.

A portion of this meeting may be closed to discuss Westinghouse proprietary information applicable to the AP1000 design. This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. Dr. John Larkins is the designated federal official for the initial portion of the meeting.

We have received no written comments or requests for time to make oral statements from members

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

7 3.2) ITEMS OF CURRENT INTEREST

8 CHAIRMAN BONACA: Before we start with the
9 presentation of the agenda, I would like to point your
10 attention to items of interest. You have a package in
11 front of you. There are a number of interesting
12 papers. There is also information about operating
13 events and inside NRC articles and fact sheets.

14 With that, if there are not any comments
15 from members of the Committee, then I will move on to
16 the license renewal application for the Robinson steam
17 electric plant, Unit 2. And Mr. Leitch will take us
18 through that presentation.

19 MEMBER LEITCH: Okay. Thank you, Dr.
20 Bonaca.

21 4) LICENSE RENEWAL APPLICATION FOR THE

22 H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT 2

23 4.1) REMARKS BY THE SUBCOMMITTEE CHAIRMAN

24 MEMBER LEITCH: We are here today to hear
25 presentations from the staff and the licensee

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1 regarding the license renewal application for the
2 H. B. Robinson steam electric plant, Unit 2.

3 It is a 2,339-megawatt thermal
4 Westinghouse three-loop pressurized water reactor. It
5 shares a site with an older fossil unit, hence the
6 name Unit 2 because the fossil unit is called Unit 1.
7 So this is the only nuclear unit on that site and
8 sometimes is also referred to as Robinson nuclear
9 plant.

10 We did have a subcommittee meeting, as you
11 recall. Many of you attended that subcommittee
12 meeting on September 30th of 2003. At the time of
13 that subcommittee, we reviewed the draft safety
14 evaluation report. At that point, there were two open
15 items and a number of confirmatory items.

16 We heard tentative plans for the closure
17 of those items at the subcommittee meeting, but formal
18 closure had yet to be achieved. In the meantime, we
19 are going to hear today about the formal closure of
20 those items and both those open items and confirmatory
21 items.

22 So, with those words of introduction, I
23 will turn it over to P. T. Kuo, who will lead us
24 through this presentation. P. T.?

25 MR. KUO: Yes. Thank you, Dr. Leitch, and

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1 good morning.

2 4.2) BRIEFING BY AND DISCUSSIONS WITH
3 REPRESENTATIVES OF THE NRC STAFF AND
4 CAROLINA POWER AND LIGHT

5 MR. KUO: My name is P. T. Kuo, the
6 Program Director for the License Renewal and
7 Environmental Impacts Program. On my right is Dr.
8 Sampson Lee, who is the Section Chief of the License
9 Renewal Section A. And on my far right is S. K.
10 Mitra, who is the Project Manager for the Safety
11 Evaluation of H. B. Robinson project.

12 S. K. Mitra will be making the staff
13 presentation today with assistance from the tech
14 staff, the tech staff from the Division of
15 Engineering, Division of System Safety and Analysis,
16 and the Inspection Program.

17 We also have the original inspector,
18 Caudle Julian, joining us on the telephone line in
19 case you may have any questions about the inspections
20 conducted throughout the review time.

21 With that, I would like to turn it over
22 the presentation first to the applicant, and then the
23 staff presentation will follow. If there are any
24 questions, I will be glad to answer at this time.

25 MR. STEWART: Good morning. I'm Roger

1 Stewart, and I'm going to talk to you about the
2 Robinson license renewal.

3 I would like to start by introducing you
4 a little bit to the Robinson plant. As Dr. Leitch
5 indicated, it is also known as Unit 1. This is the
6 Unit 1 plant. Unit 2 is the nuclear plant.

7 Robinson has some unique features about
8 it. One feature that is particularly unique is our
9 containment. Our containment has grouted timmets. So
10 we do not have timmet galleries that is typical of the
11 other applications you review.

12 Another feature on our containment is the
13 containment liner is insulated on the inside. And
14 that is part of our licensing basis to limit the heat
15 transfer during a postulated design basis accident.

16 VICE-CHAIRMAN WALLIS: What is this
17 insulation made of?

18 MR. STEWART: It's some version of a poly
19 plastic. I don't remember the exact composition.
20 It's attached. We have a steel liner inside the
21 containment. It's attached to the steel liner.
22 There's a stainless steel sheeting on the outside of
23 it.

24 VICE-CHAIRMAN WALLIS: So it is covered
25 with the sheeting?

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1 MR. STEWART: Yes, sir.

2 VICE-CHAIRMAN WALLIS: It is not exposed?

3 MR. STEWART: And it basically covers the
4 cylindrical portion of the containment. The element
5 does not insulate itself. It does have a stainless
6 steel sheeting.

7 One other feature that is somewhat unique
8 on Robinson, not totally unique, is all of our
9 emergency power supplies 480-volt versus your typical
10 4,160. We also have a dedicated shutdown diesel right
11 here. This is in addition to two emergency diesels.

12 As you can see with the units here, here
13 is the security fit. So Unit 1 is right adjacent.
14 There are some slight shared facilities, which we
15 discussed in the subcommittees. So I won't go over
16 those again.

17 MEMBER ROSEN: That dedicated shutdown
18 diesel is just sitting on a pad out there? They're
19 building around it?

20 MR. STEWART: Actually, if you can
21 envision, it was brought in as a railroad car. It is
22 basically a skid unit, self-contained. And there is
23 a building around it. It is sitting on the pad. But
24 basically we took the wheels off of it and permanently
25 attached it.

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1 MEMBER ROSEN: You say it is in a
2 building, but you show --

3 MR. STEWART: I'm sorry. It's right here.
4 You can see the exhaust stack. It is a shelter, if
5 you will.

6 MEMBER ROSEN: But it's not a concrete or
7 any other kind of building?

8 MR. STEWART: No, sir, it is not. It's
9 right here.

10 Other questions?

11 (No response.)

12 MR. STEWART: Okay. I've covered the
13 unique features. What I would like to do next is talk
14 about what we have done in terms of major equipment,
15 replacements, or upgrade. Within the past 20 years,
16 we have replaced the steam generators.

17 Those were replaced in 1984. And to our
18 last outage, which was November of 2002, we have 19
19 tubes plugged. We have no active degradation
20 mechanisms. So we have had good results with our
21 replacement steam generators.

22 MEMBER ROSEN: What is the material of
23 construction of the tubes?

24 MR. STEWART: It's thermally annealed 690.
25 I thought it was 690, but it's thermally annealed

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1 inconel. Do you remember? Six hundred? Thermally
2 treated, yes, sir.

3 We have done some extensive replacement of
4 the service water piping. First, we replaced all of
5 the service water piping inside containment. We did
6 that in 1988. And then on the discharge and inlet
7 side of containment, we replaced that in 1990.

8 And we also replaced underground supply
9 headers. We have a north header and a south header.
10 And we replaced the north header in 1999. We had done
11 some construction work. We added a rad waste
12 building. And during the construction work, they had
13 excavated close to the pipe. It had damaged the
14 coating. So we were having some problems with
15 pinhole-type leaks. So we ended up replacing that
16 header.

17 On the turbine rotor, we replaced it. We
18 did the low-pressure portion of the turbine in 1987.
19 And then in 2002, we replaced the high-pressure
20 portion. The high pressure was replaced as part of
21 the power uprate here that we did in 2002. This was
22 an Appendix K power uprate, and we raised the output
23 by approximately two percent. We have no current
24 plans for any additional power uprates on Robinson.

25 MEMBER LEITCH: Was the service water

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1 piping replaced in kind?

2 MR. STEWART: No, sir. What we had is
3 when we did the steam generator replacement in 1984,
4 we learned what not to do in later practices. And we
5 had a problem with microbiological induced corrosion.
6 Ours was very specific. We had stainless steel pipe.

7 And the mic that we had attacked the
8 heat-effective zone of the weld. It didn't do the
9 weld. It didn't do the pipe. It took the
10 heat-effective zone. And we replaced it with AL6X,
11 which we have had very good luck with so far.

12 MEMBER LEITCH: Thank you.

13 MR. STEWART: In terms of ongoing or
14 planned replacement, we're still completing our
15 security upgrades. We will have those completed this
16 year.

17 We have a replacement head on order. In
18 fact, it is in fabrication now. They have finished
19 the rough machining. And we expect to install that in
20 refueling outage 23, which will be Fall of 2005.

21 When we talked to you on the subcommittee,
22 we had a relief request related to the head
23 inspection. We have since withdrawn that request.
24 And we will conduct full inspection in this upcoming
25 refueling outage.

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1 We are also expanding our dry fuel
2 storage. That project has just started basically this
3 year. And we are expecting to load the first module
4 on that in the third quarter of 2005.

5 MEMBER LEITCH: When you say you are
6 "expanding" it, is there dry fuel storage on site now?

7 MR. STEWART: Yes, sir. In fact, we
8 signed out an application for renewal of that facility
9 last week. Its license expires 2005 or --

10 MR. CLEMENTS: Two thousand six.

11 MR. STEWART: Two thousand six. So we
12 just submitted a renewal for that one. We are also
13 looking to do some work on our generator and excitor
14 and refurbish those. And that is planned toward
15 refueling outage 24, which would be in 2004. Those
16 are the major projects that we have.

17 I would like to go over a little bit of
18 the operating experience. In 2003, Robinson had a
19 very good year. Our capacity factor was 103.54
20 percent with power uprate. It was basically a record
21 generation year for Robinson. We did have a refueling
22 outage that year. And basically this morning we have
23 a continuous run of 465 days.

24 One thing I will point out to you is in
25 2003, our exposure -- and this is the total dose for

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1 operating the plant for the year -- was 4.8 REM for
2 the year. To go along with that, we had 25 zero-dose
3 days in 2003. And we have had four so far in 2004.

4 When I checked with RFC Tuesday, we had
5 one step-off pad in the plant. That is in the hot
6 machine shop to support some work on some contaminated
7 equipment we're doing outside of the power block.

8 MEMBER LEITCH: I am a little confused by
9 the capacity factors greater than 100. Is that on the
10 basis of power uprate? In other words, that is on the
11 original basis?

12 MR. STEWART: No, sir. If you go back to
13 this year, this was a non-outage year. The capacity
14 factor is based on a theoretical maximum when we look
15 at our cooling temperature, what we expect for highest
16 cooling temperature.

17 So if you go into some of the hotter days
18 and stuff, it drops down a bit because we have a lake.
19 And Unit 1 and Unit 2 share the lack. So our lack
20 temperatures tend to go up in the summer, and the
21 factors go down.

22 So if we have relatively minor weather, we
23 can get a better vacuum. We can get a better capacity
24 factor.

25 MEMBER LEITCH: But, now, you did uprate,

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1 did you not, based on improved feedwater?

2 MR. STEWART: Yes, sir, we did. We
3 changed the MBC of the plant based on the power
4 uprate.

5 MEMBER LEITCH: Now, there are some people
6 beginning to experience problems with that ultrasonic
7 flow measurement. There have been some recent reports
8 about a couple of plants that suspect that they have
9 been overpowered for some period of time. Are you
10 familiar with that experience?

11 MR. STEWART: I am not familiar with that.
12 We have had problems with ours on the welds and
13 leaking at some of the sensors. In fact, we are doing
14 a repair this outage to correct some of those welds.

15 We have had some problems with it
16 leakage-wise, but what happens whenever we get the
17 leak, it will tend to shut that down. It drives it to
18 conservative mode. So we haven't seen as much power
19 in all cases as we could because we have had to drop
20 down a couple of percent based on problems with it,
21 but we haven't seen anything calametric-wise that
22 would drive it there.

23 MEMBER LEITCH: I am just surprised that
24 you are getting numbers as high as 103.5 percent. You
25 know, 101 perhaps wouldn't surprise me, but 103 is.

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1 MR. CLEMENTS: Those are really based on
2 historical MBC, which is substantially less than the
3 plant is allowed. And it is based on electric
4 generation obviously and not thermal generation. So
5 the plant is just basically running and better
6 maintained than it originally was.

7 MEMBER LEITCH: Okay. Thank you.

8 MR. STEWART: In 2004, we have a refueling
9 outage coming up. It basically starts. It is planned
10 for April 20th. The current plan has that as a 28-day
11 outage. If you look at it, basically the plant's
12 operated very well. We have had minimal time offline.
13 And all the NRC performance indicators are green on
14 the plant.

15 When Region II did their inspections, they
16 looked at our boric acid corrosion program. They had
17 made a couple of comments and expressed some concerns.
18 The subcommittee asked us to follow up and explain
19 what we have done with the boric acid program. We had
20 plans for work when we talked in September.

21 Since September, we have implemented a
22 corporate boric acid control program that is basically
23 in effect for all three of our PWRs. It has got some
24 specific guidance that requires all plant personnel
25 recognize borated system leakage, understand its

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1 significance, and initiate corrective action when they
2 detect the residue. That goes further to point out so
3 that everyone understands that carbon and low-alloy
4 steel components are exposed to boric acid components
5 shall be carefully cleaned and inspected.

6 To go along with that, we have a Robinson
7 plant-specific procedure that is a system walk-down
8 procedure. We have since revised it to include
9 similar statements that basically ask if any of the
10 system engineers see any boric acid anywhere in the
11 plant during their walk-down. So they basically
12 initiate the work request or condition report that it
13 get taken care of.

14 The concern, as I recall it, from Region
15 II's aspect is the only mention of boric acid in this
16 system walk-down procedure was mentioned as a
17 potential radiological hazard. So we have since
18 changed that.

19 CHAIRMAN BONACA: This statement is
20 somewhat inconsistent with the previous slide that you
21 had.

22 MR. STEWART: I'm sorry?

23 CHAIRMAN BONACA: This statement is
24 somewhat inconsistent with the previous slide that you
25 had if you are going to show it. Go back one slide?

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1 It says, "If carbon and non-alloy steel components are
2 exposed to boric acid, the components shall be
3 inspected."

4 It seems to me that if you detect boric
5 acid, you have a leak out there somewhere. I think
6 that you may want to inspect the component, but you
7 should have an action to -- well, you do have an
8 action in the next statement to evaluate the
9 conditions. So I am just trying to understand why you
10 yourself do carbon and non-alloy steel components.

11 MR. STEWART: We also have a requirement
12 to look for leakage, but the main thing we wanted to
13 do is make sure that people were a little more tuned
14 in. If you see boric acid, you need to do something
15 with it.

16 It is part of the standard procedure when
17 we go in and we are doing a cleanup. They try to find
18 the source of the leak as well as clean up after it.
19 That has typically been standard practice for a while.
20 It just was not really documented in the procedures.

21 For Robinson license renewal, we credited
22 47 programs. Of those 47 programs, 10 were existing
23 programs and required no changes. That leaves 37
24 commitments for 27 enhancements in 2 new programs.
25 All of these commitments have been entered into the

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1 Robinson commitment tracking system.

2 MEMBER APOSTOLAKIS: When does your
3 current license expire?

4 MR. STEWART: It expires July 31st, 2010.

5 MEMBER APOSTOLAKIS: Thank you.

6 MR. STEWART: And what we plan to do with
7 these commitments, if you will recall, the follow-up,
8 the third inspection that Region II did, they came
9 back and looked at the commitments in our commitment
10 track. We have a transition plan in place that
11 basically plans on moving these commitments from the
12 license renewal organization to the plant organization
13 if we don't have it implemented.

14 Where we stand on that relative to these
15 37 commitments as of today, a lot of them have already
16 been implemented. We have made the enhancements to
17 the procedures, and we have already done them. Eleven
18 of them have been transitioned to the plant
19 organization. They are actually in. They haven't so
20 far belonged to the engineering group on site.

21 At Robinson, the way we do the commitments
22 is the Robinson supervisor of licensing regulatory
23 programs has overall responsibility for management of
24 the commitment tracking. So the commitments may be
25 assigned to individual organizations to implement, but

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1 one person is in charge of all tracking. So that if
2 the NRC or anybody comes in and wants to know what is
3 the status of the commitments, they go to that person
4 in regulatory affairs so that they can run it down for
5 them.

6 CHAIRMAN BONACA: When you do implement
7 the enhancement, does the enhancement go into effect
8 shortly after some date or are you waiting for 2010 to
9 have that go into effect? How do you manage that
10 transition?

11 MR. STEWART: For the items that we have
12 implemented, if they are implemented, they are
13 currently in there. Some of the things that we have
14 implemented, we did a lot of stuff in our system
15 walk-down procedure.

16 And to give you an example, we brought in
17 a look at some of the cable tray and conduit, just
18 routine inspection stuff. The way we state it in the
19 procedure is there is a requirement now that that is
20 done. And we require that a baseline be completed, a
21 baseline inspection, walk-down of that cable tray and
22 conduit, prior to the period of extended operation;
23 i.e., 2010. Then thereafter, it is on a ten-year
24 frequency.

25 So that is the way we implement it. We

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1 put it in place. And if it is something that you need
2 some time to get done, typically we will spot a
3 timeline. But the requirement is there so they can
4 begin with it.

5 CHAIRMAN BONACA: So you do have the time?
6 I mean, you have the length of time where you are
7 stepping up to the commitments of the licensing?

8 MR. STEWART: Yes, sir.

9 CHAIRMAN BONACA: So you are not really
10 getting into individual commitments in a phased way?
11 I mean, you just --

12 MR. STEWART: A lot of the commitments we
13 went ahead and put in place because they are that
14 intrusive.

15 CHAIRMAN BONACA: So you do have a phase.
16 Let me ask you a question about Alloy 600 program.
17 Okay? At some point you are going to institute an
18 Alloy 600 program.

19 The actions of that Alloy 600 are going to
20 be important for this current period of license
21 preparation, which was the intent. So I would expect
22 that some of those activities listed would be already
23 into effect before 2010.

24 MR. STEWART: With regards to Alloy 600,
25 we have some of our engineers following what EPRI and

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1 MRP are doing in negotiations with the NRC. We are
2 following their efforts and aware of what is going on,
3 but we haven't implemented anything yet.

4 The way our Alloy 600 program works, this
5 is not one that we have either implemented or
6 transitioned, but we will put that in place prior to
7 the period of extended operation.

8 CHAIRMAN BONACA: Okay.

9 MEMBER LEITCH: I think you told us at the
10 subcommittee meeting that your intention was to have
11 18 of these programs in place by the middle of 2004.

12 MR. STEWART: Correct.

13 MEMBER LEITCH: Is that still your hope?

14 MR. STEWART: I think going back and
15 forth, it might be 17 now, but that is about the right
16 number. Our main intent is right now all of the
17 commitments were initially assigned to license
18 renewal. And we want to either get them implemented
19 or put them back into the plant organization.

20 That 18/19 split was first as we work them
21 out shifted back and forth. But I think it is one
22 different than we said in September.

23 MEMBER LEITCH: Thank you.

24 MR. STEWART: Now, what happens with the
25 commitments is typically these will go in a program

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1 document. We will identify those as a commitment. We
2 flag them as a commitment and indicate, for example,
3 that it belongs to the boric acid control program or
4 Alloy 600 program. We don't have a procedure to do
5 that, but we will flag whatever the program is that is
6 associated with it. What we expect to do then is
7 control the changes by the 50.590 process.

8 Along with that, what we will do -- and we
9 have taken some steps, but we haven't finished yet in
10 terms of the configuration control process -- is we
11 will incorporate guidance to ensure that the
12 requirements of 54.37(b) are met.

13 The way we are going to support this is
14 some license renewal training. Some phases of that
15 have been conducted on site already. We expect to do
16 one more round of that by October 2004.

17 MEMBER LEITCH: Who are the recipients of
18 that training?

19 MR. STEWART: To date it has been
20 primarily engineering. Engineering is the owner of
21 most of these commitments. I think there might be one
22 or two that will go over to chemistry, but that is
23 primarily engineering.

24 MEMBER LEITCH: Do you see any impact on
25 operator training as a result of license renewal?

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1 MR. STEWART: No, sir. What we have got
2 is we have got a configuration control process so that
3 if we are doing something with ops procedures, we will
4 be looking at those just to see if they are doing
5 something where they are changing, say, a moat from a
6 standby to normal operating or something that might
7 impact something. We will look at that for license
8 renewal, but we will cover that in some of the
9 screening criteria that we put in when they do their
10 procedure changes.

11 We also plan on creating a license renewal
12 design basis-type document or equivalent. That will
13 be done this summer. As I stated, we have got a
14 refueling outage this April. So on the schedule we
15 are on, we expect to see the renewed license in April.

16 So with this UFSCR update that we do six
17 months following the refueling outage, we will have
18 the UFSCR supplement in place. This will be the
19 chapter 18 in our UFSCR. And basically it will be the
20 Appendix A of the license renewal application as we
21 have modified it with responses to RAIs.

22 That is the last of my presentation. Any
23 questions?

24 MEMBER LEITCH: Just I would continue. It
25 is not really part of license renewal, but I am a

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1 little concerned about the power level on the unit
2 when I see that year to date, you are almost 106
3 percent. It just seems to me to be awfully high and
4 gives me a little cause for concern.

5 I would just ask you to take it back to
6 the plant folks if they are familiar with it -- I
7 think it is Byron and Dave who would have -- get them
8 to find out now --

9 MR. STEWART: About the calametrics?

10 MEMBER LEITCH: They have been overpowered
11 for several years. I am not sure whether your system
12 is the same as theirs or not, but it would be just
13 something to take a look at. As I say, it is not a
14 license renewal issue at all. It is just something
15 that gives me a little bit of question.

16 MR. STEWART: I will carry that back. And
17 I know when we installed the ultrasonics that we did
18 quite a bit of calametric testing to match it. And I
19 am not totally familiar with it, but I believe, at
20 least in each cycle, we would come back and do similar
21 calametrics and do a baseline. So we do check it with
22 --

23 MEMBER APOSTOLAKIS: Is there a PRA for
24 the plant?

25 MR. STEWART: Yes, sir, there is a PRA.

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1 MEMBER APOSTOLAKIS: And what is the core
2 damage frequency? Do you remember?

3 MR. STEWART: I do not. Do either one of
4 you? I am sorry, sir. I can get that information
5 back to you.

6 MEMBER APOSTOLAKIS: Are you participating
7 in any of the risk-informed initiatives? Have you
8 requested any changes in your licensing basis?

9 MR. STEWART: No, sir. We have not. We
10 have looked a couple of times at the risk-based ISI
11 and have concluded that there is no particular
12 advantage for us. We can't see the benefit of trying
13 to do that. We haven't looked at it. We haven't
14 proceeded with any of that to change any of the
15 licensing basis.

16 MEMBER APOSTOLAKIS: Are you doing online
17 maintenance?

18 MR. STEWART: Yes, sir. Now, we do online
19 maintenance, and we do a risk matrix based on our
20 online maintenance. Occasionally when you get a
21 merging item, I will see them shift it around just to
22 lower the risk. So we do use the risk matrix online
23 maintenance.

24 MEMBER APOSTOLAKIS: I thought everyone
25 was doing that risk-informed ISI. That's not true?

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1 MEMBER ROSEN: No. It's about two-thirds.
2 A lot of them are but not everyone.

3 MEMBER SIEBER: It seems to me that the
4 idea of going to a risk-informed ISI is to gain a
5 financial advantage but to be able to inspect the most
6 important response to this plan. And so if you
7 approach risk-informed ISI or a lot of other
8 risk-informed initiatives, the thought ought to be
9 that what we are trying to do is improve the safety of
10 the plant, as opposed to getting out of additional
11 work.

12 MEMBER ROSEN: Yes, to reduce dose as
13 well.

14 MEMBER SIEBER: Right.

15 MR. STEWART: And to proceed with
16 risk-based ISI, it is a bit of working stuff on the
17 front end. We still need to go through the review
18 cycle. At Robinson, they have looked at it and have
19 not seen it particularly finish officially for the
20 effort involved to try to do it.

21 MEMBER ROSEN: Well, notwithstanding the
22 fact that your doses are very low, but there were
23 years in which you didn't have an outage. And when
24 you have outages, you will be in doing inspections.

25 MR. STEWART: Yes, sir.

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1 MEMBER ROSEN: And some of the things you
2 will be inspecting may yield to risk-informed
3 in-service inspection technology in the sense that you
4 might not have to do them as frequently for the
5 low-risk significant welds. That is something that if
6 you are really interested in pressing on the
7 accumulated dose to your personnel you might look at.

