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Power Uprates Subcommittee

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7 ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
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11 proceeding of the United States Nuclear Regulatory
12 Commission Advisory Committee on Reactor Safeguards,
13 as reported herein, is a record of the discussions
14 recorded at the meeting.
15
16 This transcript has not been reviewed,
17 corrected, and edited, and it may contain
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1 UNITED STATES OF AMERICA

2 NUCLEAR REGULATORY COMMISSION

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4 ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

5 (ACRS)

6 POWER UPRATE SUBCOMMITTEE MEETING

7 REGARDING POINT BEACH NUCLEAR PLANT

8 UNITS 1 AND 2 EXTENDED POWER UPRATE

9 + + + + +

10 OPEN SESSION

11 + + + + +

12 FRIDAY

13 FEBRUARY 25, 2011

14 + + + + +

15 ROCKVILLE, MARYLAND

16 + + + + +

17 The Advisory Committee met at the Nuclear

18 Regulatory Commission, Two White Flint North, Room

19 T2B3, 11545 Rockville Pike, at 8:30 a.m., Sanjoy

20 Banerjee, Chairman, presiding.

21 COMMITTEE MEMBERS:

22 SANJOY BANERJEE, Chairman

23 WILLIAM J. SHACK, Member

24 JOHN D. SIEBER, Member

25 JOHN W. STETKAR, Member-at-Large

1

2 ACRS CONSULTANTS PRESENT:

3 MARIO V. BONACA

4 IVAN MALDONADO*

5 GRAHAM B. WALLIS

6

7 NRC STAFF PRESENT:

8 STEWART BAILEY, NRR/SSIB

9 TERRY A. BELTZ, NRR/DORL

10 WILLIAM JESSUP, NRR/DE

11 MEENA KHANNA, NRR/DE/EMCB

12 KAMISHAN MARTIN, NRR

13 GURCHARAN S. MATHARU NRR/DE/EEEB

14 MATTHEW McCONNELL, NRR/DE/EEEB

15 ROBERT PETTIS, NRR

16 AHSAN SALLMAN, NRR/DSS/SCUB

17 ED SMITH, NRR/DSS/SBPB

18 ALEXANDER TSIRIGOTIS, NRR/DE

19 ZEYNA ABDULLAHI, Designated Federal Official

20

21

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23

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1

2 ALSO PRESENT:

3 LIZ ABBOTT, NextEra Energy

4 ROBERT BAIN, Shaw

5 DAVID P. DOMINICIS, Westinghouse

6 RAY DRAMEL, Maracor

7 STEVE HALE, NextEra Energy

8 NORMAN HANLEY, Shaw

9 HARV HANNEMAN, NextEra Energy

10 TERRY JONES, NextEra Energy

11 ANIL JULKA, NextEra Energy

12 JAY KABADI, NextEra Energy

13 BRETT KELLERMAN, Westinghouse

14 TIMOTHY M. LENSMIRE, NextEra Energy

15 LARRY MEYER, NextEra Energy

16 MIKE MILLEN, NextEra Energy

17 KIM ROMANKO*

18 D.J. TOMASZEWSKI, NextEra Energy

19

20 *Present via telephone

21

22

23

24

25

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

2 8:31 a.m.

3 CHAIRMAN BANERJEE: I think we are going

4 to go back into session and we will start with Terry.

5 You are going to discuss the aux feed system first?

6

7 MR. BELTZ: Yes, I'll go ahead and kick

8 things off.

9 CHAIRMAN BANERJEE: This is a little bit

10 off the agenda, but we agreed to it last night, so.

11 MR. BELTZ: Right, good morning. My name

12 is Terry Beltz and I am the senior project manager in

13 NRR assigned to the Point Beach Nuclear Plant.

14 Once again, on behalf of the staff, I want

15 to go ahead and take this opportunity again to

16 personally thank the ACRS members for accommodating

17 the schedule and reviewing the proposed EPU in a short

18 period of time, a short turnaround time.

19 I also want to express my thanks to Zeyna

20 for helping me prepare for the meeting and getting all

21 the material gathered.

22 The topics for today, NextEra and the NRC

23 staff are going to provide a presentation on

24 electrical engineering. NextEra is going to have three

25 presentations: operator training; emergency operating

1 procedures and power ascension and testing; followed
2 by probabilistic safety assessment.
3 And in the afternoon, they are also going
4 to give -- I'm sorry --- also human performance after
5 the electrical engineering.
6 And in the afternoon the NRC staff is
7 going to provide presentations on human factors
8 review, mechanical and civil engineering staff will be
9 here for their presentation which will include the
10 high-energy line break methodology.
11 Prior to the electrical engineering
12 presentation by NextEra, they are going to go over
13 some of the open items from yesterday and they are
14 also going to give a brief presentation on the
15 auxiliary feedwater modification.
16 That concludes my presentation and I would
17 like to turn things over to NextEra and Steve Hale.
18 MR. HALE: Okay, as we indicated
19 yesterday, again I am Steve Hale from NextEra. We
20 wanted to go through the open items from yesterday and
21 provide our responses to those and then right at the
22 tail end, we will give a brief overview of the
23 auxiliary feedwater system and then we will go into
24 the electrical section, okay?
25 So if you could go to the next slide.