8 MEMBER SIEBER: Is your PRA a living PRA
9 or --

10 MR. STEWART: Yes, sir.

11 MEMBER SIEBER: Was it just done to
12 satisfy the generic letter?

13 MR. STEWART: No. It is a living PRA and
14 --

15 MEMBER APOSTOLAKIS: But is it being used
16 anywhere?

17 MR. STEWART: Yes, sir. We use it. We
18 use it for a number of studies. We use it to help us
19 with the online maintenance that you were talking
20 about. And a lot of times when we start looking at
21 modifications or whatever to the plant, we will look
22 at it in terms of how it reduces some of the risk.

23 CHAIRMAN BONACA: This plant must have
24 been an SEP plant, systematic evaluation plant?

25 MEMBER SIEBER: It is pretty old.

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1 CHAIRMAN BONACA: Yes.

2 MR. STEWART: I am not familiar.

3 PARTICIPANT: The answer is yes.

4 CHAIRMAN BONACA: Yes.

5 MR. STEWART: I do know that the plant is
6 old enough it is basically a pre-GDC plant.

7 CHAIRMAN BONACA: How is your system
8 configured on this plant? Do you have --

9 MR. STEWART: We have two motor-driven
10 pumps and one steam-driven pump.

11 CHAIRMAN BONACA: If everything is housed
12 in this building that you showed in the picture, if
13 you could put it up?

14 MR. STEWART: The steam-driven pump in the
15 turbine building.

16 CHAIRMAN BONACA: Yes.

17 MR. STEWART: The turbine building is
18 right here. And it is open. If you could go back in
19 the first four here? Back on this slide as the
20 steam-driven pump. Now, the motor-driven pumps are
21 actually also from the turbine building, but they are
22 enclosed. They are in a separate walled area back
23 here on the first --

24 CHAIRMAN BONACA: Is the turbine building
25 pump protected there by walls or something?

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1 MR. STEWART: No, sir. It is pretty open.
2 I mean, the main feed pumps are right here. And it is
3 probably within 30 feet of those.

4 CHAIRMAN BONACA: So your extent of the
5 events PRA must be pretty high contributors?

6 MR. STEWART: I'm sorry? I didn't catch
7 the question.

8 CHAIRMAN BONACA: I was commenting that
9 probably your extent of the event PRA contribution to
10 this is pretty high. I mean, if --

11 MR. STEWART: Yes. If you look at the
12 condensate storage tank right here, if you go to some
13 of the later plants, I mean, Harris plant, for
14 example, it is closed in a separate building with
15 concrete.

16 This is the condensate storage tank right
17 here. If you go in the plant, the reactor auxiliary
18 building is wrapped around the containment here. This
19 is the fuel-handling building back behind here.

20 MEMBER SIEBER: Where is the spent fuel
21 storage area?

22 MR. STEWART: Right there. Now, if you
23 come off this picture, we have got dry fuel modules
24 back up this way, the inside protected area, but right
25 here is the --

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1 MEMBER SIEBER: That is the wet pool?

2 MR. STEWART: That is the wet pool. And
3 this crane here is to date, we have been using
4 railroad shipments and taking spent fuel to our Harris
5 plant. This is how we handle the casks, with this
6 crane right here.

7 CHAIRMAN BONACA: Have you experienced any
8 hurricanes or tornadoes on the site, high winds?

9 MR. STEWART: Yes, sir. We have one in
10 November 2002. I remember it because I had a new
11 pickup truck, and I got it repainted.

12 CHAIRMAN BONACA: Did it have any major
13 impact on the plant?

14 MR. STEWART: No, sir. In fact, that
15 particular tornado, we were shut down for an outage.
16 If you can imagine with an outage, you bring in all
17 sorts of stuff. It actually hit on site, turned over
18 some vehicles, blew some stuff around. But
19 considering we were already shut down when it came
20 through, it was surprising how little it actually
21 damaged inside the plant, even though we had all of
22 the extra trailers and equipment in to support the
23 outage.

24 MEMBER LEITCH: Okay. If there are no
25 other questions, we will proceed with the staff's

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1 presentation now if that okay.

2 MR. STEWART: Yes, sir.

3 MEMBER LEITCH: S. K. Mitra will be making
4 the staff presentation.

5 MR. STEWART: Thank you.

6 MR. KUO: And also I would like to inform
7 the Committee that we just had Frank Gillespie, the
8 Deputy Division Director, join us. I am sure he will
9 be glad to answer any questions that we have.

10 VICE-CHAIRMAN WALLIS: We will have to
11 think of a question that only he can answer.

12 MR. MITRA: Good morning. My name is
13 S. K. Mitra. I am the lead Project Manager for the
14 Robinson nuclear plant license renewal application.
15 It is supposed to be Mr. Caudle Julian, inspector from
16 Region II, is on the line, but I couldn't get him. So
17 there is some kind of glitch there. But we will try
18 to answer the inspection questions, if you have,
19 ourselves.

20 A little bit of background. We received
21 the application on June 14, 2002. We had an ACRS
22 subcommittee briefing on September 30, 2003 on draft
23 SER with open items.

24 Since then, on January 20, 2004, we issued
25 the final SER. And the staff concluded that the

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1 applicant has met the requirements of license renewal
2 by Part 54. The current license is expiring on July
3 31st, 2010. And the request for renewal is for an
4 additional 20 years.

5 Three inspections and two audits were done
6 during the review. Just to make reference to what is
7 the difference between the audits and the inspection,
8 the audits are the ones which staff reviews, the
9 documents at the site. It is generally done by the
10 NRR personnel.

11 The inspections are the verification of
12 accuracy of the implementation with regard to the
13 aging management program. It is generally done by the
14 original staff.

15 The first two, the scoping and screening
16 methodology audit, which we did in September 2002, and
17 the scoping and screening inspection, which is in 2003
18 during March and April.

19 In the methodology, the staff audited and
20 received the applicant methodology. According to the
21 scoping and screening inspection, the staff found that
22 system structure and components are in the scope of
23 licensing renewal as required by the rule.

24 MEMBER ROSEN: I guess at that point, I
25 should ask the question about the steam generator feed

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1 ring position.

2 MR. MITRA: We have a slide later on.

3 MEMBER ROSEN: I will hold it.

4 CHAIRMAN BONACA: I have a question, a
5 general question, here. Every time we review a
6 license renewal, we see a significant amount of
7 inspections taking place and reviews. I understand
8 that the focus, in fact, is going to move further to
9 the site and everything else.

10 When you go for an inspection, are you
11 going simply with license renewal issues in mind or
12 are you also looking for specific areas of the plant,
13 either those that have experienced in the past some
14 specific iteration? I know you do that.

15 And also for a plant like this with an SEP
16 license kind of, you know, there are a number of
17 commitments on the licensing bases which were
18 different from the standard ones. In some cases,
19 there were other systems credited because you do not
20 have a plant which was fully compliant with the SRP at
21 the time.

22 Are you looking in those areas we
23 understand what the differences of the significance
24 are to the license renewal issue, differences may be
25 simply that the system is not fully pedigreed, yet is

1 used for an application on the licensing basis and
2 then need special attention maybe that is not needed
3 for other plants, where you have multiple trains and
4 that kind of thing?

5 MR. MITRA: Most of the inspection is done
6 by the region personnel. They have pretty much
7 familiarity with each plant in that region. And they
8 do their inspections other than licensing frequently.
9 If there is any problem or any maintenance or any
10 other issue, they are quite familiar.

11 They are usually inspectors on site who do
12 most of the inspection. He does the walk-down during
13 the inspection. And they are quite familiar with what
14 is the shape of the plant at that time.

15 MR. KUO: In general, the region does 100
16 percent inspection for all systems. For license
17 renewal inspection, the commitment is made
18 specifically to license renewal to be definitely part
19 of the inspection.

20 CHAIRMAN BONACA: To me, issues like this
21 would come into the scoping first. I mean, we might
22 have some systems that are not to the degree and, yet,
23 they are committed.

24 MR. KUO: Yes.

25 CHAIRMAN BONACA: And for those, of

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1 course, you want to have special attention. And
2 mostly it would be that issue.

3 MR. GILLESPIE: Certainly we are focused
4 on the word "inspection." There are two elements to
5 the scoping. Actually, there are three. One is the
6 inspection. That is after the fact, if you would, in
7 the timeline.

8 The first one is actually the scoping
9 audit on site, which is actually done out of
10 headquarters. It is our QA group, maintenance QA
11 group, that goes up and does it. They are actually
12 looking at the process of how they went through, which
13 systems they picked.

14 And so there is that element. Then the
15 second element is DSSA is actually looking at, if you
16 would, to simply, the prints with the crayon lines
17 around it for the scoping. So the one group that is
18 going on site really has to go on site to answer those
19 kinds of questions to evaluate the alternative systems
20 in some of these older plants consistent with the
21 broader scope of the rule itself.

22 So you have got that group different from
23 the inspection group with the maintenance QA people
24 looking exactly at the question you are asking as an
25 audit. And then you have got the inspectors going out

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1 several months later confirming if the licensee has
2 done what they already said it was okay to do.

3 CHAIRMAN BONACA: Okay. So what you are
4 telling me is that the regional people really have the
5 more focus on the equipment and the specifics and that
6 should be reflected, in fact, in the application in
7 the NRA. And so as you verify the NRA commitments
8 insofar as scoping, somebody has that SEP in mind and
9 remembers that system X was committed to and it should
10 be there, correct, that kind of knowledge?

11 MR. KUO: Right. Like Frank said,
12 actually, there are three groups of the NRC doing this
13 particular scoping work. That is our inspection
14 program staff doing the methodology audit and the DSSS
15 staff doing the result audit and then regional
16 inspection. So that is really welcome.

17 CHAIRMAN BONACA: Okay. Thank you.

18 MEMBER LEITCH: Some plants we see that
19 there are only two inspections here. There were
20 three. What significance is that third inspection?

21 MR. MITRA: We will come to that slide.
22 Why we do it in the final inspection is because of the
23 inspection, the aging management inspection. We found
24 that there is some concern regarding the tracking.
25 And that's why we went back and did the third.

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1 MEMBER LEITCH: Third inspection. Okay.

2 MR. MITRA: We did the aging management
3 program audit. NRR staff went there and did that
4 during May 2003. We have the audit report issued on
5 August 3rd, 2003. We audited all of the attributes of
6 the AMP claimed to be consistent with GALL and
7 concluded that most of the attributes are consistent.

8 There are a few that we identified some
9 differences. We clarified with technical staff at the
10 applicants' sites. And they have revised their basis
11 documents to be consistent with the GALL.

12 VICE-CHAIRMAN WALLIS: Everything is now
13 consistent with GALL?

14 MR. MITRA: It is. We have one AMP that
15 we found that the applicant's cable-converted
16 connector program lacked detail to conclude the
17 consistency with GALL. So we asked the applicant to
18 submit it to our headquarter staff for review. They
19 did. They revised it. And the staff found it
20 acceptable.

21 MR. KUO: If I may, I just want to say
22 that Robinson is the first plant that we started
23 having the staff team to go to the site to do the
24 audit for the consistency with GALL because in the
25 application itself, the applicant simply addressed

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1 whether they were consistent with GALL or not without
2 actually the supporting documentation.

3 So the purpose of this audit is for the
4 staff to go to the site to review the supporting
5 documentation.

6 VICE-CHAIRMAN WALLIS: And I think that is
7 very important. Now, we are going to see another
8 application later in the day.

9 MR. KUO: Yes.

10 VICE-CHAIRMAN WALLIS: And in that one, I
11 think it turns out that everything is not consistent
12 with GALL. So the key question for me was, what did
13 you folks do about those parts which were not
14 consistent with GALL? We will get to that later in
15 the day.

16 MR. KUO: Yes.

17 VICE-CHAIRMAN WALLIS: So two questions.
18 Are they consistent with GALL? Check it. What is it?
19 And then what do you do with the ones which are not
20 consistent?

21 MR. KUO: We will explain that later.

22 VICE-CHAIRMAN WALLIS: Okay. Thank you.

23 MR. KUO: Thank you.

24 MEMBER LEITCH: P. T., while we are on
25 that point, perhaps you could refresh my memory. I

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1 think it is Farley, is it, that you are going to move
2 even more of your activities to the site?

3 MR. KUO: Correct, correct.

4 MEMBER LEITCH: Has that occurred yet?

5 MR. KUO: Yes, that has occurred. Our
6 staff team performed the audit at Farley. They
7 actually wrote the audit report and wrote the draft
8 SER based on their audit.

9 MEMBER LEITCH: So it is still probably
10 six months or so at the subcommittee level until we
11 see the results of that?

12 MR. KUO: That is correct.

13 MEMBER LEITCH: But could you make a
14 comment? We are a little off the topic here, but did
15 you find that process to be successful?

16 MR. KUO: Yes, sir, to the best of my
17 knowledge. And then the feedback that I got from the
18 applicants, it looks like the process really works.
19 How efficient, how effective, we haven't been able to
20 assess yet, but just based on the general observation
21 from the feedback from the applicants, it looks like
22 the process works well.

23 MEMBER LEITCH: Okay. Thank you.

24 MR. MITRA: We have done the aging
25 management inspection at the original inspection

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1 period, in June 2003. And, as I said, the inspector
2 observed that the applicant had not yet established
3 adequate tracking items in the plant action request
4 database to assure the future task base to support
5 license renewal.

6 So the inspection report was issued on
7 July 31st, 2003. And, to answer your question, we
8 went back for further inspections to verify that its
9 tracking system is in place. That is the third
10 inspection.

11 We went back on September. By that time,
12 applicant had loaded its attempts to establish a site
13 action request tracking system and before we went
14 through the tracking system, how they did it. Also we
15 found that there is a transition plan for completion
16 of licensing projects. They have established that.
17 And the inspection report was issued on September 9,
18 2003.

19 Now we will go to open items. We had 2
20 open items and 30 confirmatory items. All of them are
21 resolved right now. As a matter of fact, when we
22 briefed the subcommittee on September 30th, all of
23 them were resolved, but we didn't get the response
24 from the applicant on the open item information.

25 So we will just discuss a couple of open

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1 items that we had at that time. The first one is that
2 staff identified the degradation of feed rings, which
3 is a non-safety-related item, but it is surrounded by
4 the safety-related items. The DNRs or the DNR weld
5 could produce root spark inside the steam generator
6 shell and may damage safety-related components,
7 especially during the transient.

8 CHAIRMAN BONACA: Is this a generic
9 concern with this kind of steam generator?

10 MR. MITRA: I think it has generated
11 concern.

12 CHAIRMAN BONACA: So this is something for
13 which there have been commitments already on the part
14 of other applicants? I remember that.

15 MR. MITRA: Yes.

16 MEMBER ROSEN: So what puzzles me about
17 this -- and this is why I brought it up earlier -- is
18 that it seems to me there was a lot of sound and fury
19 here without much significance because this is a
20 matter that should have been obvious to everybody.

21 I wonder, rather than going through this
22 again and again, maybe, P. T. and Frank, if you might
23 think about ISG, interim staff guidance, or something
24 that would clarify this to licensees and the staff so
25 we could get on to more substantive matters earlier if

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1 they exist.

2 MR. KUO: We will see if this is a
3 subject.

4 CHAIRMAN BONACA: Yes. And either item
5 can be based, and that will be pumps. They keep
6 coming back up. It should be clear by now that they
7 have to be in the scope of license to do it.

8 MR. KUO: Thank you very much. Good
9 suggestion.

10 VICE-CHAIRMAN WALLIS: This comes up with
11 the next license, too, doesn't it, the business about
12 in-vessel components and all of that? The same issue
13 comes up again?

14 MR. KUO: Right.

15 MR. MITRA: By the way, the pump was in
16 scope from the beginning.

17 CHAIRMAN BONACA: Yes. I'm not referring
18 to this application. It just routinely comes up as an
19 item that I think, in fact, was not in the original
20 and didn't come to us as an other item. I know that
21 there was a debate between the applicant and the NRC.
22 So since it come back a number of times, I think it is
23 an appropriate candidate.

24 MR. MITRA: The other work item is that
25 Lake Robinson had a dam failure and depletion of

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1 condenser storage tank in rendering the failure of
2 deep well pump, which caused failure of separation of
3 the auxiliary feedwater system to prevent the residual
4 heat removal. That is the main condition.

5 As a result of staff finding the deep well
6 pumps, associated piping, and it was according to
7 scope, the open item would result.

8 VICE-CHAIRMAN WALLIS: So their ultimate
9 heat sink has forward tendencies? It has a lake and
10 three deep wells? There are three separate wells
11 essentially?

12 MR. MITRA: Yes.

13 MR. STEWART: The heat sink is consistent
14 with the lake only. We have deep well pumps that we
15 use as a backup source. The preferred source
16 obviously is a condensate storage tank.

17 VICE-CHAIRMAN WALLIS: Right.

18 MR. STEWART: And our safety-loaded backup
19 is service water. So we do have service water as a
20 backup if we deplete inventory of the condensate
21 storage tank.

22 However, our main reservoir is not
23 safety-related. It has been seismically designed. We
24 do inspect it. So that is why this item came up. So
25 deep well pumps are the backup in case we lose the

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1 reservoir.

2 MR. MITRA: This is a TLA aging of
3 boraflex. I am just discussing this slide because the
4 licensee has submitted an amendment to eliminate the
5 credit of the boraflex panel from technical
6 specification.

7 When we had the presentation during the
8 subcommittee, the staff was still reviewing this
9 amendment. Since then, the amendment has been
10 approved and the document and the license amendment
11 can be seen in amendment number 198 issued in December
12 22nd, 2003. It is also addressed in our ACR section
13 4.614.

14 Finally, we will go to reactor vessel
15 integrated TLAs. And we will have a couple of slides
16 on that. The first one is reactor vessel needle
17 embrittlement. The analysis of pressurized thermal
18 shock is projected to end up with a period of extended
19 operation. And staff independently performed the
20 calculations to verify that. And it shows that
21 Robinson numbers are well under the maximum limit.

22 MEMBER ROSEN: This is a very good
23 presentation of data as well. Thank you for clearing
24 it up. But it now raises the question, really, in my
25 mind of an older vessel like this within all of this

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1 margin. What is it about this vessel that makes it
2 come out so well?

3 MR. CLEMENTS: When the issue first came
4 into effect, we immediately took action and went to
5 first a low leakage loading pattern in the core. And
6 then since we have put in special part link shield
7 assemblies in the regions of the critical welds that
8 reduce the fluence by about a factor of ten.

9 We did that in the early 1980s, when PTS
10 first became an issue. And we have maintained those
11 assemblies in the vessel since.

12 MEMBER ROSEN: I think you are to be
13 commended for that, for those actions. Those are very
14 proactive things to do.

15 CHAIRMAN BONACA: Yes. Also I think the
16 volumes in these early plants were sufficiently large
17 and spent to the actual size of the core. I think
18 these kinds of plants, like 600, like the electric,
19 you compare them to the modern four-loop with the
20 ISBWRs, just about the same volumes. And, yet, they
21 have twice as much power density now. So I think that
22 is another component. It is encouraging to see that
23 there is this kind of margin.

24 VICE-CHAIRMAN WALLIS: These independent
25 calculations were not very sophisticated. We were

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1 just putting some numbers in a formula that is in Reg
2 Guide 9 or whatever it is.

3 MR. MITRA: Jim? There are a lot of
4 details that go into it.

5 VICE-CHAIRMAN WALLIS: There are lots of
6 details? Okay. Do you have to look at the
7 composition of the steel and that sort of thing?

8 MR. MEDOFF: I am Jim Medoff. I am with
9 the Materials and Chemical Engineering Branch of the
10 Division of Engineering, NRR. I was assigned the TLAs
11 for neutron embrittlement.

12 There are a lot of factors that go into
13 the pressurized thermal shock assessments. And the
14 upper shelf is energy assessments. They include
15 surveillance data and their specific criteria of how
16 we expect the licensees to incorporate this
17 surveillance data into the calculations. And
18 sometimes that gets a little bit tricky.

19 So it is not always quite as
20 straightforward as you may think, but I think we have
21 had enough discussions with the industry that they are
22 conforming to the way we expect them to incorporate
23 the surveillance data into the calculations. So the
24 data that you are seeing here should incorporate any
25 relevant surveillance data.

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1 VICE-CHAIRMAN WALLIS: But they are your
2 calculations that are reported?

3 MR. MEDOFF: But we have a database that
4 has calculational methods that conform to regulatory
5 guidance.

6 VICE-CHAIRMAN WALLIS: These numbers here
7 are the industry calculations?

8 MR. MEDOFF: No. The numbers --

9 VICE-CHAIRMAN WALLIS: Are your
10 calculations?

11 MR. MEDOFF: The numbers you are seeing
12 here are the numbers that we independently calculated
13 using the database.

14 VICE-CHAIRMAN WALLIS: You independently
15 calculated? Okay. What did they calculate?

16 MR. MEDOFF: I would have to go back to
17 the SER and see.

18 VICE-CHAIRMAN WALLIS: Essentially the
19 same thing?

20 MR. MEDOFF: I think the numbers compare
21 pretty well between what they --

22 VICE-CHAIRMAN WALLIS: Presumably if you
23 did the same thing, you would get the same answer.

24 MR. MEDOFF: Right.

25 MEMBER SIEBER: Presumably.

1 MR. MEDOFF: Not always, not always.

2 VICE-CHAIRMAN WALLIS: No. I am very
3 pleased you did independent calculation. I am just
4 trying to check what was the depth of them and how
5 they compared because I think a lot of our job here is
6 to assess how you went about checking things.

7 MR. MEDOFF: Typically what we do is we go
8 pull the latest surveillance capsule reports for the
9 plant. We go look into the data, make sure that we
10 have all of the data in the ARB. And if it's not, we
11 update the ARB. And then we perform the calculations.

12 VICE-CHAIRMAN WALLIS: Thank you.

13 MR. MITRA: And we have data from reactor
14 vessel upper shelf energy. Again, the analysis
15 predicted an extended operation, and staff began to
16 perform independent calculation. And, again, it shows
17 the limit minimum made by the Robinson.

18 MEMBER LEITCH: Now here the limit is 50
19 in all cases, but since the number came out to be
20 below 50, you do an equivalent margins analysis. Is
21 that correct? And based on that, I guess what I would
22 say approved but more refined calculation, 42 is
23 allowable. Am I correctly --

24 MR. MEDOFF: Let me clarify this. What
25 the rule states is that the criteria for your

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1 end-of-life upper shelf energy is 50. If you don't
2 meet that, you are required to do a fracture analysis
3 to demonstrate equivalent margins to the ASME code.

4 Now, Robinson was a plant that for some
5 other place, they were below the requirements for
6 upper shelf energy in the rule. There are also some
7 requirements for initial upper shelf energy. So they
8 had an enlargement analysis for their plate almost
9 from day one. And the value that got accepted in that
10 equivalent margins analysis was down to 42-foot
11 pounds.

12 So when we did our analysis for the
13 corresponding plate, we had to make sure that they
14 remained above what was approved in the previous
15 equivalent margins analysis. Otherwise we would
16 require them to come in with a more refined
17 assessment.

18 MEMBER LEITCH: Okay. Thanks.

19 MEMBER APOSTOLAKIS: Can you give me a
20 quick tutorial on what "equivalent margins" means or
21 is that something that everybody knows? What is an
22 equivalent margin?

23 MR. MEDOFF: Well, the rule, the
24 requirement is your upper shelf energies to
25 demonstrate adequate futility of your shelf materials,

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1 the rule requires 75-foot pounds before you have any
2 irradiation and 50-foot pounds at the end of the
3 current operating period.

4 If you don't need either one of those, you
5 have to do what they call an elastic plastic fracture
6 analysis assessment to demonstrate the upper shelf
7 energies. Values that are listed here are really
8 based on linear fracture mechanics assessments.

9 If you can't meet them, what you do is you
10 do another type of assessment, which is called an
11 elastic plastic fracture mechanics assessment. It
12 postulates some use of plastic deformation at the
13 crack tip. And you do another analysis to figure out
14 what is acceptable under those analyses in terms of
15 the upper shelf and to see how far you can go down if
16 you postulate some elasticity at the crack tip. So
17 that is what it gets into.