1 First question. This has to do with the dissimilar
2 metal welds, since these were in the `83 time frame,
3 it's pretty standard for Westinghouse just to use
4 stainless for welding, and that sort of thing.
5 So the nozzles are carbon with stainless
6 cladding, and the welding between the steam generator
7 nozzles and the stainless piping is a stainless steel
8 weld, so there's no 82182 material there.
9 I hope that answers your question.
10 MEMBER SHACK: Yes.
11 MR. HALE: Okay. The second question we
12 had, had to do with steam generator tube operating
13 experience, you know, looking at tube velocities. We
14 were able to get Westinghouse do to some look-sees at
15 various operating plants.
16 This gives you just kind of a feel for the
17 velocity at the downcomer tube entrance, where it
18 comes into the bottom of the steam generator, and then
19 up in the U-bend region.
20 And as you can see, we are --
21 DR. WALLIS: That's not the velocity you
22 have there?
23 CHAIRMAN BANERJEE: That's the volumetric
24 --
25 MR. HALE: It's volumetric, yes.

1 DR. WALLIS: It doesn't give a -- what's
2 the velocity?
3 MR. HALE: We did not have the data in
4 terms of velocity.
5 CHAIRMAN BANERJEE: The flow area would be
6 helpful.
7 MR. HALE: Yes.
8 CHAIRMAN BANERJEE: Yes, if you could give
9 us that.
10 MR. HALE: But I think the important point
11 is that we have not seen any unusual wear observed in
12 the AVB area, in the tube bundle area in terms of
13 degradation and that sort of thing.
14 CHAIRMAN BANERJEE: Now, Kewaunee
15 yesterday, you said was somewhat bigger on the
16 secondary side --
17 MR. HALE: Right.
18 CHAIRMAN BANERJEE: per unit of power. So
19 that U-bend area probably is -- if you put it on a
20 square foot basis, it will be higher for Point Beach
21 because a forced steam generator is smaller, right?
22 DR. WALLIS: Shouldn't the velocity be the
23 same, pretty well, I mean this is a pipe. It's the
24 same --
25 CHAIRMAN BANERJEE: No, I'm talking about

1 on the secondary side.

2 DR. WALLIS: Yes, oh, on the secondary.

3 CHAIRMAN BANERJEE: Yes.

4 DR. WALLIS: This is on the secondary side

5 or the primary side?

6 MR. HALE: Yes, secondary side.

7 CHAIRMAN BANERJEE: Okay. I think we have

8 gone some way towards it, but it would be nice to know

9 the flow area on which that feet cubed per second is

10 based. In other words, then we can work out a velocity

11 from that.

12 MR. HALE: Okay.

13 CHAIRMAN BANERJEE: But this is quite

14 reassuring.

15 MR. HALE: All right.

16 MEMBER SIEBER: Do you have velocities

17 there?

18 CHAIRMAN BANERJEE: They have velocities

19 in the downcomer tube entrance region, right?

20 MEMBER SIEBER: Right --

21 CHAIRMAN BANERJEE: which is similar.

22 Which is useful to have, certainly. Okay.

23 MEMBER SIEBER: Now, you do have a section

24 11 program?

25 MR. HALE: Yes.

1 MEMBER SIEBER: Steam generator
2 examinations --
3 MR. HALE: Well, I was going to do that
4 next.
5 MEMBER SIEBER: Yes, the number of tubes
6 you have plugged puts you probably at the minimum?
7 MR. HALE: Yes, that's correct.
8 MEMBER SIEBER: And you can't examine U-
9 bends on the innermost tubes?
10 MR. HALE: Actually, we can, and I wanted
11 to talk about that.
12 MEMBER SIEBER: You have to tell me how
13 you do that because --
14 MR. HALE: Okay. Next slide there. We do
15 do inspections. In fact we are required to by our
16 steam generator program, do 100 percent inspection in
17 the ABB area.
18 MEMBER SIEBER: Okay.
19 MR. HALE: We use it using a couple of
20 different probes. The only way to get into the tight
21 U-bend areas is to use a rotating type probe.
22 MEMBER SIEBER: A pancake probe?
23 MR. HALE: Yes. Actually it's a rotating
24 probe called a bobbin.
25 MEMBER SIEBER: Okay.

1 MR. HALE: And then we use a plus point
2 probe in some of the external areas.
3 MEMBER SIEBER: Now the bobbin is not
4 multi-frequency right?
5 MR. HALE: You are getting in beyond my --
6 MEMBER SIEBER: The rotating pancakes, you
7 could use multiple frequencies, which gives you better
8 discrimination. The bobbin though is designed so that
9 you can make a bend, but I don't think you can put
10 multiple -- Bill do you know?
11 MEMBER SHACK: No, I think you could do
12 multiple frequency, yes. I suspect they don't here.
13 This is, you know, anti-vibration bar, whereas one of
14 the easier things to detect. It's not like looking for
15 cracks.
16 MEMBER SIEBER: Right, well, you know
17 where it is, so you know where to look.
18 MR. HALE: But I -- currently we have not
19 seen any excessive wear in the ABB area but we do do
20 100 percent inspection of that area as part of our
21 inspection program and we would continue to do that as
22 part of this.
23 CHAIRMAN BANERJEE: And what's the
24 frequency of these inspections?
25 MR. HALE: Well, it is dependent upon what

1 you find. Based on our current, you know, fact that we
2 don't find anything, it would be every third cycle,
3 but depending if you do start finding failures, you
4 could have cases where you need to do it the next
5 cycle if you have to.
6 CHAIRMAN BANERJEE: For the EPU, will you
7 monitor a little more closely?
8 MR. HALE: Yes, our intention is to do
9 some special steam generator inspections after the
10 first cycle of operation, especially in the secondary
11 side, you know, since we will be making a step jump in
12 the --
13 MEMBER SIEBER: Typically you can find
14 wear before you get a leak.
15 MR. HALE: Yes.
16 MEMBER SIEBER: But not always.
17 CHAIRMAN BANERJEE: That's very useful.
18 MR. HALE: Hopefully that answered your
19 question. I don't profess to be a professor in this
20 area but this was some additional information
21 regarding our bases for the mixing in the one-half
22 lower plenum value for the boron precipitation
23 analysis.
24 Most of this information was presented in
25 the Wolf Creek extended power uprate and we have given

1 you the reference there. This is just some additional
2 information which supported the bases behind the
3 credit for mixing of one-half lower plenum volume.
4 So --
5 MEMBER SIEBER: It's basically as
6 assumption?
7 MR. HALE: It's supported --
8 MEMBER SIEBER: With some kind of support.
9 MR. HALE: Yes, right.
10 MEMBER SIEBER: But it's not rigorous.
11 DR. WALLIS: Rayleigh-Benard is for a pot,
12 isn't it? It's a natural convection.
13 MR. HALE: Yes, it's kind of --
14 DR. WALLIS: This actually has flow
15 through it, so it's a bit of a stretch --
16 MR. HALE: If I could ask Brett Kellerman,
17 who is the fellow from Westinghouse.
18 CHAIRMAN BANERJEE: It's Waterford that's
19 the reference, right?
20 MEMBER SHACK: Right.
21 MR. KELLERMAN: Good morning. Brett
22 Kellerman from Westinghouse. This is an analogy to
23 Rayleigh-Benard convection. Some people have gotten
24 reasonably good agreement using Rayleigh numbers to
25 predict the onset of this convection, however the

1 potentially more appropriate dimensionalist parameter
2 would be the Richardson number, which is a ratio of
3 potential to kinetic energy in a system like this,
4 where you have the momentum of flow coming into the
5 core from the bottom.
6 CHAIRMAN BANERJEE: So what you have is --
7 explain the physical situation to me. You have got
8 lighter fluid underneath and a heavier fluid on top,
9 if you have got the Richardson number sort of
10 situation? Is that it?
11 MR. KELLERMAN: Right, now thermally, it
12 would be actually a stable system because you would
13 have hotter over the top of a cooler.
14 CHAIRMAN BANERJEE: Oh, okay.
15 MR. KELLERMAN: But as you build up the
16 concentration of the solute, you get higher density
17 above so you can have a convection in a system that
18 thermally doesn't look like you would have convection.
19 CHAIRMAN BANERJEE: So it's a combined
20 concentration and temperature field, right, that you
21 have got?
22 MR. KELLERMAN: Correct.
23 CHAIRMAN BANERJEE: And you are doing this
24 problem using an analogy that's -- but the convection
25 -- the velocities are very low coming in, so you are

1 saying this is like a pot?

2 MR. KELLERMAN: Right, I mean --

3 CHAIRMAN BANERJEE: In which you have got

4 these large convection cells? Is that it?