18 VICE-CHAIRMAN WALLIS: George, when we get
19 into PPS, it is a real zoo with all kinds of
20 statistical stuff, data all over the place and all
21 kinds of uncertainty analyses.

22 MR. MEDOFF: Just to give you some
23 information, --

24 VICE-CHAIRMAN WALLIS: It is pretty darned
25 complicated.

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1 MR. MEDOFF: -- we have a regulatory
2 guide, and the ASME code has an chapter that we follow
3 for those types of analyses.

4 VICE-CHAIRMAN WALLIS: But these are all
5 supposed to be conservative-type analysis. If you
6 really get into the statistics of crack growth and all
7 of that, then it gets very complicated and subject to
8 all kinds of uncertainties.

9 MEMBER LEITCH: Jim, did I understand you
10 to say that this equivalent margins analysis was
11 necessary almost from the get-go?

12 MR. MEDOFF: I think it may. I will have
13 to get back to you on that, but if I remember
14 correctly, it was because they didn't meet the 75-foot
15 pound initial energy.

16 MEMBER LEITCH: I see. So they are not
17 necessarily below 50 now.

18 MR. MEDOFF: It was to satisfy the
19 initial.

20 MEMBER LEITCH: The initial 75, yes.
21 Okay.

22 MR. MEDOFF: But I can double-check that
23 for you if you would like.

24 MEMBER LEITCH: I don't need that
25 information. It was just a curiosity question. Thank

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1 you.

2 CHAIRMAN BONACA: I have a more general
3 question, just a curiosity about. We talked about now
4 we have plants that are coming in and are pretty much
5 fully compliant with GALL insofar as the approaches
6 they are taking.

7 As we were looking here about
8 configuration with these plants, we saw a plant here,
9 a building that has all the safeguards, which is fully
10 opened practically. It's very different from others,
11 which are more perfected. And so there is a floor.

12 I would expect that the fact that in some
13 cases the inspectors and also the applicant would have
14 consideration for special programs that are different
15 from GALL.

16 Now, I know there are enhancements to GALL
17 that are required in some cases, but I think it is
18 left to the inspectors to go and verify that this is,
19 in fact, occurring. What is the process by which that
20 is done?

21 I am trying to understand who makes this
22 decision. I mean, one may say, "Look, you know, this
23 component is configured this way. And we have a
24 program for GALL, and it is inside. And this other
25 one doesn't have a program for GALL."

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1 There are differences coming from the site
2 configuration and building this on. How are they
3 arrived at? How are they treated, I mean?

4 MR. KUO: If I may clarify a little bit,
5 Dr. Bonaca? Are you concerned about a security issue
6 or are you --

7 CHAIRMAN BONACA: No, no. I'm talking
8 about, for example, here we started building. You
9 have a turbine-driven pump that is really exposed.

10 MR. KUO: Right.

11 CHAIRMAN BONACA: So in other buildings,
12 you have a turbine-driven pump that is sunk down in
13 the bottom of the building and protected and all this
14 kind of stuff. There are differences there, even from
15 an environmental standpoint. I am sure that the
16 program should reflect or may have to reflect those
17 differences.

18 I am trying to understand if you say you
19 comply with GALL for both cases, does GALL, in fact,
20 have consideration for environmental conditions for
21 both?

22 MR. KUO: No. The GALL only evaluates the
23 program per se. That is the aging management program.
24 All the factors, I hope that was factored into the
25 original design array. In license renewal, in

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1 support, we are doing it according to the current
2 licensing basis.

3 MR. GILLESPIE: Mario, let me see if I can
4 get directly to your question because this has come up
5 on plants. For example, we had certain precedents set
6 with open buildings like that, Turkey Point and St.
7 Lucie. It really comes down to the definition in GALL
8 of what is a benign environment.

9 In general, even the exposed buildings
10 have, for example, for stainless steel casings and
11 piping, where you are looking at the external
12 environment as one issue and the internal environment
13 as another, the internal environment is still the
14 same. The external environment, it is how GALL deals
15 with the word "benign" environment to dismiss it.

16 CHAIRMAN BONACA: So we think the
17 definition of the attributes that you are requesting,
18 there is a consideration.

19 MR. GILLESPIE: Yes. So you are going to
20 see Turkey Point, St. Lucie, Robinson, which have this
21 open design, have a heat range and a humidity range,
22 which are basically open to the atmosphere.

23 I am hoping now I am right. In the
24 definition of benign in GALL, it would be encompassing
25 the heat and humidity ranges versus being in an

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1 air-conditioned space, which would be kind of the
2 optimum reverse?

3 MR. KUO: In the evaluation of GALL, it
4 looks at the parameters that --

5 CHAIRMAN BONACA: I remember Turkey Point,
6 yes.

7 MR. GILLESPIE: So I think it is dealt
8 with. And we actually dealt with it specifically
9 because those kinds of questions came up, particularly
10 in some of the things we are doing now in looking back
11 at past precedent to fold it into GALL and where we
12 approved it in a more adverse environment and open
13 environment. But it is not addressed. It has its own
14 air-conditioned space and should be easy to
15 incorporate into GALL.

16 CHAIRMAN BONACA: In fact, GALL in some
17 cases has expectations for enhancements and stated in
18 the SERs.

19 MR. GILLESPIE: Yes.

20 CHAIRMAN BONACA: Okay. Thank you.

21 MR. MITRA: Caudle?

22 MR. JULIAN: Yes?

23 MR. MITRA: Do you want to add anything on
24 this issue?

25 MR. JULIAN: I would just add possibly a

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1 reminder that although these plants have auxiliary
2 feedwater systems that are exposed to the outside
3 atmosphere, this has been looked at in the current
4 licensing basis.

5 Of course, one of the premises of license
6 renewal is that the current licensing basis is
7 adequate for the plant. So we don't particularly go
8 into unique aspects that have already been accepted by
9 the NRC.

10 CHAIRMAN BONACA: Yes. I mean, I asked
11 the question because in this particular case, the
12 environmental condition may be such that 20 more years
13 puts a significant burden on that component just
14 because it is exposed. So that was the reason why I
15 asked the question.

16 Okay. I've got the right answer.

17 MR. MITRA: That is all I have.

18 MEMBER LEITCH: Okay. Any questions for
19 S. K. or the NRC staff?

20 (No response.)

21 MR. MITRA: Thank you.

22 MEMBER LEITCH: Anything else for CP&L?

23 (No response.)

24 MEMBER LEITCH: Well, I want to thank CP&L
25 and the staff for their concise presentation. And

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1 that will conclude this portion. I'll turn it back to
2 Dr. Bonaca.

3 CHAIRMAN BONACA: Thank you. So are there
4 any other comments or questions from members?

5 (No response.)

6 CHAIRMAN BONACA: If none, I think we will
7 recess now, take a break. We are scheduled to come
8 back at 10:15.

9 (Whereupon, the foregoing matter went off
10 the record at 9:44 a.m. and went back on
11 the record at 10:14 a.m.)

12 DR. BONACA: The agenda is interim review
13 of the AP1000 design. I would like to point out
14 before I move to this item that the first part of this
15 meeting is open to the public. At some point, there
16 will proprietary information being shown by
17 Westinghouse, and for that portion of the meeting, the
18 meeting will be closed to the public. And Dr. Kress
19 is going to lead us with his good intention, and tell
20 us when the time is for the transition from open to
21 closed.

22 DR. KRESS: I sure will. Thank you, Mr.
23 Chairman. Just a couple of comments before we get
24 started. Back on February 10th and 11th we had a
25 Subcommittee Meeting focused primarily on resolution

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1 of the thermohydraulic issue. Most of the members
2 were there, so today we're not just reviewing that
3 part of the meeting. This is more of a full
4 certification review where we're going to talk about
5 the open items, and any lingering thermohydraulic
6 issues or any lingering issues at all. And we do plan
7 on having what we call an interim letter at this time.
8 And I want to remind the members, the purpose of this
9 interim letter would be to identify any lingering
10 issues that we may have, for which we want more
11 discussion and information before we can, I guess the
12 word is bless the certification of the AP1000 design.
13 So now is the time to bring up any of those that you
14 want more information on and more discussion, because
15 we're on a fairly fast track. We're supposed to get
16 the SER in September of this year. At that time,
17 we'll probably write a final letter, so that's all I
18 wanted to remind the members of before we get started.
19 So with that, I'll turn it over to -- I guess the
20 Staff is going to start us off.

21 MR. SEGALA: I'm John Segala. I'm the
22 Senior Project Manager for AP1000 design
23 certification, and the purpose of my presentation
24 today is to provide a status of the Staff's review, to
25 discuss major schedule milestones, and to provide an

1 overview of the remaining draft safety evaluation
2 report open items.

3 To give you up front what our conclusion
4 is, is we're on schedule to issue the final SER on
5 September 13th, 2004, which was our original schedule.

6 If you look at where we are right now, we
7 received -- we completed our pre-application review in
8 March of '02. Westinghouse submitted their design
9 certification application on March 28th, 2002. NRC
10 accepted their application for docketing on June 25th,
11 and we issued our draft safety evaluation report on
12 June 16th, 2003 with 174 open items. And our review
13 is progressing nicely, and I'll talk some --

14 MR. APOSTOLAKIS: Why does it take so long
15 between the submission and the acceptance of the
16 application? Is anything happening during that time?

17 MR. SEGALA: We have to review the
18 application to make sure that it's a quality
19 application, and there's usually some iteration
20 involved where the staff will look at the document and
21 make sure that it's a good submittal.

22 MR. APOSTOLAKIS: Good in the sense that
23 it --

24 MR. SEGALA: It has all the necessary
25 information we need to do a review. And keep in mind,

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1 the design control document is a very large document,
2 multiple volumes that we have to review.

3 The schedule milestones, I have the March
4 31st, 2004 is our next milestone. We sent a letter to
5 Westinghouse laying out our milestones, and this one
6 is that we wanted all open items successfully resolved
7 by March 31st. And the next milestone you see there
8 is in red. The reason why I have those --

9 DR. LEITCH: You said something a little
10 different than the slide indicates. You said resolved
11 by March 31st, or that you have responses from
12 Westinghouse by March 31st?

13 MR. SEGALA: Acceptable responses.

14 DR. LEITCH: Okay. So by March 31st you
15 will have not only received the responses, but
16 determined that they're acceptable.

17 MR. SEGALA: That's right.

18 DR. LEITCH: Okay. Thank you.

19 MR. SEGALA: The scheduled milestones I
20 have in red are highlighted because that's really what
21 our critical path is in terms of we -- because of our
22 September 13th final SER date, we're having the Full
23 Committee Meeting on July 7th through 9th.

24 DR. KRESS: That's when you expect our
25 final letter, I think, isn't it?

1 MR. SEGALA: Yes. And the June 25th date
2 is we want to have our final future Plant Subcommittee
3 Meeting in June, and we need to provide you a no open
4 item final safety evaluation report with our branch
5 chief concurrence a month before that, so that's when
6 you'll be receiving our final version of the FSER. It
7 still will need OGC review at that point. We'll have
8 lot of OGC review at that point, but not all of it.

9 May 31st is a date that we had a milestone
10 for the final design control document revision to come
11 in, so that would be the final version that has all
12 the changes that we need to do a review.

13 The next slide here is laying out the --
14 it has a chart on there of how we resolved open items
15 over time, and it just shows you a depiction of how we
16 -- red is the open items and how they've gotten
17 resolved over time. We have ten remaining open items,
18 and I'll discuss that in some future slides here. And
19 there was 174 total, so we have 164 where we have
20 technical resolution on.

21 Two of our ten open items are on security.
22 Our security review, we've done a review and we had
23 Westinghouse create a new COO action item that
24 deferred the security plan to the COO applicant. And
25 the staff is currently right now reviewing the ITAAC

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1 related to security, and we hope to get that wrapped
2 up soon.

3 DR. KRESS: Now we have excluded security
4 issues from their review.

5 MR. SEGALA: Yes. I'm just letting you
6 know what all of our issues are, so that it's clear to
7 you what we have left to resolve.

8 MR. APOSTOLAKIS: So is security an issue
9 or not?

10 MR. SEGALA: It's a remaining open item.
11 I don't see it as a significant issue.

12 MR. APOSTOLAKIS: Now what exactly does it
13 -- this is a opening meeting, but is this the first
14 time we're dealing with security in a certification
15 process? I don't remember doing that.

16 MR. SEGALA: Yes.

17 DR. KRESS: It's not exactly the first
18 time because there are regulations on the book that
19 the Staff reviews to see if they followed them with
20 respect to security.

21 DR. POWERS: Dr. Apostolakis, you'll
22 recall for the AP600 that, in fact, we ran into a
23 problem where the security was interfering in the fire
24 protection.

25 DR. KRESS: Right. But we never brought

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1 it into our reviews since the new security up-rates I
2 call them have been put in place. I don't know
3 whether it's in there. I just don't think it's part
4 of our purview to do that. There's a separate process
5 that goes on that normally we're not too involved in.

6 DR. WALLIS: I think the point is, though,
7 for the Staff to think about is whether it's wise to
8 defer all this to the COL, because there may be
9 aspects of the design itself, generic design which
10 have a big effect on security. And just deferring it
11 to the applicant may not be the appropriate way to
12 catch those elements of that design.

13 MR. COLACCINO: If I could chime in - this
14 is Joe Colaccino of the Staff here. Just for a little
15 bit of background, in the AP600, Westinghouse
16 presented a complete security program, and they
17 intended to do that for the AP1000 also.

18 In the wake of all the new orders that are
19 coming out post 9/11, we had a meeting, we had a
20 safeguards meeting with Westinghouse to discuss how
21 they should move forward on that. After that meeting,
22 Westinghouse decided to defer most of the security
23 review to the COL. And in the meantime, part of our
24 review has been to make an assessment of what aspects
25 of security are within the design of the plant itself.

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1 And there are those aspects, and that's probably not
2 something you'd want to discuss with the public. So
3 we have thought of that point, and we are progressing
4 with that review. And John has just brought them up,
5 is that we have two of the ten open items that he has
6 in the review are security open items, just for the
7 ACRS Staff to understand what those are.

8 DR. LEITCH: When I see words like "defer
9 security plan to the COL", it implies that a plan will
10 be devised, a security plan will be devised at that
11 stage to deal with the certified configuration of the
12 plant. But my question is, are there security
13 implications related to the general configuration and
14 footprint of the plant?

15 MR. COLACCINO: And the answer is
16 definitely yes, and the Staff is working to resolve
17 those. Westinghouse, I think in the sake of the
18 scheduled time, I'm speaking for them - but it's my
19 impression that in order to not address these issues,
20 they went with what the other design certifications
21 went through, ABWR and System 80 Plus, to defer much
22 of the security review to the COL, so it's not without
23 precedent what they have done. And that has been our
24 focus of NSIR's review, which is still ongoing, is to
25 ensure that the aspects of the design that are related

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1 to security are covered.

2 MR. APOSTOLAKIS: Well, Tom, you asked
3 whether --

4 MR. CUMMINS: This is Ed Cummins from
5 Westinghouse. I think the implication that we didn't
6 do anything in security is not correct. And I think,
7 without getting involved in the details, what we did
8 for AP1000 was identify the vital equipment and
9 identify the vital area. And that's in contrast to
10 the AP600, where we also identified the protected
11 area, the protected area defense, if you will, and the
12 guard force, so the portion that is being deferred to
13 the COL is the definition of the protected area, the
14 defense also of the protected area, and the nature,
15 number, and location of the guide force.

16 MR. APOSTOLAKIS: Tom, is that something
17 that we might want to look into more carefully in a
18 closed meeting?

19 DR. KRESS: Well, the name of our
20 Committee is Safeguards, which is a real misnomer. We
21 have traditionally not -- we've left this up to the
22 Staff traditionally to deal with these issues. And so
23 I don't know if it's something we need to get into or
24 not.

25 MR. APOSTOLAKIS: Well, in light of the

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1 new era, maybe we should at least be briefed as to
2 what is going on.

3 DR. KRESS: The briefing, of course, we
4 can have and the Staff would probably be willing to do
5 that in closed session.

6 DR. POWERS: Dr. Kress, it seems to me
7 that in light of our experience with AP600, the issues
8 of security that come promptly to mind is interfering
9 with any of the emergency response activities at the
10 plant.

11 DR. KRESS: I think that would be an
12 issue, but that tends to be site-specific.

13 DR. POWERS: Well, the specific things
14 that it came up is when you configure your access to
15 vital areas in a way such that the fire gate can't
16 respond, then --

17 DR. KRESS: Yes, on the plants.

18 DR. POWERS: Then you've got something
19 that just not tenable.

20 DR. KRESS: Yes. That's the problem we
21 have with AP600.

22 DR. POWERS: Right.

23 DR. KRESS: Well, we haven't looked at
24 that aspect on AP1000 yet. It might be something we
25 want to get on our list. This is a meeting where

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1 we're going to identify any further things we want to
2 look at, and if we want to look at that, we need to
3 have it on our list of things that we -- we'll put it
4 down in writing in a letter to Westinghouse and the
5 Staff. Well, the letter goes to the Staff, but
6 Westinghouse will get a copy of it.

7 DR. POWERS: They get to do all the work.

8 DR. KRESS: Yes. And this -- you know, if
9 we want to look at things like that and think it's
10 part of our review, we need to think about it and get
11 it on -- if we decide to get it on this letter, now is
12 the time, because we don't have a lot of time left
13 before July. You know, in July, that time frame we'll
14 be writing a final letter. Anyway, it's a good point.
15 I don't know what to do with it right now. We can
16 discuss it later, I guess.

17 MR. SEGALA: Okay. The next issues are
18 regarding aerosol removal coefficients. We have three
19 open items regarding this. Two of the three open
20 items are really related to performing dose analysis
21 calculations. However, the other open items on
22 aerosol removal coefficients, but we can't finish the
23 earth analysis calculation until the aerosol removal
24 issues are resolved.

25 DR. KRESS: Your problem with that was

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1 just how did you arrive at this particular lambda
2 value?

3 MR. SEGALA: Yes. And I guess --

4 DR. KRESS: How do you plan on resolving
5 that?

6 MR. SEGALA: Westinghouse has developed
7 AP1000 removal coefficients in the DCD, and we have a
8 contract with Sandia National Labs to determine if
9 these coefficients are applicable.

10 DR. KRESS: Oh, I see. I didn't read far
11 enough.

12 MR. SEGALA: Okay. And they're doing a
13 Monte Carlo Uncertainty Analysis. They've done 200
14 runs of MELCORE for the double-ended DVI line break,
15 and they're providing plots of removal coefficient
16 over time as they vary different inputs.

17 DR. KRESS: And this is for the one
18 sequence only, the double-ended DVI line break.

19 MR. SEGALA: Yes. And they provided us a
20 draft report, and we're reviewing that as we speak.
21 And we're going to take the information from that and
22 use that to run independent dose calculations with
23 Westinghouse and Sandia's removal coefficient.

24 DR. KRESS: What sort of source term will
25 you use with that?

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1 MR. SEGALA: The alternate source term.

2 DR. KRESS: Alternate source term.

3 MR. SEGALA: The next item is regarding
4 leak before break. This last remaining issue that we
5 have is Westinghouse is using leak before break for
6 their main steam system piping, and Reg Guide 1.45 i
7 written for identifying the leakage detection systems
8 for the RCS. And for the RCS, it recommends that they
9 have redundant and diverse leakage detection
10 capabilities.

11 For AP1000, the RCS, they use the sump
12 level indication. They use radiation monitors, and
13 they use a mass balance approach as their diverse
14 means for identifying the leakage.

15 Although this Reg Guide doesn't directly
16 talk about the main steam system, the Staff doing the
17 review felt that the same criteria for the RCS should
18 reasonably be applied to the main steam system. So
19 for the main steam, Westinghouse is using the sump
20 level as their indicator of leakage, and the Staff
21 feels that we need a diverse means of identifying
22 that. And we've been having discussions with
23 Westinghouse regarding this issue.

24 These last four of the ten remaining open
25 items are more administrative open items. These were

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1 open items that when we were writing the draft report,
2 there were certain items that we did not complete at
3 the draft stage, so we put in placeholders as
4 identifiers that we need to take certain actions. The
5 first one is reviewing the final design control
6 document revision. I talked that we had that
7 milestone for Westinghouse providing us the final DCD,
8 so we're going to have to review that to make sure
9 that it captures all of our changes.

10 In terms of the Tier 2* information, and
11 COL action items, we're trying to make sure that all
12 those are what's in the design control document, and
13 what's in our FSER are consistent, and that the Staff
14 has accounted for all the information.

15 And the last one, documentation of the
16 AP600 FSER information - there were certain chapters
17 where we had pointed back to the AP600 FSER, and we're
18 trying to go back and make this a stand-alone document
19 for those chapters.

20 So in conclusion, we're on schedule to
21 issue the final SER by September 13th, 2004, and I
22 open it up to any questions or comments you might have
23 at this time.

24 DR. BONACA: Just a question I have
25 regarding your slide number 8. You say Westinghouse

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1 is using leak before break for main steam piping.
2 What does it mean? It means that in the analysis of
3 steam line break, assuming a small size break? I'm
4 trying to understand what this is.

5 MR. SEGALA: Well, I think the approach is
6 that if you have a leak out in the main steam system,
7 that they will identify the leakage so, therefore,
8 they won't need all the pipe restraints for pipe --

9 DR. BONACA: So it is for the pipe
10 restraints.

11 MR. SEGALA: Yes.

12 DR. FORD: I had four items relating to
13 potential material degradation questions. Are these
14 regarded in this system as open items, or have they
15 been closed?

16 MR. SEGALA: We asked Westinghouse. We
17 sent them comments on all four of your questions.
18 They became open items, and they are all resolved at
19 this point.

20 DR. FORD: And we'll be hearing that
21 resolution in June, in July -- in June.

22 MR. SEGALA: Yes, in the June --

23 DR. FORD: We'll be hearing that
24 resolution.

25 MR. SEGALA: Yes.

1 MR. ROSEN: I had concerns about ADS4
2 squib valve reliability.

3 MR. SEGALA: Okay.

4 MR. ROSEN: And there's been much
5 discussion about that, and a lot of data passed back
6 and forth. And it seems to me now where we are is
7 that the data has been presented that the valves are
8 likely to be highly reliable, based on the performance
9 of smaller valves, but there still needs to be some
10 extrapolation of the data to this 14-inch valve
11 actually with a 9-inch throat for the squib valve.
12 That kind of extrapolation seems to be within the
13 expert's views of what's potentially possible and
14 useful, but it is still true, it remains true that
15 there has not been a valve of this size fabricated
16 yet, or tested. And this leaves at least me in the
17 position of wondering, if you go to certification now,
18 you're certifying a plant with a component that has
19 never been tested, in a size range that has never been
20 tested.

21 Now it's a little troubling, not a show-
22 stopper for sure, but troubling in any event. It
23 seems to me that where we are, and now I'm really
24 reaching for help on this thinking - that maybe this
25 is a case where we are in design acceptance criteria

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1 space, DAC space, in that this is an item for which
2 the level of detail isn't now being provided at the
3 time of the certification. And that the as-procured,
4 and as-built characteristics we don't have because the
5 valve hasn't been built in this size. So it would
6 seem to me that - being novice now, so I'm not sure
7 that this applies - but it seems that it would be
8 possible to apply a DAC on that at this point for the
9 Staff to define what the as-built characteristics are
10 that will be required to be shown, and make that part
11 of the certification. Am I way out in left field with
12 these thoughts?

13 MR. SEGALA: Well, I can at least give you
14 some of the Staff's thoughts on this issue. When we
15 were doing the PRA review and we looked at the
16 reliability numbers that Westinghouse had in their
17 PRA, we didn't necessarily feel confident in those
18 numbers, so we had a PRA Sensitivity Study done where
19 we increased the failure probability by an order of
20 magnitude, and the CDF increased by a factor of 3.

21 MR. ROSEN: That's pretty significant.

22 MR. SEGALA: Well, it went from a value of
23 2.4 times 10 to the minus 7, to 7 times 10 to the
24 minus 7. And in our review, we felt that that
25 increase in risk was not large enough to impact the

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1 PRA conclusions in terms of the insights about the
2 design.