5 MR. KELLERMAN: Yes. The -- something like

6 the Rayleigh-Bernard convection is a large-scale -- we

7 have done phenomenon identification and ranking tables

8 where we have identified quite a few phenomena and

9 this would be the largest-scale. There's other things

10 at lower scales, but this would be a way of explaining

11 large-scale convection.

12 CHAIRMAN BANERJEE: Okay the mixing is

13 basically a density-induced convective cell --

14 MR. KELLERMAN: Right, it's a buoyancy

15 problem.

16 CHAIRMAN BANERJEE: Okay. And what's the

17 density difference between the stream coming in at the

18 top and the fluid there? There's a temperature

19 difference as well, right, and a concentration

20 difference.

21 MR. KELLERMAN: There can be, I mean for

22 this plant it's a little bit different because we are

23 talking about a large break on a hotleg with the

24 injection into the upper plenum, so you are not really

25 getting any flow through the downcomer and through the

1 lower plenum up into the core.

2 So you won't really have cold water on the

3 bottom. So it really comes down to the solute

4 concentration difference driving the convection, but

5 in a cold leg injection plant, like one with three or

6 four loops --

7 CHAIRMAN BANERJEE: Yes, I can see the

8 mechanism that yes --

9 (Simultaneous speakers.)

10 MR. KELLERMAN: You know, bulk, average

11 velocity, it's maybe one centimeter per second.

12 CHAIRMAN BANERJEE: Yes, I can see that

13 that is a reasonable assumption for -- I mean it's

14 just an approximation but it's okay.

15 MR. KELLERMAN: Right.

16 CHAIRMAN BANERJEE: Explain how you apply

17 it to this situation, though, where the physics is a

18 little bit different.

19 MR. KELLERMAN: Well, in this situation,

20 until you get the onset of this convection, there's

21 really not much of anything happening in the lower

22 plenum, so you are --

23 You are building concentration in the core

24 region until the density of the solute overcomes the

25 temperature density effect, and then you get the onset

1 of convection there.

2 CHAIRMAN BANERJEE: But the problem is, of

3 course, you have filled up the core with high density

4 stuff at the moment, so what is -- in the previous

5 mechanism, when you get mixing, you are getting

6 whatever is going in, some part of it is mixed with

7 the lower plenum fluid.

8 Here you fill the core and then it is

9 starting to go in. Eventually you will get --

10 MR. KELLERMAN: Right, it takes a while --

11 CHAIRMAN BANERJEE: It will take quite a

12 while.

13 MR. KELLERMAN: to get this large-scale

14 convection, yes.

15 CHAIRMAN BANERJEE: So where the

16 assumption of half might be okay for the other case, I

17 don't know if it's okay but let's assume it is okay

18 for when it's coming down the downcomer and you are

19 getting this low velocity -- you are getting a layer

20 of high density fluid forming, which starts to go into

21 some sort of convective cells --

22 MR. KELLERMAN: Right.

23 CHAIRMAN BANERJEE: which is driven by

24 intensity. You are getting the same thing here, except

25 it's coming first through the core, not the downcomer,

1 right?

2 MR. KELLERMAN: Correct.

3 CHAIRMAN BANERJEE: Yes, and --

4 MR. KELLERMAN: The flow is predominantly

5 down your peripheral assemblies for the power as well

6 --

7 CHAIRMAN BANERJEE: Right.

8 MR. KELLERMAN: And they have seen it,

9 like in the upper plenum tests, facility tests, or

10 cylindric core test facility, where the flow down

11 through these lower power peripheral assemblies

12 penetrates into the lower plenum.

13 CHAIRMAN BANERJEE: And then it goes on

14 through the middle.

15 MR. KELLERMAN: Yes, you get the co-

16 current upflow through the middle of the core.

17 CHAIRMAN BANERJEE: And what was the

18 timescales they have seen? This is with a slice,

19 right?

20 MR. KELLERMAN: Yes, the best test that is

21 out there is the radial slab. The data that we have,

22 which is actually proprietary to another vendor, is we

23 don't have a frequent enough point to determine what

24 the timescale is.

25 CHAIRMAN BANERJEE: But is the sort of

1 timescales that Len was showing yesterday of the order
2 that you see or expect?
3 MR. KELLERMAN: You mean --
4 CHAIRMAN BANERJEE: He showed that -- if
5 you see -- where the -- you sort of assume that that
6 was an onset of some form of mixing.
7 MR. KELLERMAN: Right, that was where he
8 used his criterion for including the lower plenum.
9 The data we have is -- the points are like half an
10 hour intervals, so his -- we don't know if it's less
11 than half an hour, but it's most likely much less than
12 half an hour because these convective velocities are,
13 you know, probably tens of centimeters per second.
14 CHAIRMAN BANERJEE: So what is the --
15 before you start to mix into the lower plenum, you can
16 do calculations to look at the velocities coming in
17 down through the peripheral channels?
18 MR. KELLERMAN: Yes --
19 CHAIRMAN BANERJEE: Typically what --
20 MR. KELLERMAN: With proper track analysis
21 --
22 CHAIRMAN BANERJEE: Yes.
23 MR. KELLERMAN: we could look at it.
24 CHAIRMAN BANERJEE: So what are those
25 velocities?