3 DR. BONACA: Have you established criteria
4 that says we would accept an increase in failure rate
5 of up to this much for this design to be the most
6 threatened at the time in which the valve would be
7 built and tested, I guess.

8 DR. KRESS: I don't think you're ever
9 going to get a failure rate for this thing. And what
10 I think we have to rely on is, they will do
11 inspections, testing, and they will check the valve to
12 see, it's supposed to meet the design specifications.
13 They'll test the wiring that goes up to the firing
14 mechanisms. They'll check the firing process, but
15 we're not ever going to get enough data on these
16 valves to get a full reliability. And I think we have
17 to rely on this testing and inspection program, plus
18 the calculating reliabilities based on extrapolating
19 from smaller.

20 MR. ROSEN: Well, I agree with you on
21 that. I'm not suggesting --

22 DR. KRESS: Yes, but --

23 MR. ROSEN: I'm willing to rely on, for
24 example, the Sandia squib valve reliability studies.

25 DR. KRESS: Yes.

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1 MR. ROSEN: I'm not suggesting the -- what
2 I'm suggesting, because you're answering a question
3 that's different than the one I'm posing.

4 DR. KRESS: Oh, okay. I'm sorry.

5 MR. ROSEN: And the one I'm posing is,
6 should the Staff be defining now with Westinghouse
7 what the new valve, when they finally build one, will
8 have to -- what characteristics will be required of
9 this new valve when they finally build it? Not the
10 reliability characteristics, but the physical
11 characteristics of it.

12 DR. KRESS: I think that is part of the
13 certification. Plus, the testing and inspection
14 requirements are part of it.

15 MR. SEGALA: These are ASME Section 3,
16 Class I valves, and they'll be build and designed in
17 accordance with the ASME Code. And in terms of the
18 testing, there are ITAAC that will verify that the
19 valve is built in accordance with ASME Section 3.
20 There's ITAAC that they'll do a type test on the ADS
21 4 where they can build a like version of what's going
22 into the plant, and they will test it to assure that
23 it actuates.

24 And in terms of the actuation logic to the
25 valve, when we've done LER searches on the smaller

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1 squib valves in the slick system, the BWRs, most of
2 the failures have been due to actuation of the valves.
3 And Westinghouse has their PMS System that
4 automatically and can manually control the valves.
5 Plus, they have their DAS System, which is a diverse
6 system that they can manually actuate the valves. And
7 there are ITAACs on that.

8 MR. ROSEN: Tell me more about the ITACCs
9 on the type test.

10 MR. SEGALA: Well, I mean, they have an
11 ITAAC that -- I have it written here. The automatic
12 depressurization valves identified in the table
13 perform an active safety-related function to change
14 position as indicated in the table. Tests of squib
15 valves will be performed that demonstrate the
16 capability of the valve to operate under its design
17 conditions. Inspections will be performed for the
18 existence of a report verifying that the as-installed
19 squib valves are bounded by the test or type test.

20 DR. KRESS: I have a question about that
21 too. It's in my mind very important that the
22 depressurization of the system take place like we
23 think it's going to, which to me means that we have to
24 pretty well predict the blowdown, sonic flow these
25 valves, through the ADS-4 valves.

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1 MR. SEGALA: Yes.

2 DR. KRESS: Is there any plans to verify
3 that the calculated blowdown flow rates through these
4 valves are bounded by our calculations? Are there any
5 tests planned for that?

6 MR. SEGALA: I believe there is an ITAAC
7 on the DP through the valve.

8 DR. KRESS: Yes, but that's flow
9 resistance, and I don't think -- I'm worried about the
10 sonic flow and the choke point, and the effective area
11 to go with your sonic flow velocity calculation. You
12 know, I mean some sort of a verification test that the
13 blowdown rates are what we think they are.

14 MR. ROSEN: It seems to me you've invited
15 the members, Tom, to put on the table our concerns
16 now. And I've enunciated one concern I have, and
17 you've enunciated another, but it's also about type
18 testing of these critical valves. I think you're
19 exactly right. I mean, without real assurance that
20 these valves are actually going to work, I mean we
21 really don't have -- I don't get a good feel for this
22 design. And the more we can probe these issues with
23 respect to these valves and get comfortable about
24 them, I think the better off we are. And so is there
25 going to be another opportunity for Westinghouse and

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1 perhaps the Staff to give us some more assurance in
2 this area?

3 DR. KRESS: Well, with respect to your
4 part of it, I think they would ask what more do you
5 want that they haven't already given in terms of this
6 assurance that the design is like they say, and the
7 reliability is close to what it is. And that they
8 conform to the ASME standards, and so forth.

9 I think the question would be what more do
10 you want them to give you. And in my case, I just
11 don't think the delta P measurements - the answer to
12 my question of whether the blowdown rates are
13 calculated correctly or not. But in your case, I
14 don't know what else they can give you. That's the
15 question I would have. And if you've got some ideas,
16 I'm sure they'd be willing to consider it.

17 MR. ROSEN: Well, they could build one and
18 test it, and give me the results of the test.

19 DR. WALLIS: But you might want to --

20 MR. CUMMINS: This is Ed Cummins again. I
21 think the ITAAC that John just read forces us to build
22 one and test it, so it does it in the framework of
23 delivery at the plant, rather than a framework of
24 design certification. But those are the typical sort
25 of ITAACs for environment qualification, and those

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1 aren't the only valves that we have to do that with,
2 or only devices that we have to do that with. So we
3 have to build them and demonstrate that it's qualified
4 to perform in its environment.

5 DR. WALLIS: Building one and testing it
6 won't tell you much about its reliability.

7 MR. ROSEN: No, it won't tell you anything
8 about reliability, but I've accepted the reliability
9 argument.

10 DR. KRESS: Yes.

11 MR. ROSEN: My arguments have progressed.

12 DR. WALLIS: So you just want to have one
13 test that --

14 MR. ROSEN: Well, first that they can
15 build it and meet the ASME Code.

16 DR. WALLIS: But they can build it.

17 MR. ROSEN: And then second, that when
18 they test it, it does, in fact, meet the requirements.
19 And I'm troubled by this. I think it's a process
20 issue, not an issue with the Staff or an issue with
21 the AP1000 design. It's more of a process issue of
22 the way we certify the -- do design certification,
23 that when you have a unique component that you don't
24 have real data on, performance data or plant
25 operational data, the demonstration of its

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1 capabilities is deferred to so late in the process.
2 This is troubling.

3 DR. KRESS: Okay. I think we've talked
4 that one through.

5 MR. SEGALA: Okay.

6 DR. KRESS: It probably will show up in
7 our letter, interim letter as needing something
8 additional. I'm not sure what.

9 DR. LEITCH: I would like to just cycle
10 back to the security issue for just a minute within
11 the constraints of an open meeting, to make sure I've
12 articulated my concern. Deferring the security plan
13 to the COL - now what I think I'm hearing we mean by
14 the security plan is describing what the protected
15 area is, describing what the vital area is, and
16 managing that. And I think one can develop a security
17 plan for any particular plant configuration. You can
18 develop an acceptable security plan, and that's what's
19 being deferred to the COL phase, and properly so. I
20 don't see any problem with that.

21 My question is have we learned anything
22 since September 11th that might reflect on the bigger
23 picture, the layout, the configuration, the footprint
24 of the plant? Has anyone thought about those kind of
25 issues? Because it seems to me, those kind of issues,

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1 the window for addressing those is rapidly closing.
2 And now if, in that context, there has been work done
3 on addressing those particular issues, I think we need
4 to hear about that in a closed session. And I guess
5 what I think I hear you saying is that there has been
6 some work done. We just haven't heard about that. Is
7 that a correct --

8 MR. COLACCINO: Yes. This is Joe
9 Colaccino. Yes, it has, and possibly as a suggestion,
10 although I can't say this for certain. I haven't
11 talked with NSIR yet, obviously, but we possibly in
12 the June meeting of the Subcommittee that we could NSIR
13 and go into a closed session and have a briefing for
14 you and discuss the things that have been done with
15 security related to the design of the plant itself.
16 I don't see why we couldn't do that, and we'll just
17 have to get with NSIR and ask them.

18 MR. APOSTOLAKIS: Would June be a little
19 too late, especially if this part has to be closed.
20 I mean, we have to write the letter in two or three
21 weeks afterwards.

22 MR. CUMMINS: It depends when we're going
23 to get the FSER. We're not going to get the FSER
24 until late-May.

25 DR. BONACA: We're going to get an update

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1 of program security and safeguards probably in this
2 May time frame. We could have --

3 MR. APOSTOLAKIS: Then let's make that
4 part of the --

5 DR. BONACA: Ask for a presentation on
6 this issue at that time.

7 MR. APOSTOLAKIS: Yes.

8 DR. BONACA: We're saying that we will
9 have another meeting on security and safeguards
10 probably in the May time frame. Could we have an
11 update on this issue?

12 MR. COLACCINO: Okay. We can certainly
13 ask and bring that back and talk with ACRS Staff on
14 that. I just want to remind you, in case it's not
15 clear to everybody, that the security plan is being
16 reviewed to the current regulations, Part 73. The
17 ICMS or ISDPT are not part of that review, so there is
18 an understanding that that takes place, but really
19 what the plant design is being reviewed to is Part 73.

20 DR. POWERS: Dr. Kress, have we had an
21 opportunity to discuss containment failure modes for
22 this particular reactor?

23 DR. KRESS: No, we haven't, other than the
24 pressure and temperature meets the BVA requirements
25 for the LOCAs and DEDVI steam break. Other than that,

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1 we haven't talked about containment failure modes.
2 Would you like to bring that up as a potential issue?

3 DR. POWERS: Well, I recognize we have
4 limited data on containment failure modes for steel
5 shell containments.

6 DR. KRESS: This is beyond-design basis.

7 DR. POWERS: It is beyond-design basis.
8 But what data we have to indicate the potential for
9 catastrophic failure and the absence of measures to
10 prevent that, and I'm wondering if we have taken those
11 steps to prevent catastrophic failure.

12 DR. KRESS: I will leave that up to Staff
13 or the Westinghouse people, but let me ask you a
14 question about that. If in PRA space, we're
15 calculating a LERF which is a substitute for maybe a
16 safety goal or acceptance criteria, does it matter
17 whether a LERF is catastrophic failure or -- I mean,
18 a LERF is a LERF. That's the question I have. What
19 are the implications in terms of acceptance criteria
20 of catastrophic containment failure?

21 DR. POWERS: I think if you --

22 DR. KRESS: We've done the transport or
23 something.

24 DR. POWERS: I think if you explore how
25 the LERF criteria are set up, you'll find that they're

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1 all very gentle and graceful failures when they
2 calculate consequences for those LERFs.

3 DR. KRESS: Okay.

4 DR. POWERS: And we don't have events like
5 catastrophic failures like a redeposited radionucleid
6 incidence.

7 DR. KRESS: So you're worried about when
8 we do the plume calculation in the NRT that a
9 catastrophic-type failure is not reflected very well.

10 DR. POWERS: That's right. I believe
11 you'll find that whatever consequence has been done
12 and established in those LERFs, there was a
13 presumption that all we were going to do is get a puff
14 release of the material that was suspended in the
15 containment atmosphere at the time of the failure. We
16 weren't discussing the potential of re-suspending
17 every radionucleid that you deposited in the reactor
18 containment.

19 DR. KRESS: I see. Yes. I see what your
20 concern is there now. No, we didn't discuss that at
21 all, and they haven't even brought it up as an issue
22 that I know of. And I'm not sure how one would deal
23 with re-suspension issues in PRA space, because AP1000
24 is almost a wet deposition. And a lot of this stuff
25 may have -- at the time of failure of the containment

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1 may have made its way down to the sump already. And
2 the question that might be in my mind is whether you
3 have a sudden release from that sump, due to the fact
4 that it's reduced pressure may nucleate and give --
5 but it's a question, I don't know if it's within PRA
6 space. Well, I'm pretty sure it hasn't because the
7 release is usually the puff of what's left in the
8 containment when it fails.

9 DR. WALLIS: Well, if this containment
10 fails presumably that tank of water would also fail
11 catastrophically, would come tumbling down wouldn't
12 it?

13 DR. KRESS: Yes, but I don't know what
14 you'd do with that.

15 DR. WALLIS: Well, you could have even
16 more of a flood in the sump, stir everything up.

17 MR. CUMMINS: This is Ed Cummins. I don't
18 think the water has any relationship. It's held by
19 the concrete structure, the steel containment is
20 independent. And, Dr. Powers, I'm not sure -- we're
21 trying to understand your comment. The failure
22 mechanism of the containment is what kind of thing, a
23 slow increase in pressure, hydrogen burn, or what are
24 you thinking?

25 DR. POWERS: I guess the answer is yes.

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1 The experiments that I'm aware of were free-standing
2 shell containers or upward slope pressurizations. But
3 I presume that an energetic combustion at the wrong
4 time in the containment's history could produce a
5 coastic static pressurization. I'm not sure that I'm
6 thinking about any dynamic lodes on the containment.

7 DR. WALLIS: What do you mean by
8 catastrophic failure? Do you mean that the whole
9 thing blows apart in many directions, or a big hole
10 blows in it?

11 DR. POWERS: Yes.

12 DR. WALLIS: If it blows apart in many
13 directions, presumably the concrete and the steel
14 blown apart?

15 MR. CUMMINS: I doubt that the concrete
16 would be, but it would be once the steel vessel has
17 broken, it would be open to the atmosphere, so there
18 could be a release of fission products. We do have
19 some vent capability that we've talked about in AP600,
20 and through the spent fuel pool, actually. So that
21 would require operator actions, but --

22 DR. KRESS: And you have igniters?

23 MR. CUMMINS: We have igniters, yes.

24 DR. KRESS: And you've pretty well
25 demonstrated, I think, that you have significant

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1 natural circulation patterns to not worry considerably
2 about stratification of hydrogen.

3 MR. CUMMINS: Yes. We actually say
4 because we have much more robust situation than any
5 other containment.

6 DR. KRESS: Well, it's a thought, Dana.
7 I don't know what to do with it right now.
8 Especially when you already have a LERF that's 10 to
9 the minus 8. But a lot of that is based on the fact
10 that the CDF is pretty --

11 MR. ROSEN: And that's based on the
12 performance of the squib valve.

13 DR. KRESS: To some extent. But anyway,
14 I'll note that one down as something we can talk about
15 and debate over what goes in this interim letter. You
16 can have the floor again. Are you through?

17 MR. SEGALA: Yes, I'm done.

18 DR. KRESS: Okay. I guess then, Mario,
19 this is the time we want to close the session.

20 DR. POWERS: One additional question.

21 DR. KRESS: Okay.

22 DR. POWERS: Have we satisfactorily
23 resolved the in-vessel retention issue?

24 DR. KRESS: I don't think so, and what
25 we've heard is that they've made steam explosion FCI

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1 calculations just in case it didn't work, and have
2 told us that these FCI calculations do not fail
3 containment. Now we haven't seen the details of these
4 calculations and what they use for the energetics or
5 how they calculate the energetics, so in my mind we
6 still may need to review the details of the coolant
7 interactions, particularly what they use for initial
8 conditions, in view of the fact that there may be more
9 metal in there than they -- our view may be that there
10 may be more molten metal in there than they used in
11 the calculations, and maybe at a higher temperature.
12 And it may affect the energetics, so I don't think
13 we've heard enough on that, so that may be one of my
14 issues I'll put on the list that we need to hear a
15 little more about, and it's the details of that
16 calculation and what the initial conditions are.

17 Okay. I guess this time, Mario, is when
18 we need to go into closed session. We have to be sure
19 that there's nobody in here that shouldn't be.

20 DR. BONACA: Okay. So we're asking for
21 everyone who is not involved with the presentation
22 from Westinghouse and the Staff on AP1000 to please
23 leave the room now.

24 (Whereupon, at 11:02 a.m., the proceedings
25 went into Closed Session.)

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

2 (1:30 p.m.)

3 CHAIRMAN BONACA: Okay. Good afternoon.

4 The meeting will get back to order now again. And we
5 are going to be reviewing the license renewal
6 application for the Virgil C. Summer Nuclear Station.

7 I will lead this discussion. We received
8 the SER for review I believe in November, and we had
9 a subcommittee meeting with the applicant on
10 December 3, 2003.

11 There were no open items on this
12 application. In fact, no open items and no
13 confirmatory items as of December, and this was a
14 first. So that's one of the reasons also that caused
15 us to advance our review from May to March.

16 We are here now to have a presentation for
17 the whole committee from the applicant and then from
18 the staff.

19 Did you have any comments?

20 MR. KUO: Well, thank you, Dr. Bonaca.
21 Just again, for the record, that I'm P.T. Kuo, the
22 Program Director for License Renewal in the
23 Environmental Impacts Program. And the Project
24 Manager for the safety review of this application is
25 Dr. Raj Auluck. He is going to make the staff

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1 presentation today.

2 Other than that, I really want to thank
3 the committee to accommodate our schedule, to shift
4 the schedule. Originally, this was scheduled for in
5 May. But because we were able to complete the safety
6 evaluation earlier, so we requested to push the
7 schedule up. Really appreciate that.

8 Other than that, like, Dr. Bonaca, you
9 mentioned that this is the first time that we reviewed
10 an application. There was no open item at the draft
11 SER stage. It was a really good review that we
12 thought -- that resulted in no open item at all.

13 If there's no other questions for me, I
14 would like to request the applicant to make the
15 presentation first, and then the staff presentation
16 will follow.

17 CHAIRMAN BONACA: Okay.

18 MR. KUO: Thank you.

19 CHAIRMAN BONACA: All right.

20 MR. PAGLIA: All right. Thank you. I'm
21 Al Paglia. Good afternoon. I'm Supervisor of the
22 Plant License Extension Project.

23 As far as the agenda this afternoon, what
24 I thought I'd present, based on some feedback, we'll
25 just touch on the background and history of the plant,

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1 the application and development, and then talk through
2 some issues of interest that were identified, and
3 close out with a little discussion on the commitment,
4 tracking, and living program that we're putting
5 together at this point.

6 Background on the plant -- again, most of
7 you are aware, but we are a 1,000 megawatt three-loop
8 Westinghouse PWR, initially licensed in 1982. SCE&G
9 is a two-thirds owner with Santee Cooper, our public-
10 run utility owning one-third.

11 We did steam generator replacement in
12 1994, followed by an uprate to 2,900 megawatt thermal
13 in '96. And all our indicators right now are -- and
14 findings are green.

15 The application -- we were in that class
16 of 2002, the first of the GALL plants, and developed
17 the application, of course, in accordance with the
18 guidance documents and the standard review plan, and
19 did the GALL comparison. A large percentage of our
20 application and results were ultimately consistent
21 with and comparable to GALL.

22 The first of the issues, which was the big
23 issue for us back in 2000, was the hot leg crack.
24 What we did, of course, is to replace that weld with
25 a spool piece a little over a foot long using new 690

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1 weld materials. The root cause that we did, quite
2 extensive, but what it boiled down to in the end was
3 residual stresses, tensile stresses, remaining on the
4 ID after initial weld installation and subsequent
5 repairs. There were some fine repairs to that weld at
6 the time.

7 We also in that outage did an NDE on the
8 other loop nozzle welds, and none of them showed any
9 recordable indications at that point.

10 Now, subsequent to refuel 12 and
11 refuel 13, we went -- the lower internals remained in.
12 We went in and we did -- and, of course, we repaired
13 alpha loop, so we went in and looked at the bravo and
14 charlie loop welds, and it showed one recordable
15 indication by UT in the bravo loop. Improvements in
16 UT allowed it to become visible. It was there before
17 in eddy current. All early indications were
18 subsequently identified -- reidentified.

19 We went through what we called a
20 mechanical stress improvement process where we
21 physically deformed through hydraulics the pipe to put
22 the ID in a compressive state. We did that process --
23 after we did that process, that one recordable
24 indication went away, basically squeezed it to the
25 point where it was invisible to UT.

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1 And based on our stress analysis, and so
2 forth, the ID surface now remains -- is in a
3 compressive state and remains in a compressive state.
4 So hopefully we have, if not eliminated, significantly
5 reduced the primary driver -- a primary driver for
6 TWSCC.

7 MEMBER LEITCH: How extensive was the MSAT
8 that you used? Did you do it on all the welds or just
9 the parallel welds of the one that had failed or --

10 MR. PAGLIA: We did it on the hot leg
11 welds.

12 MEMBER LEITCH: On the hot leg welds.

13 MR. PAGLIA: Yes, the two that were not
14 yet repaired.

15 MEMBER LEITCH: Okay.

16 MR. PAGLIA: That's right, bravo and
17 charlie.

18 MEMBER ROSEN: Do you have a picture of
19 this? A backup --

20 MR. PAGLIA: I do have a graphic of the
21 repair that I'll show in just a second. So I'll go
22 through that.

23 CHAIRMAN BONACA: Of interest to this
24 committee, by the way, is going to be -- by now
25 clearly you have inspected and reinspected. It would

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1 be more some of the industry activities taking place,
2 and you have committed to follow those to improve the
3 volumetric inspections, so that this kind of event is
4 not going to happen in the future at other plants.

5 I know there is an activity in the
6 industry. The NRC is involved in that. I would like
7 to hear from your perspective what is taking place,
8 what gives us better confidence today that some of
9 these indications will not be missed today. I mean --

10 MR. PAGLIA: Well, I think we had a very
11 good outcome from refuel 14, which we just completed
12 in October. This was a 10-year ISI for us, so we went
13 in and we did both eddy current and the E-ultrasonics
14 on all of them. And the end result of it all was that
15 we identified everything we identified before. There
16 were -- there was no crack growth. That I think is
17 the key piece.

18 And this is based on the eddy current,
19 which is not the qualified process but one that is
20 improving and one that we use. And then, of course,
21 in UT there was no formal indication. So, and based
22 on that, we -- of course, NRR reviewed that and
23 approved a startup and allows us, at this point, for
24 continuing on making improvements. And we are engaged
25 with EPRI and others to improve UT technology and

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1 capability, but we -- we are now on an ASME code-
2 directed inspection regime.

3 CHAIRMAN BONACA: Well, the next question
4 I have is: does it mean that EPRI now is recommending
5 that you do volumetric inspection? We also do eddy
6 current and a defined superficial --

7 MR. PAGLIA: At this point, that's not in
8 the -- that is not --

9 CHAIRMAN BONACA: It's not yet. So this
10 is just your initiative because you found that in your
11 particular case that was the determining factor.

12 MR. PAGLIA: Yes, sir. And in the future,
13 we are not -- at this point, we are not planning on
14 doing eddy current in the future. We are planning on
15 relying on UT as allowed by the code. But I would say
16 -- and I'm not the expert here -- but there are some
17 significant improvements being made in the UT, and we
18 even noticed those between refuel 13 and 14.

19 And it really has to do with the foot
20 sizing and the tracking on the surface is really where
21 -- and the coupling, and so forth, where the
22 improvements are being made. So we're getting more
23 ability to see these fine cracks, and certainly before
24 they became significant enough to become a safety
25 concern.

1 Now, we feel fairly comfortable in our
2 ability to see what's going on at the plant.

3 MR. CLARY: I'm Ron Clary, the Project
4 Manager. One other point on our future 10-year window
5 -- just based on the code, we will be reinspecting the
6 bravo hot leg every other outage until we finish this
7 10-year window. And that's driven by the code
8 requirements --

9 MR. PAGLIA: Right. For that recordable
10 indication.

11 CHAIRMAN BONACA: Well, I guess --

12 MR. CLARY: That previously recordable
13 indication.

14 CHAIRMAN BONACA: I guess I worry about
15 the other plant there. We don't know which one it is,
16 but it may have had a crack similar to yours. It may
17 be working its way now for about 20 years, hasn't come
18 out yet. And with the normal UT, with improvements
19 you say, but without eddy current, identify those
20 cracks. I don't know.

21 MR. PAGLIA: Well, you know, to be honest
22 -- in our particular case, we don't believe that the
23 crack that we had in 2000 was there for an extended
24 period of time. We believe it propagated through in
25 a fairly short period of time like a cycle length,

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1 which we did not see anything in the previous --

2 CHAIRMAN BONACA: But you had other
3 indications you didn't see -- on the B nozzle, for
4 example. You didn't -- you had an indication later on
5 when you went with eddy, but you hadn't seen it before
6 with the UT.

7 MR. PAGLIA: That's correct. That's
8 correct. I mean, the eddy current does identify that
9 surface cracking early before UT would see it.

10 And another complicating factor -- and,
11 again, I'm sure you are aware, the nature of primary
12 stress water corrosion cracking, it's not a very
13 planer-type crack, and the irregular surface tends to
14 diffuse the signal. And that's the reason why you
15 don't get the amplitude and the -- why you don't get
16 the feedback that you need. That's the complicating
17 factor.

18 MEMBER ROSEN: Well, I have questions like
19 where did the crack initiate, and all of that. But
20 you're going to show the picture of that.

21 MR. PAGLIA: Yes, I am. We'll do that,
22 yes.

23 MEMBER SHACK: On your 152 repair, how
24 many weld repairs did you have to make in that weld?

25 MR. PAGLIA: Well, we -- what we ended up

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1 doing, we did have some difficulty. We started out
2 with an automatic welding process and putting this
3 weld back together. And we did find that we -- we had
4 difficulty. And when we did the -- you know, the X-
5 rays, that we couldn't -- we couldn't get clear welds.
6 So we did end up going to a -- basically, a 152 stick
7 weld process.

8 But the key point -- I mean, the main
9 point is that this process was from the ID to the OD,
10 and that we didn't create this situation that caused
11 the problem back in the early days. It wasn't the
12 weld repair per se. It was what -- what I'm about to
13 show you. It's from the middle of the wall back to
14 the ID.

15 Here you see the initial weld fit up and
16 configuration. The nozzle, of course, that -- orange
17 is the butter, and then the stainless steel pipe.

18 Let's go ahead and go to the next one.

19 So, by design, what is done is you lay
20 these beads in from the ID to the OD. This wall
21 thickness, by the way, is like two and a fifth inches,
22 and there are about 100 passes to get to the ID to the
23 OD. And the design is that as you lay the subsequent
24 weld beads in place and they shrink, they cause a
25 compressive load on the underlying weld beads. And in

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1 the end you end up with an ID servicing compression.
2 That's by design.

3 So we did this. This was the first setup.
4 This is not to scale. I'll show you an actual picture
5 in a minute.

6 But when we did this we found flaws. And
7 so they ended up going in and grinding all of that out
8 after they laid a bridge in to stabilize the pipe. So
9 they ground it in -- ground it out, and then followed
10 up with -- you can jump on to the next one -- then
11 welded it from the bridge back to the ID. That was
12 the main causal problem. And then they welded it from
13 the bridge to the OD, and we ended up in a
14 configuration like that.

15 Now, this is -- let's just jump to the --

16 CHAIRMAN BONACA: Al, you are saying that
17 the crack initiated from the ID. And, therefore, when
18 you were out, looking from the outside, you won't see
19 it.

20 MR. PAGLIA: That's right. That's right.
21 It's definitely an ID initiative. That's the one.

22 Now, this picture shows the actual cross-
23 section, and that -- this area down here, which is
24 highlighted here, is the actual weld repaired area
25 that I was showing on that graphic.

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1 CHAIRMAN BONACA: Under the arch.

2 MEMBER ROSEN: So where is the bridge in
3 this picture?

4 CHAIRMAN BONACA: Right there.

5 MR. PAGLIA: It would have been in that
6 area there. It's not visible on this picture, but it
7 was above that -- of the area that was excavated and
8 to be welded.

9 MEMBER FORD: Just to be sure I understand
10 what you're doing here, is this the original weld
11 repair?

12 MR. PAGLIA: Yes, sir.

13 MEMBER FORD: Before the current one.

14 MR. PAGLIA: Yes.

15 MEMBER FORD: So this is using, what, 82
16 -- 182?

17 MR. PAGLIA: That's correct.

18 MEMBER FORD: Okay.

19 MEMBER ROSEN: This was done in what year?
20 20 years ago?

21 MR. PAGLIA: Well, it would have been done
22 in the late -- in the '70s.

23 This was the original -- by the way, and
24 part of that -- this made the first loop weld also,
25 and there was a learning exercise involved here. And

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1 that was part of what gave us the situation. We got
2 smarter and didn't have that problem in the other
3 five.

4 MEMBER FORD: Now, in answer to Dr.
5 Shack's question, are you going to show us what
6 happened when you put in the spool piece, or you tried
7 to do 52 and 152?

8 MR. PAGLIA: I don't have a graphic that
9 shows that. But what I can -- you know, we put in
10 like, well, I think four or five layers, and then we'd
11 go in and do the -- shoot the welds. And we're
12 basically finding voids. I mean, we're finding
13 imperfections in the weld, and it was ground out, and
14 then it started over.

15 We never, you know --

16 MEMBER FORD: Now, you -- I think you said
17 to Dr. Shack that 52 is much worse than 152?

18 MR. PAGLIA: 52 was used in the automatic
19 welding process, and in that process the -- from a
20 technique standpoint, they were not getting a good
21 weld. And what we ended up doing -- and this was a
22 learning process. Our outages got extended because of
23 these -- our planned long outage got extended because
24 we had to work through this, and then we went manual
25 and solved the problem.

1 CHAIRMAN BONACA: I thought that under the
2 SER that you used now for the repair, 690 weld
3 material?

4 MR. PAGLIA: Yes. 690 is the -- is what
5 152 and 52 is --

6 CHAIRMAN BONACA: Okay.

7 MR. PAGLIA: -- is made of. And 82 and
8 182 is, of course, the 600. So we've got the better
9 materials, and we did -- even with repairs, though, it
10 was an ID to OD. That's the key.

11 And also we know from stress analysis we
12 have left the ID in a compressive state in the other
13 -- other loop as well. So while it has the original
14 materials, we think we've eliminated really the
15 driver. You take the stress away, you've really
16 eliminated a major piece.

17 MEMBER SHACK: Now, you didn't mess up the
18 new weld, then.

19 MR. PAGLIA: No. No, we did not.

20 VICE CHAIRMAN WALLIS: So what we're
21 looking at here is a cutaway? You actually cut
22 through the --

23 MR. PAGLIA: Yes, we did. We took out
24 that --

25 VICE CHAIRMAN WALLIS: -- and that -- so

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1 we're looking at some metallurgical examination of the
2 piece of --

3 MR. PAGLIA: That's right. This is a
4 slice of the wall cross-section. That's two and a
5 fifth inches here.

6 MR. LaBORDE: This is the actual carbon
7 steel nozzle. This is the buttering that was done.
8 This is the actual weld material. This is the pipe
9 that --

10 VICE CHAIRMAN WALLIS: And the failure was
11 somewhere else. This is actually the one that leaked?

12 MR. PAGLIA: Yes.

13 VICE CHAIRMAN WALLIS: Is this the place
14 where it leaked?

15 MR. PAGLIA: No. This is not the actual
16 section.

17 VICE CHAIRMAN WALLIS: There is no crack
18 shown here in the -- right.

19 MR. PAGLIA: A different radial location.

20 VICE CHAIRMAN WALLIS: Right. That's
21 right.

22 MEMBER ROSEN: So you say you don't have
23 a picture of the crack.

24 MR. PAGLIA: No, sir.

25 MR. CLARY: Not with us. We've got it.

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1 We've got a report "yah" thick at home that we sent to
2 NRR that showed the metallurgical evaluation of that,
3 showing the crack.

4 MR. PAGLIA: What the crack did, it
5 propagated from the ID to the OD, and it progressed
6 through the butter to the carbon steel nozzle and
7 arrested. And that's the extent of it.

8 MEMBER ROSEN: Can you show me what you
9 mean in this left-hand -- can you roughly trace out
10 what you think the path of the crack was?

11 MR. PAGLIA: Yes. The crack started in
12 this region down here, and it went up, and it pretty
13 much increased in width, if you will, and it went to
14 this carbon nozzle. Then that cracking stopped at
15 that point, and that was one of the things that
16 obviously confirmed -- there was a lot of other
17 reasons, but that it's TWSCC, which does not act in
18 carbon steel. And then carbon steel stopped it at
19 that point.

20 MEMBER ROSEN: So how did it -- how did
21 you detect it if it was stopped before it --

22 MR. PAGLIA: Well, actually, it penetrated
23 in this region right here. And it was like a dome, if
24 you will, to the crack. That penetrated the surface
25 right in this region. The pictures that we have show

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1 basically a very small hole. It wasn't a big crack
2 along the pipe; it was a small hole that was the crown
3 of that crack. And that became a small leak that over
4 time created all of the boron deposits that we saw
5 when we went down and did the inspection.

6 MEMBER ROSEN: Forgive me for not
7 understanding.

8 MR. PAGLIA: Yes, sir.

9 MEMBER ROSEN: Can you trace it out one
10 more time? You said it went up to the carbon steel,
11 and then how did it get to the surface from there?

12 MR. PAGLIA: Well, it -- think of it as a
13 -- it's a crack. It's filling up. It's a planer
14 crack.

15 MEMBER SHACK: It's an axial crack.

16 MEMBER SIEBER: Right.

17 MR. PAGLIA: It's an axial crack. And
18 that was another point -- it was an axial crack. And
19 then, there was a circumferential component, a small
20 circumferential component in this region right here,
21 but not very long.

22 MEMBER ROSEN: And that's what leaked.

23 MR. PAGLIA: No, it didn't. It leaked --
24 it was -- that was embedded. That component was
25 embedded. But where it came through was in this

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1 region here, and that was the axial --

2 MEMBER ROSEN: So the crack was, like my
3 hand, in this plane?

4 MR. PAGLIA: That's correct.

5 MEMBER ROSEN: That would be the picture?

6 MR. PAGLIA: That's correct. And it just
7 hit the surface, and that's where the --

8 MEMBER ROSEN: Here.

9 MR. PAGLIA: That's right.

10 MEMBER ROSEN: It went through the
11 surface.

12 MR. PAGLIA: But when we did all of the
13 cross-sections, you know, we -- that's when we found
14 out the true crack profile to the metallurgical
15 evaluations that we did.

16 And, of course, the -- Ron said there's
17 reports like this that show all of the actual
18 metallurgical views of this, and the nature of the
19 cracking, and --

20 MEMBER ROSEN: Okay. So when it's in this
21 plane, it's axial to the pipe, right?

22 MR. PAGLIA: That's correct.

23 MEMBER ROSEN: Which is a good thing to
24 know, and it --

25 MR. PAGLIA: Yes, that was a positive.

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1 MEMBER ROSEN: Very much a positive.

2 MR. PAGLIA: That's right.

3 MEMBER ROSEN: Because axial cracks are
4 less threatening than --

5 MR. PAGLIA: Yes, sir.

6 MEMBER ROSEN: -- circumferential.

7 MR. PAGLIA: Yes, it was.

8 MEMBER FORD: Now, you said that it went
9 through the wall, you believed, in one cycle? So you
10 went -- an average propagation is --

11 MR. PAGLIA: Well, I believe so, because
12 this crack was very identifiable, you know, in the
13 outage when we had the -- we went in and, you know, we
14 could see it clearly once we had this throughwall
15 situation.

16 We did not see anything with the UT outage
17 previous to that. So it could have been -- there's no
18 doubt it was probably there, but it wasn't of
19 significant magnitude. But -- and there's no way to
20 know for sure.

21 CHAIRMAN BONACA: Although, I mean, one of
22 the things I heard was that one of the beliefs was the
23 sled that the probe was running on may have bumped
24 into a rough surface there on the bottom. Is it --

25 MR. PAGLIA: Well, that's part of the

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1 improvement of the UT. I mean --

2 CHAIRMAN BONACA: So it could have been
3 there, but you hadn't seen it.

4 MR. PAGLIA: It could have been there, and
5 we just didn't see it.

6 MEMBER ROSEN: So how much boric acid came
7 out? Was there a huge pile?

8 MR. PAGLIA: There was quite a bit. How
9 many --

10 MEMBER ROSEN: About 1,000 pounds?

11 MR. PAGLIA: About 1,000 pounds. It was
12 huge. I mean, when we went in to do the normal
13 walkdown inspections at the outage, it was like, wow.
14 In fact, we really couldn't believe that it was coming
15 from the primer. We thought it may have been some
16 leakage from --

17 VICE CHAIRMAN WALLIS: Well, that's what
18 we're doing here. I mean, we're not talking about the
19 event at V.C. Summer. We're talking about license
20 renewal.

21 MR. PAGLIA: Yes.

22 VICE CHAIRMAN WALLIS: We could be here
23 all day about diagnosing what happened with --

24 MEMBER SIEBER: This is significant
25 degradation.

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1 CHAIRMAN BONACA: It's a significant
2 issue for this plant and for others, and we wanted to
3 learn something about this, so --

4 MR. PAGLIA: Okay. So we're going to
5 be --

6 CHAIRMAN BONACA: -- I think we can move
7 on.

8 MR. PAGLIA: Okay. The next item was the
9 head inspections that we've done, kind of like, I'll
10 say, the bottom line at this point in refuel 14 --
11 really, we also -- we went in in 13 as well and didn't
12 see anything, but in 14 we did remove all of the
13 insulation, and went in with remote optical devices,
14 did 100 percent bare metal inspection in the upper
15 head, and at this point we're in pretty good shape.
16 There was no active leaks, obviously, or degradation.

17 The lower head -- similar. We went in, we
18 did a 360-degree, 100 percent bare metal inspection,
19 and there were no active leaks or degradation. We
20 cleaned it very well, and we've got a video record.
21 And we have a good benchmark for future inspections.

22 MEMBER ROSEN: Did you choose your words
23 very carefully there? There are no active leaks. Do
24 you mean there have been leaks in the past or --

25 MR. PAGLIA: Yes, I did. And there was a

1 leak in the past on the upper head. There was a comma
2 seal leak back in refuel 2. This is where a
3 thermocouple wire -- gets a CM for thermocouple into
4 the drive. And there was a leak, and we had it
5 subsequently in 3. We did a modification in 4, and we
6 haven't had it since. But it wasn't a head -- it was
7 not a head leak.

8 MEMBER ROSEN: So you went in and found a
9 lot of boric acid on the head from that?

10 MR. PAGLIA: There was not much, no -- no,
11 sir. There was not much, but there was some.

12 MEMBER ROSEN: Okay.

13 MR. PAGLIA: Yes.

14 CHAIRMAN BONACA: I thought it was coming
15 from the crack that you identified.

16 MR. PAGLIA: Well, what I was speaking of,
17 again, is the upper head.

18 CHAIRMAN BONACA: Oh, I see.

19 MR. PAGLIA: On the lower head, when we
20 went in, we did find some thin film boric acid residue
21 on the lower head. But it was in the radial position
22 of the alpha hot leg, and almost assuredly came down
23 from that leak. And we've cleaned it. And, again,
24 through the inspections primarily, we know we -- we
25 are -- don't have a cracking situation.

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1 We also did -- we also did a chemical
2 analysis on that boron. That boron was 1.9 years old
3 based on some comparisons of cobalt and cesium, and so
4 forth. So we have other bases to believe that that's
5 not active in this -- at least in this cycle, so --

6 MEMBER SIEBER: Did you compare it to the
7 boron you collected at the -- at the hot leg?

8 MR. PAGLIA: I'm not sure if we did or did
9 not.

10 MEMBER SIEBER: That would be a good match
11 to tell you whether it came from there or not.

12 MR. PAGLIA: But I know that based on the
13 lack of cesium-137, I mean, we knew it wasn't run
14 recently.

15 MEMBER SIEBER: Yes, right.

16 MR. PAGLIA: Because if it was, it would
17 be -- it would be new, obviously, because we had just
18 shut down.

19 So that's where we are on the head. So
20 right now, I mean, we don't have any specific plans,
21 although we know it's probably inevitable that we'll
22 have to do something with the head later. Right now,
23 we're okay. We'll continue to monitor it closely.

24 Sump blockage bulletin -- we went in in
25 refuel 14, did some inspections, walkdowns per the NEI

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1 guidelines. We did identify some original
2 installation gapping, nothing significant. But
3 nevertheless, not meeting the intent or the letter.

4 The gaps were repaired, if you will. We
5 recovered them in modification. And currently, we're
6 really looking at the sump design. The adequacy of
7 the sump design and the surface area defined in the
8 screen is the issue of concern, and the -- and we are
9 going through that process. We expect to finish that
10 analysis this year.

11 And if any modifications are required to
12 the sump to increase that, we'll do it in refuel 16,
13 which should close out this issue for -- in accordance
14 with the GSI-191 target time.

15 Next item I'll talk about a little bit --
16 and Jamie will speak to this -- and that's the thermal
17 fatigue.

18 MR. LaBORDE: I'm Jamie LaBorde, and I'm
19 the lead for the primary systems in license renewal.

20 We have been doing fatigue monitoring for
21 a while. We have been using the WESTEMS process for
22 a little over 12 years now. We do have data, both
23 cycle counting type data and a number of items that we
24 do actual CUF monitoring on.

25 We have three locations specifically which

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1 have been a concern, because of the high usage for
2 2002. The numbers are up there for 2002 for the
3 normal and alternate charging and surge line. Those
4 locations -- CUFs -- for normal charging is 4.63.
5 Alternate charging is 4.74, and the surge line was
6 3.78. We do have new numbers for the year 2003, which
7 are not on the slide, but they were for normal
8 charging -- were 4.75, alternate charging is 4.78, and
9 the surge line is 4.14.

10 And we have projected those out to 40
11 years using the last 12 years of data, because the
12 first eight years was not as rigorously -- wasn't
13 monitored by the WESTEMS system. And right now that
14 puts our projections at 40 years at -- for normal
15 charging at .836, for alternate charging it puts it
16 over one, and for the surge line it puts it over one.
17 And that's with no allowances for environmental
18 fatigue, and all three of those locations in 60 years
19 are showing right now a trend to go over one at 60
20 years without any allowance for environmental fatigue.

21 We have committed to do the 6260 locations
22 for environmental fatigue using the two NUREG curves
23 -- the carbon steel curve and the stainless steel
24 curve. And that is in our -- will be in our FSAR, and
25 it's one of our commitments.

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1 MR. PAGLIA: Okay. Next, Bob Wharton is
2 going to speak to the groundwater.

3 MR. WHARTON: My name is Bob Wharton. I'm
4 the structural lead on license renewal at Summer
5 Station.

6 At the subcommittee meeting in December,
7 there was interest shown in discussing our groundwater
8 analysis at this meeting. So what we're presenting
9 here is from our original application submittal in
10 2002. The results are shown from some old wells,
11 which existed at the plant site at the time that we
12 were developing the license renewal application.

13 Those results indicated that we had a pH
14 in the 4.8 to 5.3 range, which, according to the NRC
15 criteria or the regulation criteria, is that we should
16 be considered as aggressive groundwater.

17 Subsequent to the submittal, however, as
18 part of a new site study at Summer Station to evaluate
19 a dewatering concept around the plant site, we've
20 installed 37 new wells through soil borings and
21 establishing some wells in the plant site area.

22 And the recent analysis which was done in
23 October of 2003 from five of the wells indicated now
24 that the water is non-aggressive. As you can see from
25 the new wells, the pH was in the range of 6.0 to 7.1.

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1 So our later data basically says that we're in a non-
2 aggressive environment, so we just wanted to present
3 that at this point in time.

4 MEMBER ROSEN: Well, what changed?

5 MR. WHARTON: The only -- we had old wells
6 which had been in effect -- established for over 15
7 years, so they were put in originally around our fuel
8 oil storage tanks to monitor any potential leakage
9 that could occur out in the yard area. This is from
10 a state regulatory perspective.

11 Whether those wells had been contaminated
12 over time, or there was some chemical analysis that
13 took place that could potentially have changed or
14 lowered the pH, we really don't know at that point in
15 time. All we can say now is that we -- we have recent
16 studies.

17 In talking to the engineer who performed
18 these well studies and establish the wells at the
19 plant site, they went through all of the proper
20 procedures to cleanse the water -- to cleanse the
21 wells to resurge, and then take samples.

22 So it appears that we have a better
23 quality of sampling that was taken at this point in
24 time. Originally, we just asked people to go out and
25 get some water samples, and so I -- it's hard to

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1 distinguish why the pH changed to that level.

2 CHAIRMAN BONACA: In the SER it is
3 documented that you have no commitment to enhance your
4 program to monitor groundwater. Are you changing that
5 now because of this finding?

6 MR. WHARTON: No, we are not. We have
7 committed that we will continue to monitor the
8 groundwater every five years, and we're going to do
9 that concurrent with the structural maintenance rule
10 schedule.

11 CHAIRMAN BONACA: Although during the
12 subcommittee you showed us an interesting picture of
13 another structure close by with similar groundwater
14 characteristics. And, in fact, you are showing that
15 after 70 years it is in good shape, so that --

16 MR. WHARTON: Yes. Do you want to see
17 that?

18 CHAIRMAN BONACA: -- is more comforting
19 than --

20 MR. WHARTON: Would you like to see
21 those -- yes, we have those.

22 CHAIRMAN BONACA: Yes.

23 MR. PAGLIA: And also, too, that chemical
24 analysis of the water at this location is also
25 comparable to these results that we got. So another

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1 data point for us.

2 MR. WHARTON: All right. This -- we have
3 a hydro facility located about 18 miles south of
4 Summer Nuclear Station. What we have determined is
5 that the area is in the same geological province. The
6 rock -- underlying rock structure is similar.

7 The soil profile is very similar, and we
8 actually went and took some analyses at that location
9 and determined that the pH was in the range of roughly
10 seven -- 6.94. Sulfides, sulfates, the chlorides were
11 all very comparable. So we think we had very similar
12 groundwater conditions.

13 So what we're looking at here is a
14 powerplant that was -- that was established or was
15 constructed in 1930 as part of a large reservoir for
16 hydro production. So in the upper photograph you have
17 the construction in the 1930 timeframe, and in the
18 lower it's from 2003.

19 You can go ahead and flip through these
20 slides.

21 The next slide will show you the penstocks
22 coming in to the hydro plant were metal penstocks but
23 they were encased in concrete. And these penstocks
24 were subsequently embedded in the toe of the dam. And
25 as you can see also, the construction activity -- it's

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1 a lot of scaffolding, barrels, and so forth.

2 So when we started a dam remediation
3 project at Saluda Hydro -- yes, the next slide. When
4 we started this project, they did the excavation, and,
5 as it turned out, they found out that all of the old
6 construction materials were left in place. The
7 barrels -- they found everything intact as it was
8 left. It was just buried.

9 So there were potentially a lot of
10 contaminants, and so forth, and it's -- Saluda Dam is
11 the location. But in the lower photograph from 1930,
12 you can see the concrete encasement of the penstocks.
13 And then, when we excavated in 2003 -- and I visited
14 this location -- the concrete was in remarkable
15 condition, 70 plus years later, being subject to very
16 similar groundwater conditions.

17 Any more questions on that? Okay. Let's
18 go back to the original slides.

19 So anyway we did the recent analysis, and
20 I guess we're looking at now approximately --

21 MEMBER FORD: I'm sorry. Would you kindly
22 go back to that picture? It was a fascinating
23 picture. Is that rust in 2003 at the top of --

24 MR. WHARTON: No, it's the red clay
25 staining.

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1 MEMBER FORD: Oh, okay.

2 MR. WHARTON: Yes, red clay staining.

3 MEMBER FORD: Okay.

4 MR. WHARTON: That part of the country has
5 a significant amount of red clay.

6 MEMBER ROSEN: Is that concrete reinforced
7 concrete from --

8 MR. WHARTON: Yes, it would have been
9 reinforced concrete. But, again, it was from the 1930
10 vintage. It was, you know, concrete quality,
11 placement techniques, construction techniques.

12 MEMBER ROSEN: Following Peter's comment,
13 I guess he was trying to figure out whether the --

14 MEMBER FORD: It was rust.

15 MEMBER ROSEN: -- whether the rebar was
16 rusting.

17 MR. WHARTON: Well, in fact, there were no
18 visible cracks seen, no scalding of concrete, no
19 moisture --

20 MEMBER FORD: I'm not suggesting concrete
21 rusts.

22 (Laughter.)