1 MR. KELLERMAN: I don't know off the top
2 of my head.
3 CHAIRMAN BANERJEE: Would they come out
4 with sufficient velocity to form jets into the top
5 part of the lower plenum, or are they just sort of
6 coming -- they are so slow that they just form a
7 stagnant layer?
8 MR. KELLERMAN: I don't know. I haven't
9 looked at those velocities.
10 CHAIRMAN BANERJEE: But you have the
11 calculation, right?
12 MR. KELLERMAN: Yes, we have the
13 calculation.
14 CHAIRMAN BANERJEE: I don't think this is
15 -- you need to resolve this today but it would be
16 helpful, when you come in front of the full committee,
17 to have these numbers.
18 MR. KELLERMAN: Okay.
19 CHAIRMAN BANERJEE: You know, because it's
20 a question of, there are other people who will
21 certainly start to look at this.
22 MR. KELLERMAN: Sanjoy we looked at this
23 on the committee and we looked at the BACCHUS
24 experiments and so on. This is in the Waterford
25 context?

1 MEMBER SHACK: It's in the Waterford
2 context.
3 DR. WALLIS: There's a whole history --
4 CHAIRMAN BANERJEE: But is Waterford also
5 the -- injecting on the top?
6 DR. WALLIS: I'm not sure -- that's what's
7 different. That's what's different.
8 CHAIRMAN BANERJEE: Yes, it's completely
9 different.
10 DR. WALLIS: That's right. That's right.
11 CHAIRMAN BANERJEE: The problem here, of
12 course, is that you have to go through the core --
13 DR. WALLIS: To get to the core plenum --
14 CHAIRMAN BANERJEE: Yes, before you can
15 track --
16 DR. WALLIS: So it is different, yes.
17 CHAIRMAN BANERJEE: So the mechanism is a
18 little bit different.
19 DR. WALLIS: Sounds like a good homework
20 problem, right?
21 CHAIRMAN BANERJEE: It is. But I think if
22 we got an idea of the velocities and you know,
23 COBRA/TRAC must be giving you also the -- once this
24 starts to sort of mix in and you get the convective
25 cells set up, the downflow -- the peripheral nozzles

1 and upflow through the middle, you've got those
2 calculations, right?
3 MR. KELLERMAN: Right.
4 CHAIRMAN BANERJEE: With COBRA/TRAC.
5 MR. KELLERMAN: Yes, I mean, we have the
6 thermal hydraulic analysis.
7 CHAIRMAN BANERJEE: It may even be better
8 if we could take a look at -- do you have a report on
9 this, the thermal hydraulic analysis for this?
10 Did you have a report where you documented
11 the COBRA/TRAC calculations?
12 MR. KELLERMAN: Yes, but I don't believe
13 we have the data plotted that you are --
14 CHAIRMAN BANERJEE: Looking for.
15 MR. KELLERMAN: looking for. I mean we
16 have some data for analysis and results that we
17 provided to the staff during the injection phase we
18 did a justify those 20 minutes of flushing at the
19 beginning of the problem that has mass flow rates at
20 the, I believe at the top of the core, and what mass
21 is leaving the vessel through the hotleg.
22 DR. WALLIS: Sanjoy, the temperature
23 difference produces this downflow periphery, but the
24 density difference opposes that.
25 CHAIRMAN BANERJEE: That's why it's not an

1 obvious --

2 DR. WALLIS: It's not quite clear what

3 happens.

4 CHAIRMAN BANERJEE: Yes. It's not, because

5 it's cold.

6 DR. WALLIS: Yes, but it's also -

7 CHAIRMAN BANERJEE: What concentration --

8 DR. WALLIS: got less boron in it so it's

9 lighter, so it's not clear which way it goes.

10 CHAIRMAN BANERJEE: It's not obvious.

11 DR. WALLIS: No, it's not obvious. It may

12 have difficulty happening.

13 CHAIRMAN BANERJEE: It's a different flow

14 path than through the downcomer. I can see the

15 argument you are making when you have flow through the

16 downcomer.

17 DR. WALLIS: Right.

18 CHAIRMAN BANERJEE: Because you have got

19 basically cold concentration boron coming in, or

20 relatively cold water, and it sort of floats on the

21 top and then it --

22 MR. KELLERMAN: There's some debate about

23 how it cold it is.