23 MR. WHARTON: That's purely just the
24 staining from the red clay.

25 Where the corner is is roughly where the

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1 grade of the toe of the dam would have encased or been
2 consuming the penstocks.

3 MEMBER ROSEN: Was this stuff underground
4 water? I mean, it's pretty high up.

5 MR. WHARTON: It was at the toe of the
6 dam. It was saturated, so it was --

7 MEMBER ROSEN: Oh. There was water level
8 over the whole --

9 MR. WHARTON: The dam goes from the pump
10 house back towards us.

11 MEMBER ROSEN: Okay. So it was all
12 covered in earth.

13 MR. WHARTON: Yes. It was covered in
14 earth for --

15 MEMBER ROSEN: And that was the level of
16 the ground right there, the top -- where the penstocks
17 enter the --

18 MR. LaBORDE: Right. I think about here
19 was the --

20 MEMBER ROSEN: So it was very close to the
21 surface there.

22 MR. LaBORDE: Yes, but you can see ground
23 in here.

24 MR. WHARTON: Since you're in generally a
25 saturated condition at the toe of the dam where it

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1 goes back into the river below.

2 MEMBER ROSEN: Okay.

3 MR. WHARTON: If there are no more
4 questions on groundwater, our next slide -- the next
5 slide is on surface water pump house. There was
6 interest shown at the last meeting about the
7 settlement of our surface water pump house. And in
8 general, what we observed during the construction of
9 the pump house was excessive settlement. And this was
10 in the 1976 to 1977 timeframe.

11 As we were building up the embankment, the
12 west embankment, which was where the pump house was
13 constructed, the pump house settled six to seven
14 inches at a point in time which was greatly exceeding
15 our original estimates. So we, at that point in time,
16 accelerated the settlement by loading the pump house,
17 filling it with water, to accelerate whatever maximum
18 settlement would occur.

19 During that same time, we did a
20 reanalysis, and based on additional soil borings
21 determined that the total projected settlement would
22 be about 12 inches. And that's what it ended up at,
23 so we had a total settlement, very uniform, of about
24 12 inches.

25 Since that time, we filled the surface

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1 water pond. We have been monitoring the settlement
2 since 1977/1978 timeframe. So for the last 20-plus
3 years we've shown relative stability within a plus or
4 minus quarter-inch, which is what we had expected to
5 be a seasonable fluctuation. And we're continuing to
6 monitor it to this date.

7 Any other questions on settlement?

8 MR. PAGLIA: Okay. On commitment tracking
9 and the living program, as has been verified, we have,
10 of course, loaded all of our commitments into our
11 station tracking system. And we are putting all of
12 the implementation guidance for license renewal in a
13 couple of principle documents, and then, of course,
14 there are a large number of implementing procedures
15 for the programs.

16 But we're putting together what we're
17 calling a license renewal DBD or design basis
18 document. And it will basically summarize what went
19 on in the application process and point to and
20 reference the underlying basis documents. And this
21 will be a resource feature for engineering folks to
22 use in evaluations of changes.

23 We're also putting together a station --
24 for us what we call a station administrative
25 procedure. It's the highest level procedure we have.

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1 It's procedures used that cuts across the entire plant
2 site and affects all organizations. And this
3 procedure will house the direction, if you will, for
4 implementing all of the requirements and commitments
5 of license renewal.

6 And that main principle procedure will
7 reference all of the individual implementing
8 procedures for all of the programs that we accredited,
9 and they, in turn, will cross-reference this -- this
10 station's stated procedure.

11 And that's well on its way. That
12 procedure will probably be in the review cycle within
13 the next month. As far as configuration control, just
14 meeting the requirements of staying in compliance with
15 the requirements of 54, part of the procedure
16 revisions that we're doing involve the engineering
17 configuration control procedures. And we will be
18 including steps in there to review future changes
19 against the requirements of 54, and then -- and it
20 will also drive the necessary FSAR updates on the
21 normal update cycle.

22 That pretty much ends what we had planned
23 to cover. I would say in summary after nearly four
24 and a half years now, I think that we have met all of
25 the requirements of the license renewal rule and the

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1 associated guidance documents. And we really
2 appreciate your consideration of the license renewal
3 for Summer Station.

4 Thank you.

5 VICE CHAIRMAN WALLIS: Just go back to
6 this last slide. A lot of license renewal is based on
7 commitments from a licensee to do things, which sounds
8 fine, but obviously that's no good without a really
9 good followup to make sure that it really happens.

10 MR. PAGLIA: And that's the reason why --
11 and I'll tell you, we have evolved, and I think where
12 we are now is a very strong position. That station
13 administrative procedure, again, is the highest level
14 procedure. It's signed by all of the general
15 managers, and it is our -- our means of causing things
16 to happen.

17 All changes to that procedure in the
18 future will have to be done under 50.59. When they do
19 that 50.59, our future commitment accountability
20 program will drive them to review that DBD and do the
21 necessary reviews against the licensing basis for
22 renewal.

23 So that's our programmatic control system,
24 and it's essentially the same system that we use for
25 the CLB. We really aren't doing anything new

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1 programmatically, but we are using the highest level
2 procedure we have to capture these LR requirements.

3 MEMBER ROSEN: Who is in charge of license
4 renewal commitment performance?

5 MR. PAGLIA: Well, in this case, because
6 -- in this case, because of this level of procedure,
7 okay, all of the organizations -- and assigned, again,
8 by -- normally, a procedure is owned by a department
9 head. This is a procedure that's a level above that.
10 This procedure is owned by all of the four general
11 managers, and they report to the Vice President for
12 Nuclear.

13 So everybody has a part to play, and those
14 parts are clearly identified in this procedures. As
15 far as you would say the overall tracking of
16 commitments, and so forth, that follows the nuclear
17 licensing organization.

18 MR. LaBORDE: This is a draft. I don't
19 think Al has even seen this yet. It's still warm.
20 This is a 100 series SAP, which is our station
21 administrative procedure. Because it's a 100 series
22 procedure, this will be signed by the general manager
23 of Nuclear Plant Operations who is the plant manager.
24 And he is ultimately responsible for the things that
25 are in here.

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1 Although the procedure will be written and
2 controlled in effect by the licensing manager, it is
3 the GM of Nuclear Plant Operations or the Plant
4 Manager's procedure responsibility to ensure that this
5 is done.

6 MEMBER ROSEN: I assume --

7 MR. CLARY: And I'm the licensing manager,
8 so it's mine.

9 MEMBER ROSEN: I assume he has something
10 to do other than just worry about license renewal --
11 the Plant Manager?

12 MR. LaBORDE: Yes, but --

13 MEMBER ROSEN: Is there anybody who has --

14 MR. LaBORDE: This is the level that our
15 procedures have to --

16 MEMBER ROSEN: Is there anybody who has a
17 full-time job worrying about license renewal, or a
18 significant portion of his time spent on --

19 MR. PAGLIA: Well, I would say that,
20 frankly, to be honest --

21 MEMBER ROSEN: Or is it like QA, where
22 you've distributed the function out to everybody?

23 MR. PAGLIA: It's sort of like everything
24 else. I mean, we -- we committed mostly to existing
25 programs. And we have obviously committed to do some

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1 future inspections.

2 So we are going to continue to implement
3 our existing programs, and the organizations
4 responsible to do that will continue to be
5 responsible. There's really nothing unique that we
6 have to do for license renewal, except in a case where
7 we've got some future inspection activities.

8 Now those are listed in here, and they are
9 tracked with our tracking program. And they will have
10 due dates, and they will cause actions at that time.

11 If we went past those, we would be
12 violating this procedure. And it's just typical
13 programmatic control at the plant.

14 But there's -- you know, there is really
15 -- we have talked about it, to be honest with you. Do
16 we need a single point accountability person, and so
17 forth? I think we will have one, but that role really
18 -- what we're doing is we are going to change the
19 engineering procedures and do training.

20 And we will have training sessions with
21 our engineering personnel, such that the processes
22 that they need to go through, so that we remain in
23 compliance with 54, will be done on an ongoing basis
24 by those people using their procedures. There's no --
25 there's not going to be a central -- necessarily a

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1 central point that you have to get all the answers
2 from.

3 Does that address your question or
4 concern?

5 MEMBER ROSEN: It does. And I think about
6 half of the licensees have taken the position that
7 you've taken. And about half or maybe slightly less
8 than half have taken the position that they needed a
9 station point of contact, someone to --

10 MR. CLARY: Each SAP has an owner. Okay?
11 And that person owning -- that manager that owns that,
12 okay, is the person who will then drive it through the
13 process to make any changes. It just -- it's such
14 high-level procedure that general managers sign off
15 on --

16 MEMBER ROSEN: Yes, I understand. And I
17 -- you know, I think that either approach can work.
18 I just was wondering whether or not -- which one you
19 had chosen, and now I know.

20 MR. PAGLIA: Now, in reality, okay, for a
21 while while we're still around, we -- me is that
22 person. And if questions come up about how we will
23 implement, they will come to this team here to get
24 help. So I think after a few years this becomes
25 embedded in the station, and hopefully a lot sooner

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1 than that, frankly. But we are here as a resource.

2 CHAIRMAN BONACA: Okay. I think if we
3 don't have any additional questions, I think we should
4 turn maybe to the staff. Dr. Raj Auluck will make the
5 presentation.

6 Thank you for the informative
7 presentation.

8 MR. PAGLIA: Okay.

9 MEMBER ROSEN: You may have established
10 some sort of record, too. I think you may be the
11 first licensee who has shown us a picture from -- what
12 was it, how many years ago? 70 years ago?

13 MR. PAGLIA: Yes.

14 MEMBER ROSEN: As part of the case for the
15 current --

16 MR. LaBORDE: I believe the dam -- the
17 construction of the dam was actually completed in
18 1920.

19 DR. AULUCK: Good afternoon. My name is
20 Raj Auluck. I am the Project Manager for the review
21 of V.C. Summer's license renewal application. With me
22 is Kimberley Corp, and she is a Project Manager in our
23 License Renewal Group, and she has been helping me in
24 this -- completion of the safety regulation report.
25 You may recall that she made some presentations during

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1 the subcommittee meeting on December 3rd.

2 Caudle Julian, who is the team leader for
3 all of the inspections, I think is on the line.
4 Caudle, are you on the line?

5 MR. JULIAN: Yes, I am, Raj.

6 DR. AULUCK: Okay. Thank you. And he's
7 available to respond to any of your inspections in the
8 inspection areas.

9 Next slide.

10 This first slide you have seen. As it
11 says, the -- it's a three-loop Westinghouse plant.
12 And one thing to note here is that their current
13 license expires on August 6, 2022, and the application
14 came on August 6, 2002. It is exactly 20 years.
15 That's the earliest any applicant can come, according
16 to the regulations of 54.17. So --

17 MEMBER POWERS: Yes, sir. But what hour
18 if you submitted --

19 (Laughter.)

20 DR. AULUCK: We received them at 8:00 on
21 August 6th.

22 (Laughter.)

23 The draft SER was issued on October 9,
24 2003, and we made the subcommittee presentations on
25 December 3, 2003. Since then, there has been no new

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1 technical information exchanges to the SER, since we
2 briefed the subcommittee.

3 There has been several editorial changes,
4 and corrections have been made to the final document.
5 Comments provided by the applicant, they have been
6 addressed.

7 Next slide, please.

8 10 CFR Part 54 says that what needs to be
9 met in order to issue a renewed license. There are
10 basically three requirements as shown on this slide.
11 The first one relates to staff's safety review of the
12 application that we are talking about today, and the
13 second one relates to the environmental impact of the
14 proposed action. And the third one relates to any
15 request for hearing or petitions to intervene on the
16 proposed action. There were no such requests.

17 Next slide, please.

18 The staff's review process begins with the
19 review of the applicant's methodology described in the
20 application, and to assure that it meets the
21 requirements of the rule. The staff review is
22 supplemented by an onsite audit to review the detailed
23 documentation available at the site.

24 There was nothing unusual about that
25 review of this application. The review of scoping and

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1 screening results from the applicant has appropriately
2 identified structures and components to be included
3 within the scope of license renewal.

4 As a result of our review, no new
5 structures were added. Few components were added to
6 the scope of license renewal as a result of our
7 review, and we discussed those at the subcommittee
8 meeting. There were mostly in the fire protection
9 area.

10 As you know, fire protection is very
11 station-specific, and we do 100 percent review. And
12 there is always a difference of opinion on a technical
13 basis what should be included and what should not be
14 included.

15 The staff believes that all system
16 structures and components subject to aging management
17 review have been appropriately identified. Again,
18 staff's review of the aging management program was
19 supported by audits and inspections at the site.

20 As a result of staff review, three new
21 aging management programs were added, and they were
22 all in the electrical area.

23 Next slide, please.

24 This one -- this slide gives the -- deals
25 with the timing of audits and inspections. Audits --

1 by definition, they are used to support NRR staff
2 review activities. Inspections support regional
3 activities and follow set guidance and procedures.

4 We already talked about our audit
5 inspection for the methodology audit. And the scoping
6 and screening inspection consists of selected
7 examination of procedures and records, and interviews
8 with personnel regarding the process of scoping and
9 screening. These have been the standard procedures we
10 have followed over the last several applications.

11 Now, as you recall, this was the fourth
12 application which followed the GALL format. And so --
13 and this was the second one where we conducted onsite
14 audit. These applications contained, for those aging
15 management programs -- which they claimed they are
16 consistent with GALL aging management programs -- they
17 just provide a summary description.

18 So for this one, we conducted a detailed
19 audit of the plant. We were about five staff members
20 from here, and there were two contractors who wanted
21 to get on the -- you know, the learning curve to
22 follow the inspections later on.

23 So, and the purpose of this audit was to
24 confirm that a given aging management program, as
25 stated in the application, is consistent with the AMP

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1 as described in the GALL report. This was done by
2 comparing the 10 attributes as described in the
3 program basis documents, which are called technical
4 reports in V.C. Summer's case, and they were at the
5 site. And we've got 10 attributes in the GALL report.

6 In some of the programs, clarifications
7 were needed for completeness and accuracy. All action
8 items, as a result of this audit, were included in a
9 -- it's called condition evaluation report, CER, by
10 the applicant. And this was a part of the tracking
11 system, and we talk about how we did the closure on
12 that CER.

13 The third -- the aging management program
14 review inspection -- actually, it's the aging
15 management program inspection -- this is conducted by
16 the region. And it follows manual chapter 4516 and
17 NRC inspection procedure 71002.

18 This inspection did not identify any
19 findings as defined in the NRC manual chapter 0612.
20 The inspection concluded that license renewal
21 activities were conducted as this application, and
22 that documentation supporting the application is in an
23 auditable form.

24 Though it was -- observation was made that
25 applicant has not yet established a tracking -- for

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1 tracking for items, in the planned future task list
2 system we assure implementation of the proposed action
3 to support license renewal.

4 And we were told that they are in the
5 process of doing that, and in -- in following a couple
6 of months, I'm talking this inspection was done in
7 August, so in October or so we'll be completely
8 finished with that activity. So at that time, we
9 decided, with the region's input and NRR management
10 input, that we should conduct a third inspection.

11 So the purpose of the third inspection was
12 to -- to look at their tracking system and also our
13 closure out of any other discrimination evaluation
14 report. So that's what was done during the third
15 inspection in November of 2003, and we briefed the
16 committee of the results in December also.

17 Next slide just gives you a brief overview
18 of total number of aging management programs. The
19 applicant credited 45 aging management programs for
20 license renewal, and they claimed that 34 of these
21 programs were consistent with GALL, and 11 programs
22 were non-GALL programs, site-specific programs.

23 And 26 of them were existing programs
24 where the -- you know, changing -- when used in the
25 aging management programs, and 16 were new programs,

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1 and, in addition, there were three new -- three aging
2 management programs related to TLAAs.

3 VICE CHAIRMAN WALLIS: Now, when the
4 program is consistent with GALL, your criteria for
5 evaluation would seem to be -- to check that they
6 really are consistent with GALL.

7 DR. AULUCK: Right.

8 VICE CHAIRMAN WALLIS: Right? Well, in
9 the non-GALL programs, you have to decide what to do,
10 and you have to figure out what the criteria should
11 then be.

12 DR. AULUCK: We did not look at any non-
13 GALL programs, because the application contained all
14 of the 10 attributes for the new program, and there
15 were staff at headquarters -- they did a detailed
16 review and wrote the safety evaluation on those
17 programs.

18 VICE CHAIRMAN WALLIS: I'm trying to
19 remember, because the question arose in my mind when
20 I read your -- the SER, and then it turned out that
21 there was a rather thorough review of the non-GALL
22 programs. But it still wasn't quite clear to me what
23 the criteria are.

24 You say there are 10 criteria, the 10 --

25 DR. AULUCK: The 10 attributes in the

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1 GALL --

2 VICE CHAIRMAN WALLIS: Okay. So there is
3 some consistent basis for evaluation.

4 DR. AULUCK: Right. It is, right.

5 MR. LEE: This is Sam Lee. The 10
6 criteria, as explained, will be primarily what the
7 staff uses for license renewal.

8 VICE CHAIRMAN WALLIS: So that's really
9 helpful, and you have a procedure and it's clear, and
10 you go through it.

11 DR. AULUCK: Next slide, please.

12 This slide I think I had put it here for
13 the completeness. Dr. Bonaca, you already asked the
14 question, "What are you going to do with the
15 conditions we have put in the SER?" And our answer is
16 this -- you know, this is -- we accept what the
17 reserves are. And as time goes on, if those new
18 reserves are established, it will be a decision what
19 to do. But right now those additional provisions
20 would stay in the SER.

21 VICE CHAIRMAN WALLIS: Okay.

22 DR. AULUCK: Next slide, please.

23 MEMBER POWERS: I note that the applicant
24 corrected that slide.

25 DR. AULUCK: Yes, right. Well, see, those

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1 are the -- the new data is not sent to us on a docket,
2 so we do -- yes, so -- and it's for their own use,
3 and --

4 CHAIRMAN BONACA: This is the SER
5 information. We haven't changed that.

6 DR. AULUCK: No, we have not changed the
7 SER information. No.

8 CHAIRMAN BONACA: We will note that.

9 DR. AULUCK: Next slide, please.

10 CHAIRMAN BONACA: TLAAs.

11 DR. AULUCK: The staff review concluded
12 that the applicant has appropriately identified all
13 TLAAs in the application. Actually, one of the RAIs
14 we did ask the applicant to tell us that other TLAAs
15 which are identified in the -- you know, the GALL are
16 -- not the GALL, I think in the SRP are not applicable
17 to the V.C. Summer site. So they responded that --
18 they assured us that they have included all of the
19 applicable TLAAs.

20 And, again, for completeness, we have
21 included the slide for reactor vessel improvement
22 results. The first one shows upper shelf -- these are
23 the various screening criteria, as the staff
24 calculated values. It got very close to the
25 applicant's values also.

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1 I just wanted to add that during the last
2 outage, which was in November, they have taken one
3 condition capsule out, and they have been -- one
4 capsule has been removed and will be tested and will
5 provide the bounding data for the end-of-life values,
6 and they will --

7 CHAIRMAN BONACA: These are end-of-life
8 calculated values, right? This is end of 60-year
9 life.

10 DR. AULUCK: Yes. Right. They are
11 confirm that -- if there are any changes from the
12 current results. So that will be new --

13 CHAIRMAN BONACA: What you put up there
14 is --

15 DR. AULUCK: It's 60 years.

16 CHAIRMAN BONACA: Yes.

17 DR. AULUCK: It's 60 years.

18 MEMBER POWERS: How many capsules does the
19 licensee have to extract over the next four years?

20 DR. AULUCK: They have two left, one that
21 -- they are taking it out now. The next one they're
22 going to take out in refueling outage 15, and then put
23 it in storage for future use.

24 MEMBER POWERS: And so after that they
25 will have no more capsule?

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1 DR. AULUCK: No, they will -- except the
2 one in storage for future use. If they want to put it
3 back there --

4 MR. ELLIOT: This is Barry Elliot,
5 Materials and Chemical Engineering Branch. We have a
6 gold program for capsules, and our direction is that
7 we want one capsule to be withdrawn at a fluence
8 equivalent or slightly greater than the 60 years
9 fluence for the vessel ID. And that would be the
10 capsule -- the last capsule that they're going to
11 withdraw.

12 Our other direction is if you have other
13 -- additional capsules, to take them out early in a
14 plant's life, like now, before they gain too much
15 fluids, beyond the 60 years, so that if -- if the
16 plant decides to go for another 20 years, they can
17 reinstall those capsules and they will have -- they
18 can start generating a fluence.

19 The leak factor for this plant is on the
20 order of three. So that if we leave the capsules in,
21 they could gather -- by year 60, they would gather 180
22 years of fluence and be useless. It's a good idea to
23 take them out.

24 MEMBER POWERS: We love those broken
25 things that are totally useless.

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1 (Laughter.)

2 MR. ELLIOT: I understand.

3 MEMBER ROSEN: What did you say about
4 another 20 years beyond the 60 years?

5 MR. ELLIOT: Yes. In other words, if they
6 wanted to go another 60 -- 20 years past the 60, they
7 could take the capsules that they've taken out,
8 reinsert them sometime in the future, and gather more
9 fluence.

10 MEMBER ROSEN: Wait a minute. I didn't
11 even know that there was such a process involved --
12 available.

13 MEMBER POWERS: There is no limit.

14 (Laughter.)

15 MEMBER ROSEN: You mean these plants are
16 immortal.

17 MEMBER POWERS: He didn't say the plants
18 were immortal. But if they are immortal, they can go
19 forever.

20 (Laughter.)

21 CHAIRMAN BONACA: Right. The only thing
22 you know is that this committee won't be here at that
23 time.

24 (Laughter.)

25 MEMBER ROSEN: No. On the contrary, I

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1 think the committee will be -- yes, Dr. Kress will be,
2 but the members may be different.

3 CHAIRMAN BONACA: Well, no, I said these
4 people are -- they won't be here.

5 MEMBER SHACK: Barry, why don't you just
6 leave the next capsule in until it hits 80 years worth
7 of life, and then haul it out?

8 MR. ELLIOT: That's an alternative that
9 they can -- they can decide. I mean, we don't tell
10 them to take it out at 60.

11 MEMBER SHACK: Oh, I thought you said we
12 just --

13 MR. ELLIOT: No, no, no. We say -- we
14 recommend you take it out sometime --

15 MEMBER POWERS: I really like the strategy
16 you've set up better than leaving it in to 80, because
17 you have no guarantee that over the next 20 years we
18 won't change Logan patterns, and things like that.

19 MR. ELLIOT: Well, we also have criteria
20 that they have to establish for fluence, in that they
21 have to have -- maintain a certain fluence level, and
22 also have a extensive dosimetry program, so that if
23 they do change the loading pattern we'd be able to
24 determine what the impact of the new loading pattern
25 is on the fluence.

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1 MEMBER POWERS: Because your information
2 on the vessel is so comprehensive and complete,
3 there's hardly a thing to research anymore.

4 (Laughter.)

5 CHAIRMAN BONACA: All right. So there's
6 a lot of margin there.

7 MEMBER ROSEN: Yes. We commented earlier
8 to the licensee that they had a lot of margin, and
9 this one has even more.

10 DR. AULUCK: I think the copper content is
11 very low.

12 MEMBER POWERS: It's not low enough to
13 keep us from researching copper, though.

14 DR. AULUCK: The next one I think is
15 related to metal fatigue. I think it's, again, a
16 repeat from what the applicant has put -- the
17 applicant's analysis indicates that three components
18 which make the design basis fatigue usage factor
19 during a period of extended operation --

20 CHAIRMAN BONACA: Those are the
21 charging --

22 DR. AULUCK: Charging nozzle and surge
23 line reactor coolant loop nozzle. And they will have
24 to take corrective actions, and the corrective actions
25 include more regressive analysis of the component to

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1 demonstrate that design code limit will not be
2 exceeded, repaired, or replace part of the component.

3 The next one --

4 MEMBER SHACK: So at the moment he's
5 tracking transients, but he's still using his old-
6 fashioned stress analysis. So he can still go back
7 and sharpen the pencil?