24 CHAIRMAN BANERJEE: and then it comes

25 down. Whereas now you have got it coming down the

1 periphery of the core so it is heating up.

2 MR. KELLERMAN: Oh yes, the core is going

3 to be -- and in the analysis we do, we assume the

4 water injected to the top is at saturation.

5 CHAIRMAN BANERJEE: Right.

6 MR. KELLERMAN: So --

7 CHAIRMAN BANERJEE: So you get boiling as

8 it flows down?

9 MR. KELLERMAN: Yes, that's a counter-flow

10 problem.

11 CHAIRMAN BANERJEE: Wow. This is a

12 complicated problem. How do you know water goes down

13 at all, then?

14 DR. WALLIS: So you can always turn on the

15 cold leg injection.

16 CHAIRMAN BANERJEE: Let us think about

17 this a little, what to do, because you probably will

18 need to look at the calculations. The staff has

19 already done that, I assume? I mean you have had a lot

20 of attention on this problem by the staff.

21 MR. HALE: Yes, we had a desk audit and

22 we, Brett and the Westinghouse folks, brought

23 calculations and we actually sat across the table and

24 discussed --

25 MR. KELLERMAN: They have looked at the

1 injection phase prior to recirculation in detail, but
2 they haven't asked for more detailed results during
3 the recirculation phase on the kind of data you are
4 looking for with the flows down into the lower plenum
5 from the periphery.
6 CHAIRMAN BANERJEE: Well, I think the only
7 reason we are doing this is to satisfy ourselves that
8 this one half volume bringing it in at whatever time
9 is reasonable, which changes the whole situation quite
10 a bit, is reasonable.
11 Now, my impression from the talk Len gave
12 yesterday was that he had also taken an independent
13 look at it and decided it was okay.
14 MR. KELLERMAN: Yes. We met with him on
15 two different occasions.
16 DR. WALLIS: Did he say that the half was
17 okay though, or did he just use it?
18 CHAIRMAN BANERJEE: I don't know. We will
19 have to ask Len the question again.
20 MR. HALE: I think one of the things I
21 wanted to emphasize though, we do have a lot of
22 conservatisms in this analysis.
23 CHAIRMAN BANERJEE: Right.
24 MR. HALE: We don't credit any containment
25 pressure, which would tend to increase the solubility

1 limits for boric acid. We don't take into account the
2 beneficial effect of the sodium hydroxide in the
3 water, which would tend to increase the solubility,
4 and we don't credit any entrainment whatsoever.
5 So I think while there were some questions
6 associated with it, I think both the staff and
7 ourselves came to an agreement that with the approach
8 that we were taking, that we had taken a sufficiently
9 conservative approach to it.
10 CHAIRMAN BANERJEE: Right. So, I mean,
11 these conservatisms are important because that one
12 half may be you know, not easy to defend. But what
13 would be more worrisome is if it was not one half but
14 20 percent or something, 15 percent, 10 percent, you
15 know, big difference.
16 Because the mechanisms are somewhat
17 different here from what you might have in Waterford
18 or something like that. Let's think about it. We'll
19 come back to you. If we have a specific need, we will
20 get back to you.
21 But you do have a report on at least the
22 early stages of this injection?
23 MR. KELLERMAN: Right, that information
24 has already been provided to the staff in an RAI
25 response --

1 CHAIRMAN BANERJEE: Okay. Yes. So we can
2 get that.
3 MR. KELLERMAN: back in early December.
4 CHAIRMAN BANERJEE: I'll take a look. But
5 it doesn't specifically address this issue, that's
6 what you are saying?
7 MR. KELLERMAN: No, it's during the
8 injection phase, I mean it's fairly similar except the
9 water, the injected coolant is subcooled and you have
10 injection from the cold legs.
11 DR. WALLIS: It may well be Sanjoy that
12 the boiling is what helps circulate the core and
13 that's what saves them.
14 CHAIRMAN BANERJEE: Yes, but it's not a
15 question of circulation here, it is a question of --
16 (Simultaneous speakers.)
17 DR. WALLIS: The stuff from above down to
18 mix down below, don't you?
19 CHAIRMAN BANERJEE: You have to stop to
20 take the credit for the plenum volume for dilution. It
21 may never penetrate down there. You know you might
22 just be happily mixing the core and boiling, you know.
23 It's good for the mixing in the core but
24 it doesn't give you additional volume.
25 MEMBER SIEBER: The concentration kept

1 going up.

2 CHAIRMAN BANERJEE: Okay. Thanks. I think

3 we have got what is needed here. Let's keep this item

4 flagged for the moment.

5 MR. HALE: Okay. Right. Next slide. We

6 wanted to talk about the containment cooler fouling.

7 The containment fan coolers at Point Beach are

8 supplied by service water, which is Lake Michigan.

9 This piping is evaluated by Generic Letter

10 96-06. This is where you look at, you know, high

11 temperatures in containment, what it does to piping

12 systems in terms of causing those piping systems to

13 have adverse effects in terms of operation under those

14 high temperatures.

15 When we do this analysis we tend to bias

16 the input so we get a water hammer load that then goes

17 into evaluating the forces in the piping.

18 When we looked at it for EPU, we saw about

19 a 0.8 percent increase in the delta T across the fan

20 coils.

21 Now we talked a lot about fouling factors.

22 A typical fouling factor in Great Lakes water is about

23 one times 10 to the minus three.

24 DR. WALLIS: When you say typical, is this

25 essentially a conservative value when you are trying

1 to create heat transfer, do you use --

2 MR. HALE: No, no, no, this is basically

3 like you would -- you typically would find --

4 DR. WALLIS: It's more likely the best

5 estimate?

6 MR. HALE: No. Let me just walk through --

7 DR. WALLIS: Where does it come from?

8 MR. HALE: This is a value that

9 historically we have seen when you look at heat

10 exchanges that are cooled by Great Lakes water, the

11 fouling factor is about this.

12 DR. WALLIS: Does it vary tremendously? Is

13 it sometimes --

14 MR. HALE: Not too much.

15 DR. WALLIS: Not so much?

16 MR. HALE: It's pretty consistent.

17 DR. WALLIS: Is there some data that says

18 it is always bigger than 3.6 T to the minus five?

19 MR. HALE: No, we were just providing this

20 as a typical value.

21 DR. WALLIS: Oh. Okay.

22 MR. HALE: Okay? We looked at the analysis

23 that was done for 96-06. We saw that we increased the

24 fouling factor from zero to 3.6 times 10 to the minus

25 5th, that we could accommodate the delta T for the EPU

1 without doing any further analysis, okay?

2 DR. WALLIS: Without changing it --

3 MR. HALE: It's a fairly sophisticated

4 analysis and this is like a couple of order magnitude

5 lower than typical and the value that we have seen on

6 our other heat exchangers run about 10 percent. I mean

7 where we are actually 10 percent of what we actually

8 see in our other heat exchangers.

9 DR. WALLIS: Now is this fouling that

10 builds up over time? It doesn't instantly happen, does

11 it?

12 MR. HALE: It happens fairly quickly with

13 service water. You get a --

14 DR. WALLIS: But there's a period when

15 everything is new.

16 MR. HALE: Yes, but it doesn't last very

17 long.

18 DR. WALLIS: Well, okay. Let that very

19 long is --

20 MR. HALE: As soon as you admit the

21 service water to it, you'll start getting fouling.

22 DR. WALLIS: I just wonder if there's a

23 window of vulnerability or something at the beginning

24 when you start up, but this is much better than what

25 we heard before.

1 MR. HALE: Okay.

2 DR. WALLIS: You have actually got some
3 numbers here and you are showing it may be on the
4 extreme end some tail that -- and you haven't, even if
5 you -- you haven't bothered to do the analysis, but
6 this is a very small change in delta T.

7 MR. HALE: Right.

8 DR. WALLIS: So it's not clear that that
9 is going to lead to any kind of problem, right?

10 MR. HALE: That is correct.

11 DR. WALLIS: And the staff accepts this
12 then, this is sort of like --

13 MR. HALE: Yes, yes, yes.

14 DR. WALLIS: Okay. Thank you.

15 MR. HALE: You are welcome. The next
16 slide, Harv. Strainer drawing. This is to the 96-06.
17 We thought we would superimpose a picture of what the
18 strainer actually looks like.

19 CHAIRMAN BANERJEE: That's nice.

20 MR. HALE: What happens -- the way our
21 system operates is that we go onto recirc before the
22 RWST is fully drained, and we continue to drain down
23 the RWST until it's fully depleted with the
24 containment spray pumps.