8 DR. AULUCK: That's the options.

9 The next slide is a commitment tracking
10 system. And we have mentioned earlier that they have
11 put most of these action items, commitment items, in
12 the tracking system. Appendix A of the SER lists all
13 of the license renewal commitments.

14 In doing a thorough inspection of the
15 site, staff verified that all of these have been
16 entered into the station tracking system. Completion
17 of these actions will be confirmed by the staff with
18 the inspection procedure 71003.

19 The next slide talks about license
20 conditions. As a result of our review, no new plant-
21 specific license conditions have been included.

22 Two standard licensing conditions are
23 given on this slide. The first one is applicant will
24 include the UFSAR supplement in the next update of the
25 FSAR. And the second one is that future inspections

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1 accurately identified in the supplement will be
2 completed prior to the PRA standard operation.

3 And as a note of information, the final
4 environmental impact statement was issued last week on
5 February 27th.

6 And that -- it comes down to the
7 conclusions here. Staff has completed its review,
8 and, you know, will prepare -- based on your
9 recommendation, we will prepare the renewed license.

10 Again, I would like to thank the ACRS for
11 moving the full committee meeting forward two months.
12 You know, it saves us a lot of time, and we are -- and
13 we really appreciate that. Of course, this was
14 possible with the cooperation of -- a good effort from
15 our technical staff, and the applicant, and we had --
16 you know, everybody pushed to, you know, a meeting of
17 the minds and resolved the issues.

18 We had issues like any other application,
19 so maybe more than others, but, you know, everybody
20 worked hard to resolve the issues.

21 And, again, I'd like to personally thank
22 the members. This is my sixth visit here in the last
23 two and a half years.

24 CHAIRMAN BONACA: Okay. Very good. Any
25 questions for Mr. Auluck?

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1 MEMBER ROSEN: You're getting good at
2 this, Raj.

3 CHAIRMAN BONACA: Yes.

4 DR. AULUCK: Well, you can't do any better
5 with no open items.

6 MEMBER ROSEN: You presented the PTS and
7 upper shelf energy data in the way we like to see it.

8 DR. AULUCK: Thank you.

9 CHAIRMAN BONACA: So we want to thank the
10 applicant for a good application and staff for a good
11 review. And with that, if there are no further
12 comments, we will take a recess until five of 3:00.

13 (Whereupon, the proceedings in the
14 foregoing matter went off the record at
15 2:37 p.m.)

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CERTIFICATE

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

Name of Proceeding: Advisory Committee on
Reactor Safeguards

510th Meeting

Docket Number: n/a

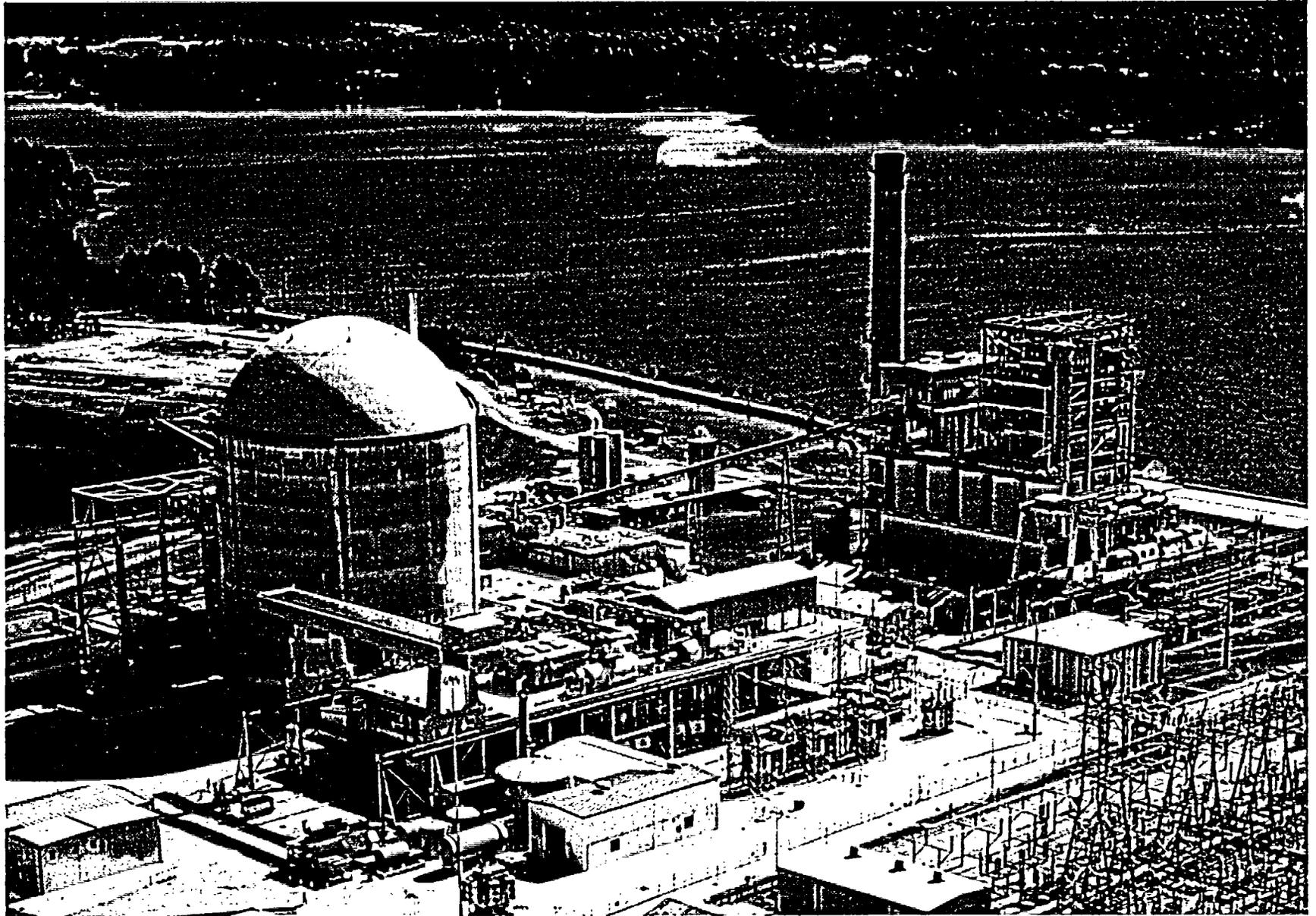
Location: Rockville, MD

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 Silberman
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ROBINSON NUCLEAR PLANT

ACRS MEETING

March 4, 2004

RNP Unique Differences

- Robinson Site Consists of a Fossil Plant (Unit1) and a Nuclear Plant (Unit 2)
- RNP Containment-
 - ▶ Grouted Tendons
 - ▶ Liner is Insulated (Limit Heat Transfer during postulated DBA)
- 480 Volt Emergency Power (versus 4160 volt)
- Safe Shut Down Diesel (in addition to 2 Emergency Diesel Generators)

Major Equipment Replacement/Upgrade

Within Past 20 Years-

- Steam Generators Replaced (1984)
- Service Water Piping Replaced
 - ▶ Inside containment (1988)
 - ▶ From booster pumps to containment (1990)
 - ▶ North Header (1999)
- Turbine Rotor Replaced (LP 1987, HP 2002)
- Power Uprate (Appendix K, ~ 2% in 2002)
 - ▶ No current plans for additional uprate

Major Equipment Replacement/Upgrade

Ongoing or Planned

- Security Upgrades (4Q04)
- RV Head Replacement (RO 23, Fall 2005)
 - ▶ RNP Request for relief from NRC Order related to RV Head Inspection withdrawn.
- Dry Fuel Storage (Load 1st Module 3Q05)
- Generator & Exciter Refurbishment (RO 24)

Operating Experience

	2000	2001	2002	2003	2004
Capacity	103.96	92.18	93.70	103.54	(2/23) 105.88 (proj.) 95.14
Refuel	NA	4/7 to 5/12	10/12 to 11/14	NA	28 day plan- April 20
Exposure (REM)	8.4	124.8	110.6	4.8	(Goal) < 9 Plus RO22

Currently, continuous run of 465 days*. Breaker to Breaker operation between spring 2001 and fall 2002 refueling. Other offline, minimal:

- 6/21/00 to 6/22/00 Manual Trip due to Turbine EH oil leak
- 11/24/02* Turbine taken offline to repair steam leak

All NRC Performance Indicators are Green

Boric Acid Program

(reference - 06/03 AMR Inspection Report and 09/30 ACRS subcommittee meeting)

- Corporate “*Boric Acid Corrosion Control*” Program has been implemented at Progress Energy PWRs. Procedure guidance includes

“All plant personnel should recognize borated system leakage, understand its significance, and initiate corrective action when boric acid residue is detected.”

“If carbon and low-alloy steel components are exposed to boric acid, the components shall be carefully cleaned and visually inspected.”

Boric Acid Program

- RNP System Walkdown Procedure revised to include

“Boric acid corrosion of carbon steel components can adversely impact component integrity. When boric acid leakage is detected, initiate a work request and/or condition report as appropriate to be evaluated in accordance Boric Acid Corrosion Control Program”

Commitments/Tracking

- 47 Programs credited for License Renewal. 10 are existing programs and require no changes. 37 Commitments for 27 Enhancements and 10 New Programs have been entered into RNP Commitment Tracking Program
- All Commitments will be either implemented or “transitioned” from LR to Plant Organization for future implementation by July 2004
- The RNP Supervisor of Licensing/Regulatory Programs has overall responsibility for management of commitment tracking

Commitments/Tracking

- Once Implemented
 - ▶ Commitments are identified in implementing documents
 - ▶ Change controlled by 10 CFR 50.59 process
- Configuration control process will incorporate guidance to ensure that requirements of 10 CFR 54.37(b) are met; Support by
 - ▶ License Renewal Training (October 2004)
 - ▶ License Renewal DBD (July 2004)
 - ▶ UFSAR Supplement (October 2004)

V C Summer Nuclear Station

ACRS Presentation

Al Paglia

Jamie LaBorde

Bob Whorton

Purpose

- Background/History
- Application
- Issues of Interest:
 - Hot Leg Crack
 - Head Inspections
 - Sump Blockage Bulletin
 - Thermal Fatigue
 - Ground Water Issues
 - SWPH Settlement
- Commitment Tracking/Living Program

Background/History

- 1000 MWe 3 Loop Westinghouse PWR
- Initial License granted August 1982
- SCE&G is 2/3 owner and licensee
- Santee Cooper is 1/3 owner
- Steam Generator Replacement – 1994
- Up-rate 2775 MWt to 2900 MWt – 1996
- NRC Indicators and Findings all Green

Application

- Application developed in accordance with Regulatory Guide 1.188, utilizing guidance from NEI 95-10
- Format in accordance with NUREG 1800, Standard Review Plan, with comparisons to NUREG 1801, GALL, as appropriate

Hot Leg Crack

- “A” Hot Leg weld replaced with a spool piece utilizing Alloy 690 weld materials
- Root Cause of crack attributed to high residual stresses resulting from original installation weld repairs
- NDE results of all other loop nozzle welds showed no recordable indications

Head Inspections

- Upper Head
 - RF-14 – 100% bare metal inspection
- Lower Head
 - RF-14 inspection – 360 degree 100% bare metal
- No Active Leaks or Degradation

Sump Blockage

- Sump inspections RF-14
 - Original installation gaps
 - Level instrument replacement gaps

- Future Plans
 - Evaluate current sump design\surface area
 - Modification (if necessary) within NRC established schedule for GSI-191

Thermal Fatigue

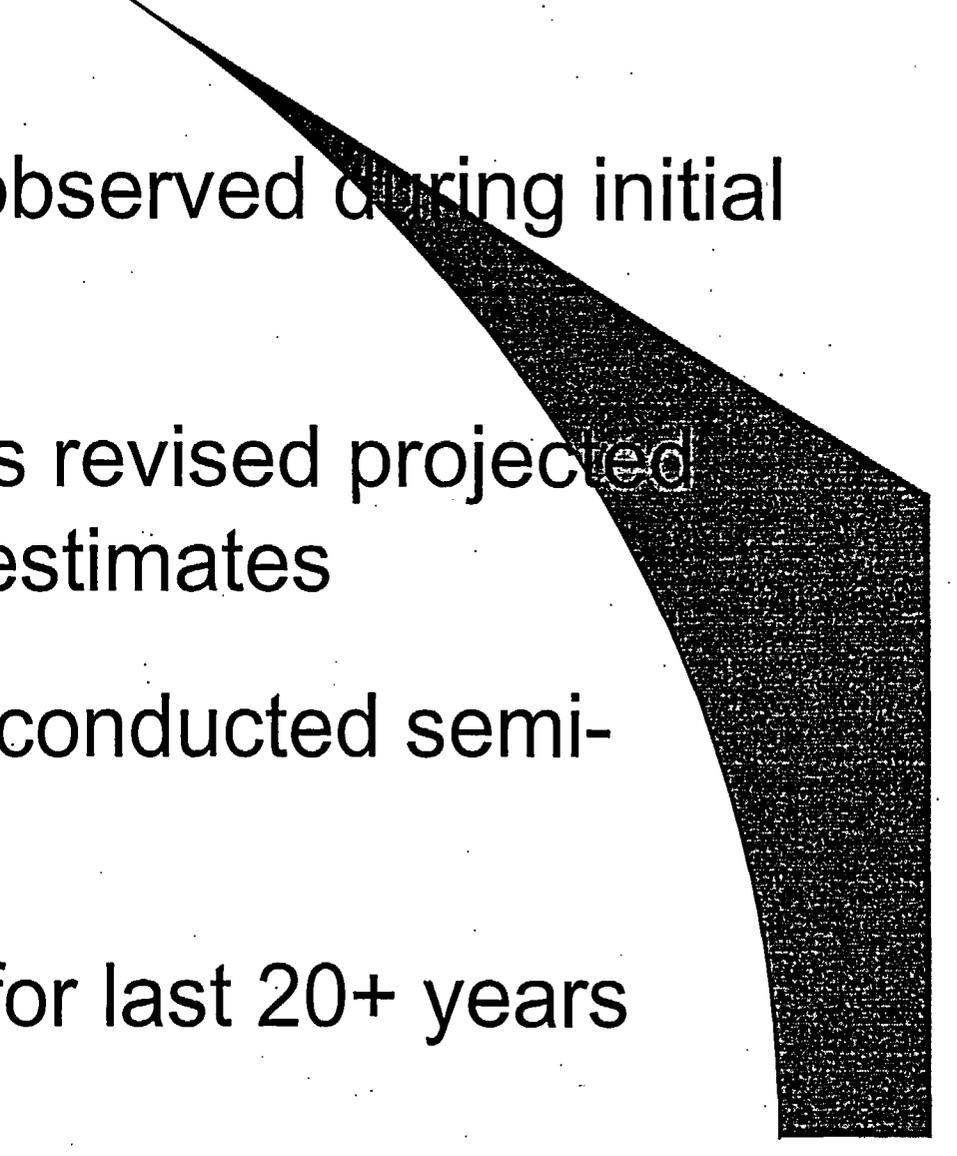
- WESTEMS utilized for cycle counting including high usage components
- The year 2002 CUF for the Pressurizer surge line is 0.38
 - Changes made to operating procedures to slow accumulation of usage on surge line nozzle
- Year 2002 CUF for the normal charging line is 0.46 and the alternate charging is 0.47
- VCS committed to re-compute the CUF for NUREG/CR-6260 locations using guidelines of NUREG/CR-6583 and NUREG/CR-5704

VCSNS Groundwater Evaluations

- Groundwater initially identified (2002) as “mildly acidic, but non-aggressive”
- Recent analyses (October 2003) from 5 new wells indicate that groundwater is “non-aggressive” — thus minimal effects on buried components

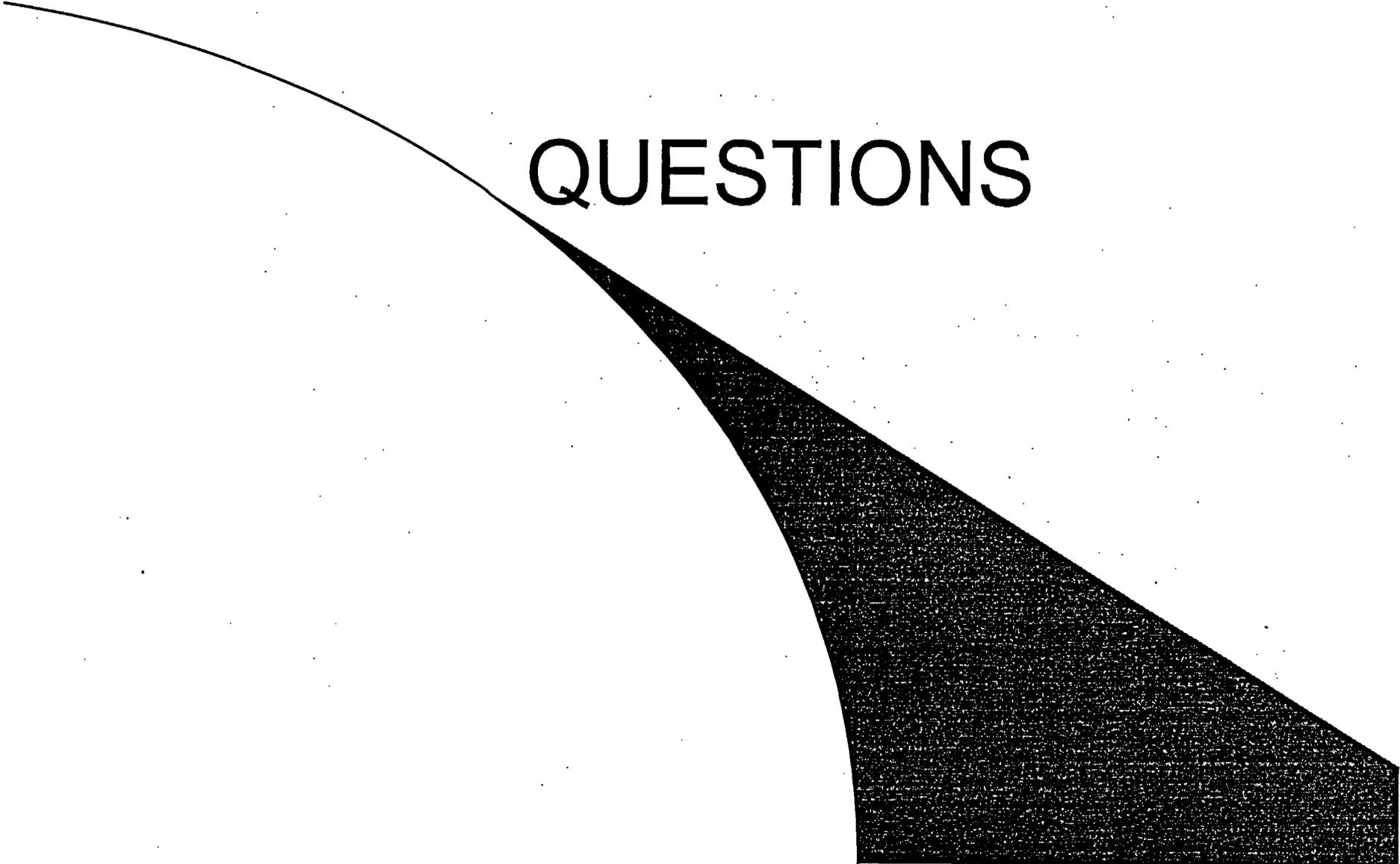
	pH	Cl	SO ₄
Old Wells	4.8 – 5.3	< 10 ppm	< 10 ppm
New Wells	6.0 – 7.1	< 25 ppm	< 185 ppm
NUREG-1801 (GALL)	< 5.5	> 500 ppm	> 1500 ppm

Service Water Pump House & Intake Structure Settlement

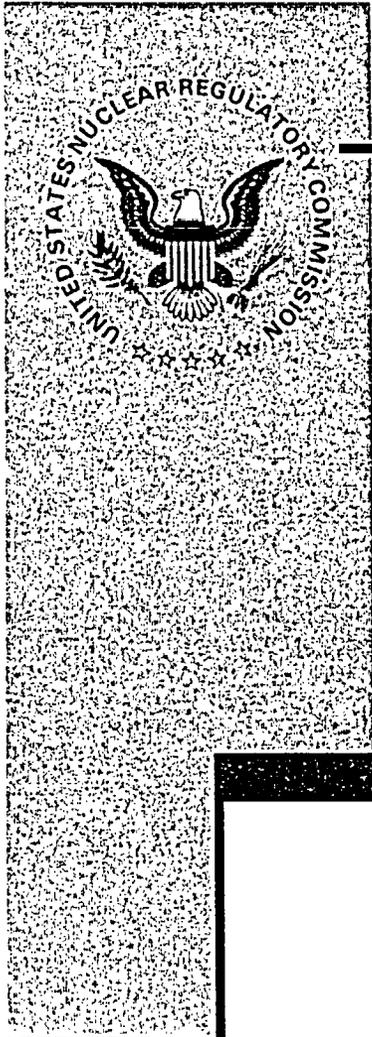
- Excessive settlement observed during initial construction
 - Subsequent re-analysis revised projected settlement & rebound estimates
 - Settlement monitoring conducted semi-annually
 - Results show stability for last 20+ years
- 

Commitment Tracking/Living Program

- All commitments and associated action items have been entered into the station tracking program
- Commitment implementation guidance being incorporated into a License Renewal Design Basis Document and Station procedures
- Configuration Control processes will incorporate guidance to ensure continuing compliance with requirements of Part 54



QUESTIONS



ACRS License Renewal Full Committee

V.C. Summer Nuclear Station License Renewal Application

**Final Safety Evaluation Report
March 4, 2003**

**Rajender Auluck
Senior Project Manager**

Overview

- Application submitted by letter dated August 6, 2002
- Westinghouse pressurized water reactor
- Plant located in Fairfield County, South Carolina
- Current license expires August 6, 2022 - Requests renewal through August 6, 2042
- Draft SER issued October 9, 2003
- ACRS License Renewal Subcommittee meeting held on December 3, 2003
- Final SER issued January 29, 2004

Staff Conclusions

The Applicant has met the requirements for license renewal, as required by 10 CFR 54.29:

- Actions have been identified and have been or will be taken such that there is reasonable assurance that activities will continue to be conducted in the renewal term in accordance with the current licensing basis
- The applicable requirements of 10 CFR Part 51 have been satisfied
- Matters raised under 10 CFR 2.758 have been addressed

Scoping and Aging Management

- Scoping and screening methodology is adequately described and justified in the LRA and satisfies the requirements of 10 CFR 54.21(a)(2)
- Scoping and screening review results found that the SSCs within the scope of license renewal have been identified, as required by 10 CFR 54.4(a) and those subject to an AMR have been identified, as required by 10 CFR 54.21(a)(1)
- Aging management review found that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation, as required by 10 CFR 54.21(a)(3)

Scoping and Aging Management

Audit and Inspections

- Scoping and Screening Methodology Audit
 - January 28-31, 2003
- Scoping and Screening Inspection
 - May 12-16, 2003
- Aging Management Program Audit
 - July 16-17, 2003
- Aging Management Review Inspection
 - August 4-8, and August 18-22, 2003
- Third Inspection
 - November 19-20, 2003

Aging Management

Aging Management Programs

- 45 AMPs credited for license renewal
 - 34 AMPs are consistent with GALL
 - 11 AMPs are non-GALL programs
 - 26 AMPs – Existing Programs
 - 16 AMPs – New Programs
 - 3 AMPs – TLAA Programs
- 3 AMPs added as a result of staff review

Aging Management

Aging Management of In-Scope Inaccessible Concrete

	Aggressive Limit	V.C. Summer
pH	<5.5	4.8 - 5.3
Chlorides	>500 ppm	<10 ppm
Sulphates	>1500 ppm	<10 ppm

- Applicant has initiated additional site groundwater studies.
- Additional provisions to be added to existing plant programs and procedures.

TLAAs

- The applicant has identified the appropriate TLAAs and had demonstrated or is committed to demonstrate that the TLAAs:
 - Will remain valid for the period of extended operation
 - Have been projected to the end of the period of extended operation, or
 - The aging effects will be adequately managed for the period of extended operation

TLAAs

Reactor Vessel Upper Shelf Energy (USE)

Reactor Vessel Beltline Material	Screening Criteria USE FT-LBS	Staff Calculated USE FT-LBS
Limiting Beltline Plate Material	≥ 50	53
Limiting Weld	≥ 50	59

Pressurized Thermal Shock

Limiting Beltline Material	RT _{PTS} Criterion (°F)	Staff Calculated RT _{PTS} (°F)
Base Metal Intermediate Shell Plate A9154-1	≤ 270	158
Axial Weld 4P4784	≤ 270	110

TLAAs

Metal Fatigue

- Reactor coolant system components at V.C. Summer designed to Class 1 requirements of the ASME Code.
- Three components may exceed the design basis fatigue usage factor during the period of extended operations.

Commitment

- Transients will be tracked by Thermal Fatigue Management Program (TFMP)
- Perform evaluation of NUREG/CR-6260 components for environmental fatigue prior to the period of extended operation
- Components with CUFs projected to exceed 1.0 will be either re-analyzed or replaced prior to exceeding cycles of transients tracked by TFMP

Commitment Tracking System

- SER Appendix A lists the applicant's license renewal commitments
- Fulfillment of commitments will be confirmed by the staff with Inspection Procedure 71003
- Commitments are tracked using the station tracking program
- Implementation guidance being incorporated into a License Renewal Design Basis Document and Station Procedures

License Conditions and Environmental Review

- Two standard license conditions:
 - Following issuance of the renewed license, the applicant will include the UFSAR Supplement in the next UFSAR update, as required by 10 CFR 50.71(e)
 - Future inspection activities identified in the UFSAR Supplement will be completed prior to the period of extended operation
- No new plant-specific license conditions
- Staff's environmental evaluation documented in NUREG-1437, Supplement 12, published on February 27, 2004

Staff Conclusions

The Applicant has met the requirements for license renewal, as required by 10 CFR 54.29:

- Actions have been identified and have been or will be taken such that there is reasonable assurance that activities will continue to be conducted in the renewal term in accordance with the current licensing basis
- The applicable requirements of 10 CFR Part 51 have been satisfied
- Matters raised under 10 CFR 2.758 have been addressed



H.B. ROBINSON STEAM ELECTRIC PLANT, UNIT 2

License Renewal
Safety Evaluation Report

Staff Presentation to the ACRS
SIKHINDRA (S.K.) MITRA
Project Manager
March 4, 2004



Background

- **JUNE 14, 2002: CP&L SUBMITTED LICENSE RENEWAL APPLICATION**
- **SEPTEMBER 30, 2003: ACRS SUBCOMMITTEE BRIEFING ON SER /OI**
- **JANUARY 20, 2004: SER ISSUED**
 - **REQUIREMENTS OF PART 54 HAVE BEEN MET**
- **CURRENT LICENSE EXPIRES JULY 31, 2010**
- **REQUEST LICENSE RENEWAL THROUGH JULY 31, 2030**



NRC Audits and Inspections

- **THREE INSPECTIONS AND TWO AUDITS**
 - **SCOPING AND SCREENING METHODOLOGY AUDIT**
 - **SEPTEMBER 17 - 20, 2002**
 - **SCOPING AND SCREENING INSPECTION**
 - **MARCH 31 – APRIL 4, 2003**
 - **AGING MANAGEMENT PROGRAM AUDIT**
 - **MAY 28 – 29, 2003**
 - **AGING MANAGEMENT INSPECTION**
 - **JUNE 9 – 14 and JUNE 23 -27, 2003**
 - **FINAL INSPECTION**
 - **SEPTEMBER 9 – 10, 2003**
-



Aging Management Program Audit

OBJECTIVE: REVIEW AMPs CONSISTENCY WITH GALL

- › **DATE OF AUDIT - MAY 28-29, 2003**
- › **AUDIT REPORT DATED AUGUST 12, 2003**
- › **AUDITED ALL THE ATTRIBUTES OF THE AMPs CLAIMED TO BE CONSISTENT WITH GALL**
- › **CONCLUDED AMPs WERE CONSISTENT WITH GALL EXCEPTING:**
 - › **NON-EQ INSULATED CABLES AND CONNECTIONS PROGRAM LACKED DETAIL TO CONCLUDE CONSISTENCY WITH GALL**
 - › **AMP WAS REVISED AND SUBMITTED TO TECHNICAL STAFF FOR REVIEW**
 - › **STAFF FOUND IT ACCEPTABLE**



Aging Management Inspection

- ▶ **OBJECTIVE: VERIFICATION OF THE ACCURACY OF THE APPLICATION IMPLEMENTATION WITH REGARD TO AMPs**

- ▶ **CONDUCTED JUNE 9–27, 2003**

- ▶ **OBSERVATION:**
 - ▶ **INCOMPLETE INTEGRATION OF FUTURE TASKS INTO ESTABLISHED SITE ACTION REQUEST TRACKING SYSTEM**

- ▶ **INSPECTION REPORT (50-261/03-09) ISSUED ON July 31, 2003**



Aging Management Inspection (Continued)

- **THIRD (OPTIONAL) INSPECTION**
- **CONDUCTED SEPTEMBER 9-10, 2003**
- **APPLICANT HAD LOADED FUTURE TASKS INTO ESTABLISHED SITE ACTION REQUEST TRACKING SYSTEM**
- **TRANSITION PLAN FOR COMPLETION OF LICENSE RENEWAL PROJECT WAS ESTABLISHED**
- **INSPECTION REPORT (50-261/03-11) ISSUED ON SEPTEMBER 29, 2003**



Open Items

- ▶ **TWO OPEN ITEMS AND THIRTY CONFIRMATORY ITEMS ALL OPEN AND COMFIRMATORY ITEMS ARE RESOLVED**
- ▶ **Open Item 2.3.1.6-1**
 - ▶ **STAFF IDENTIFIED THAT DEGRADATION OF THE FEEDRINGS, J-NOZZLES, OR J-NOZZLE WELDS COULD PRODUCE LOOSE PARTS INSIDE THE STEAM GENERATOR SHELL**
 - ▶ **MAY DAMAGE SAFETY-RELATED COMPONENTS, ESPECIALLY DURING TRANSIENTS**
 - ▶ **COMPONENTS BROUGHT INTO SCOPE AND OPEN ITEM IS RESOLVED**



Open Items (continued)

▶ **Open Item 2.3.3.8-1**

- ▶ **FOLLOWING A LAKE ROBINSON DAM FAILURE AND DEPLETION OF CONDENSATE STORAGE TANK INVENTORY, FAILURE OF DEEPWELL PUMPS WOULD CAUSE FAILURE OF THE SAFETY RELATED AUXILIARY FEEDWATER SYSTEM AND PREVENT THE RESIDUAL HEAT REMOVAL NECESSARY TO MAINTAIN A SAFE SHUTDOWN CONDITION**

- ▶ **THREE DEEPWELL PUMPS, ASSOCIATED PIPING, AND VALVES WERE BROUGHT INTO SCOPE AND OPEN ITEM IS RESOLVED**



RESOLUTION OF CONFIRMATORY ITEM 4.6.4 .1 - AGING OF BORAFLEX

- **LICENSE AMENDMENT WAS SUBMITTED TO ELIMINATE CREDIT OF THE BORAFLEX PANELS FROM RNP TECHNICAL SPECIFICATIONS**

 - **STAFF REVIEWED THE AMENDMENT APPLICATION AND APPROVED THE APPLICANT REQUEST**

 - **DOCUMENTED IN LICENSE AMMENDMENT 198, ISSUED ON DECEMBER 22, 2003, AND SER SECTION 4.6.4**
-



TLAA - REACTOR VESSEL NEUTRON EMBRITTLEMENT

- ▶ Analysis of PTS projected to end of PEO
- ▶ Staff performed independent calculations

ITEMS	LIMIT (°F) (MAXIMUM)	RNP (°F)
CIRCUMFERENTIAL WELDS	300	275
PLATES/FORGINGS/AXIAL WELDS	270	235

PTS = Pressurized Thermal Shock

PEO = Period of Extended Operation



REACTOR VESSEL UPPER SHELF ENERGY (USE)

- ▶ ANALYSIS OF USE PROJECTED AT THE END OF PEO
- ▶ STAFF PERFORMED INDEPENDENT CALCULATION

REACTOR VESSEL UPPER SHELF ENERGY (USE)	LIMIT (MINIMUM) FT-LBS	RNP FT-LBS
WELDS/FORGINGS	50	56
PLATE MATERIALS	42 (EMA)	45
NOZZLE FORGING	50	53
NOZZLE WELDS	50	52

EMA = Equivalent Margin Analysis

AP1000 Status



March 4, 2004

ACRS Full Committee Meeting

John Segala, Senior Project Manager
Office of Nuclear Reactor Regulation

Overview

■ Purpose

- Provide status of the staff's review
- Discuss major schedule milestones
- Provide overview of remaining Draft SER open items

■ Conclusion

- On schedule to issue Final SER by September 13, 2004

AP1000 Review Chronology

- March 2002 - Completed pre-application review
- March 28, 2002 - Westinghouse (W) submitted DC application
- June 25, 2002 - NRC accepted the application for docketing
- June 16, 2003 - NRC issued DSER with 174 Open Items
- FSER Review Progressing

Schedule Milestones

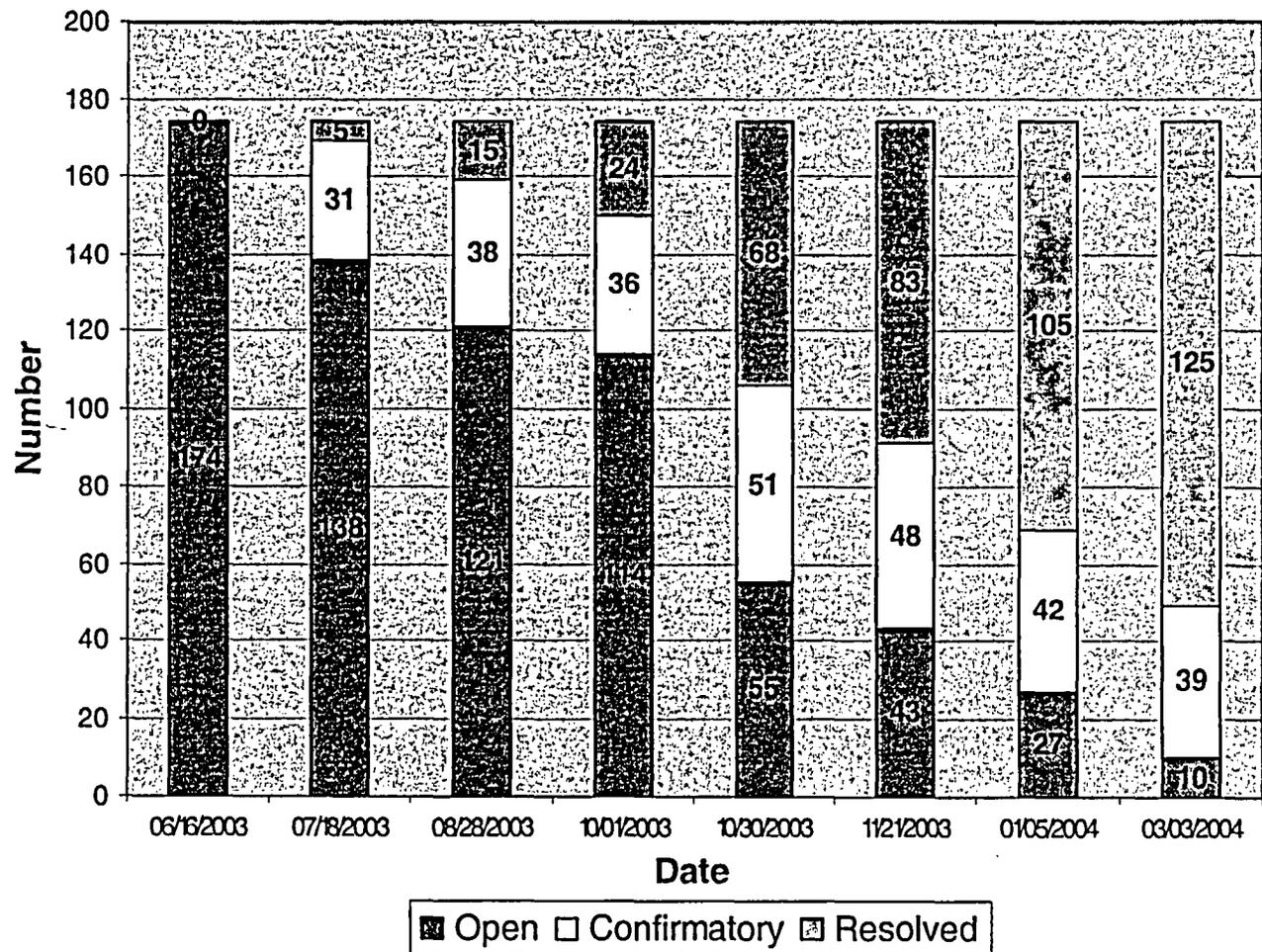
- March 31, 2004 - W provides acceptable responses to all open items
- May 25, 2004 – No Open Item FSER to ACRS
- May 31, 2004 - W submits final AP1000 design control document
- June 25, 2004 - ACRS Future Plant Design Subcommittee Meeting
- July 7-9, 2004 - Full ACRS Committee Meeting
- September 13, 2004 - Final SER and FDA issued

AP1000 DSER Open Item Resolution

Working to Resolve Open Items

- 10 open
- 164 technical resolution completed

AP1000 DSER Open Item Status



Remaining Open Items

- Security (2 Open Items)
 - New COL Action Item
 - Deferred Security Plan to the COL applicant
- Staff is currently reviewing the ITAAC

Remaining Open Items (Continued)

- Aerosol Removal Coefficients (3 Open Items)
 - Need to determine if AP1000 Removal Coefficients are applicable
 - Sandia National Laboratory Contract
 - Monte Carlo uncertainty analysis
 - 200 runs of MELCORE for DEDVI line break
 - Removal Coefficient over time
 - Staff currently reviewing draft report
 - Staff will run independent dose calculations with W and Sandia's Removal Coefficients

Remaining Open Items (Continued)

- Leak Before Break (1 Open Item)
 - W using LBB for Main Steam piping
 - AP1000 does not have a diverse means of detecting main steam line leakage

Remaining Open Items (Continued)

- NRC Open Items (4 Open Items)
 - Review of final AP1000 Design Control Document Revision
 - Review of Tier 2* information
 - Review of COL Action Items
 - Documentation of AP600 FSER information

Conclusion

- On schedule to issue Final SER by September 13, 2004
- Questions/Comments?



United States Nuclear Regulatory Commission

AP1000 Thermal-Hydraulics Design Review

Presented to
The Advisory Committee on Reactor Safeguards
March 4, 2004

By
Jennifer L. Uhle, Chief
PWR Systems
Reactor Systems Branch
Division of Systems Safety and Analysis
Office of Nuclear Reactor Regulation

1

Outline

- NRC Review Team
 - Steve Bajorek (RES)
 - Gene Hsui
 - Walt Jensen
 - Lambros Lois
 - Summer Sun
 - Len Ward
- Review Question
- Open Items and Independent Analyses
- Westinghouse Safety Basis
- Conclusions

2

Review Question

- NRC performed a design review of the AP1000
 - Relied on work performed for the AP600
 - RELAP5 code adequacy assessment
 - Focused review on phenomena that were more important in the AP1000
 - Level swell
 - Entrainment
 - Upper plenum
 - Hot leg
- NRC did not perform a code acceptance review of NOTRUMP and WCOBRA-TRAC
 - Identified code deficiencies were handled by performance of bounding calculations to demonstrate margins in the design
 - 10 CFR 50.46 for LOCAs
 - 2200 F, oxidation limits and maintenance of coolable geometry
 - All components of the safety demonstration comprise the "Evaluation Model" and must be repeated by future licensees

3

Open Items and Independent Analyses

- 12 questions posed by ACRS at the July 2003 meeting
 - Staff and Westinghouse resolved the issues in the course of the review
- Open Items
 - Scaling of APEX
 - Identification of limiting transient
 - Backpressure assumption
 - Early phase collapsed liquid level (CLL)
 - Level swell
 - Entrainment (Upper Plenum and Hot Leg)
 - ADS-4 pressure drop
 - NOTRUMP/RELAP5 comparisons
 - Long-term cooling CLL
 - Boron precipitation
- Independent analyses

4

APEX-1000 Scaling and Testing Background

- APEX-AP600 Scaling for AP1000 Applicability
 - Top-down scaling identified minor distortion in APEX-600 in early portion of ADS4 blowdown
 - SPES found to be adequately scaled for AP1000 up to & including ADS4 blowdown
 - Upper plenum (UP) entrainment was distorted non-conservatively
 - Hot leg entrainment not adequately scaled
- APEX was modified to represent AP1000 and tests conducted in APEX-1000 facility in 2003

5

APEX-1000 Scaling Review

- Independent top-down scaling evaluation performed by NRC for ADS4 blowdown and transition to IRWST injection.
- Specific evaluation for downcomer mass using test data
- Verification of UP entrainment using test data
- Independent bottom-up scaling for hot leg entrainment

6

Summary of APEX-1000 Experimental Observations

- Design-basis showed
 - No core uncover or cladding heat-up; two-phase levels near or above bottom of hot leg
 - Higher entrainment than AP600 tests
 - Less margin than in AP6000
- Beyond-design basis tests
 - Failure of 2/4 ADS4 valves cause core uncover
 - Entrainment to ADS4 continues even when UP two-phase level drops to UCP.

7

Downcomer Scaling

- Downcomer excess mass is a concern only in tests where DVI stops and downcomer inventory supplies coolant to core
- Effect estimated with a test with a 300 second gap between CMT empty and IRWST injection times
- Excess mass represented ~8% of total vessel inventory, which if removed would lower vessel level less than 5 inches
- Conclusion: Excess mass delays time of core uncover, but not enough to perturb transient such that the data are not useful for code assessment

8

Upper Plenum and Hot Leg Entrainment Scaling

- Upper Plenum
 - UP design accounted for entrainment and de-entrainment using best-available correlations.
 - Post-test evaluation of experimental results shows reasonable agreement between test data and Kataoka-Ishii predictions
 - UP in APEX-1000 is considered to be adequately scaled
- Hot Leg
 - APEX-1000 preserves (d/D) and (L/D) ratios and scales adequately with ATLATS derived correlations for entrainment onset
 - Scaling for HL entrainment considered adequate
 - High uncertainty in prediction of HL processes is recognized

9

Scaling Conclusions

- APEX-1000 adequately scaled to AP1000 for ADS4 blowdown and transition to IRWST injection
- APEX-1000 provides a reasonable approximation of global, system-wide processes and event progression in the full scale plant
 - Adequate for code assessment
 - Cannot prove that no heat up is expected for AP1000
 - Code calculations are required

10

Open Issues (cont.)

- Limiting Transient
 - DEDVI was verified to be the limiting transient
 - Loss of 1/2 injection capacity
 - Independent verification
 - RELAP5 calculations
 - Review of appropriate scaling factor for all transients using code calculations indicate that entrainment is maximized for the DEDVI
- Backpressure
 - NRC reviewed Westinghouse's evaluation of backpressure and proposed more conservatism
 - Westinghouse followed this guidance to set backpressure
- RELAP5 Independent Analysis
 - RELAP5 showed lower CLL than NOTRUMP
 - Differences between NOTRUMP and RELAP5
 - Interfacial drag
 - Downcomer modeling and condensation
 - In a sensitivity study, W demonstrated that the overprediction did not result in higher CLL later in the transient and did not rely on CLL as the figure of merit during the period of overprediction
 - Not an issue

11

Westinghouse Safety Basis

- Deficiencies in modeling are accommodated by conservatism and alternative figures of merit.
- Evaluation Model Definition
 - NOTRUMP run in Appendix K mode (AP600)
 - ADS-4 blowdown
 - CLL is over-predicted by NOTRUMP
 - Downcomer modeling and subcooling
 - Safety ensured by heat transfer
 - heat flux for hot rod compared to critical heat flux
 - Ensured that overprediction does not affect CLL in later stages
 - IRWST transition phase
 - NOTRUMP entrainment model is deficient
 - Safety ensured by bounding calculation
 - NOTRUMP run with homogeneous assumption in UP, HL and ADS-4 (Maximizes liquid entrainment and ADS-4 pressure drop)
 - Minimized head in the region accounted for by increased form loss (pressure drop) in the ADS-4 line
 - WCOBRA/TRAC for LTC
 - Boron precipitation assumes no boron in steam phase

12

Roadmap - Break Phase and ADS Phase

Event Phase	Phenomena	Primary Analysis Tool	Validation Method	Alternate Assessment	Conclusion
Break Opens to ADS	Core voiding	NOTRUMP	WCAP 14807 + Comparison to APEX data	None	Acceptable comparison to test data
ADS Depressurization	Core voiding and Downcomer mixing	NOTRUMP	WCAP 14807 + Comparison to APEX data	NOTRUMP simulation of downcomer thermal mixing observed in test	Increased core voiding does not propagate to later phases
ADS Depressurization	Core voiding	NOTRUMP	WCAP 14807 + Comparison to CHF data	CHF assessment relative to data	Core heat flux less than CHF at increased void condition



Validation to CHF correlation using RELAP5 results

13

Roadmap - Transition to IRWST Phase

Event Phase	Phenomena	Primary Analysis Tool	Validation Method	Alternate Assessment	Conclusion
Transition to IRWST Injection	ADS 4 pressure drop	NOTRUMP	WCAP 14807 + Comparison to APEX data + Detailed analysis of ADS4 piping (FLOAD4)	Comparison to DP data NOTRUMP Sensitivity Analysis	ADS4 Flow resistance acceptably represented in NOTRUMP Ample margin for ADS4 Resistance uncertainty
Transition to IRWST Injection	Level swell	NOTRUMP	WCAP 14807 + Comparison to full scale data	Comparison to APEX data	Acceptable comparison to full scale and APEX data
Transition to IRWST Injection	Flow instabilities	NOTRUMP	WCAP 14807 + Comparison to APEX data	NOTRUMP simulation homogeneous flow in UP/IL/AL	Acceptable core cooling even with bounding analysis

RELAP5 CLL swelled using drift flux model and conservative heat up assumptions

Independent verification using RELAP5 and data

14

Roadmap - Long Term Cooling Phase

Event Phase	Phenomena	Primary Analysis Tool	Validation Method	Alternate Assessment	Conclusion
Long Term Cooling	Level swell	WCOBRA /TRAC	WCAP 14776	Additional comparison to full scale level swell data	Acceptable comparison to level swell data.
Long Term Cooling	ADS4 Pressure Drop, level swell, entrainment	WCOBRA /TRAC	WCAP 14776	First principles steady state model	First Principles model confirms equilibrium condition provides adequate core cooling.
Long Term Cooling	Boron concentration	First principles steady state model	WCOBRA/ TRAC for liquid discharge	None	First Principles model confirms equilibrium condition provides adequate liquid discharge.

↻ Bounding assumptions, simplified model

RELAP5 calculations, simplified model and pressure drop data

15

Independent Analyses

- CHF Review
 - RELAP5 results were below CHF
 - CHF model is boiling length for appropriate conditions
 - NOTRUMP G, P appropriately predicted
 - Limited review
 - 2200 is the regulatory criterion
 - Can sustain about 100s of adiabatic heatup
 - APEX scaled for blowdown period showed no heatup even for BDBA
- IRWST transition period
 - RELAP5 CLL swelled up with conservative heatup
 - RELAP5 underpredicts CLL during this period
 - AP800 and AP1000
 - ADS4 pressure drop compared to data, simplistic calculation and RELAP5
- LTC
 - Adequate cooling
 - Simplified model and RELAP5
 - ADS4 pressure drop compared to data
 - Maintenance of coolable geometry
 - Bounding calculation to demonstrate no precipitation of boron

16

Conclusions

- Review of AP1000 design adequacy
 - Reliance on AP600
 - Focus on differences between designs
- Open items related to 10 CFR 50.46 LOCA criteria
 - Non-LOCA transients and LBLOCA were acceptable
- Independent analyses
- NRC has confirmed the AP1000 thermal-hydraulic design meets the regulatory requirements and can be licensed
 - Definition of evaluation model is preserved

17