25 So the evaluations that we do are at the

1 minimum level when we initially go on recirc, which is
2 the lower line, but as the RWST continues to drain,
3 then you will see the upper line as where it
4 ultimately ends up after the RWST is fully depleted.
5 CHAIRMAN BANERJEE: So that 4.2 feet is
6 from the --
7 MR. HALE: Minimum line, the --
8 CHAIRMAN BANERJEE: Which is -- can you
9 point from where to where that is? MR. HALE:
10 It's the lower -- the 4.2 is from this to the pump,
11 and of course once the RWST fully drains, you will
12 actually get some additional head on top of it.
13 DR. WALLIS: This is also 4.2 -
14 MR. HALE: Yes if you look at 11.2 inches
15 versus the 16 foot minus 16 foot 10, that's where you
16 get the 28 feet initially, is from this -
17 DR. WALLIS: But it's sort of
18 coincidental, but it is also -- so if we took that 4.2
19 feet across the heat exchanger, we would just get back
20 to the pressure we had up in the containment and so
21 flashing would be minimal?
22 MR. HALE: Right.
23 CHAIRMAN BANERJEE: So the submergence is
24 about two inches to the top?
25 MR. HALE: On the top of the strainer,

1 initially and then the level increases as the RWST
2 drains fully to the 12th point level, 12 foot level,
3 and depending on where your break is, the location of
4 the break and that sort of thing, it could be as high
5 as 15 feet.
6 CHAIRMAN BANERJEE: Maybe it's useful if
7 you could give us, you know, this is minimum, but it
8 would be nice to see it. Do you have that level with
9 time and the temperature of the water, the time?
10 MR. HALE: The -- I think from the 11 foot
11 two to the 15 foot two, and looking at the --
12 CHAIRMAN BANERJEE: I mean just the
13 submergence and temperature would be useful.
14 MR. HALE: It's approximately 20 minutes
15 to an hour.
16 DR. WALLIS: So when do you start
17 recirculation?
18 MR. HALE: We start recirculation at this
19 point.
20 DR. WALLIS: When it's low, so you
21 probably would get some flashing if you had 4.2 across
22 the --
23 MR. HALE: Yes, but it's also the initial
24 point that you go on recirc, so you know, you have got
25 to look at a combination of things like debris, you

1 know, when does the debris occur, when does it happen,
2 where's your break located.
3 CHAIRMAN BANERJEE: That's why a time plot
4 would be useful.
5 MR. HALE: The time frame in here is
6 depending on whether you have got max safeguards, or
7 minimum safeguards, you know, in other words, whether
8 you are pumping the RWST with two containment spray
9 pumps or a single containment spray pump, it could
10 vary between say 20 minutes and an hour, for this
11 piece of it.
12 CHAIRMAN BANERJEE: What is the hottest
13 the sump water gets? At this point you said it was
14 212, right?
15 MR. HALE: Yes, yes, once you go on recirc
16 --
17 CHAIRMAN BANERJEE: But it must have been
18 hotter before, then?
19 MR. HALE: Yes, but the assumption is you
20 are at the saturation, you are in saturation in the
21 containment.
22 CHAIRMAN BANERJEE: Right, but how what
23 was it before this? I mean let's say when the accident
24 first started or you know, what was -- how does the
25 sump water vary with time coming up to this point?

1 It's obviously cooling off, right? So it
2 was hotter than this.
3 DR. WALLIS: The problem is what you
4 assume. If you are forced to assume atmospheric
5 pressure in containment then it's going to boil. But
6 there isn't atmospheric pressure containment so it
7 could get hotter than 212.
8 MEMBER SIEBER: Right, it could.
9 CHAIRMAN BANERJEE: But whatever it is --
10 but if it boils, it will boil at whatever pressure
11 there is in containment.
12 MEMBER SIEBER: Water temperature.
13 CHAIRMAN BANERJEE: I'm wondering whether
14 it boils or it's below boiling, that's all I'm trying
15 to figure out. A pressure temperature curve would be
16 useful to know.
17 DR. WALLIS: Are you looking at a
18 realistic analysis or a regulatory analysis? It makes
19 a difference
20 CHAIRMAN BANERJEE: Well, it has to be
21 related to the minimum pressure that you expect in
22 containment, to see whether it boils or not.
23 DR. WALLIS: If you are taking credit for
24 that pressure.
25 CHAIRMAN BANERJEE: That's -- let's say,

1 just to keep us happy, if you don't mind, if you could
2 give us the temperature of the water, I mean, in the
3 containment as a function of time, before this minimum
4 point, and the pressure in the containment.
5 DR. WALLIS: And the prediction of the
6 pressure drop across the screen versus time. That's a
7 difficult one.
8 CHAIRMAN BANERJEE: No, no, that's --
9 forget it.
10 DR. WALLIS: Look, if they have a very low
11 level down just two inches above the strainer and it's
12 ready to boil, then when they go through the debris,
13 it will flash.
14 CHAIRMAN BANERJEE: Yes.
15 DR. WALLIS: But then it will condense in
16 the pipe and probably that's not a problem. I don't
17 know.
18 MR. HALE: We do have --
19 CHAIRMAN BANERJEE: You have to take into
20 account flashing in the strainer, right?
21 MR. HALE: Yes, well that's kind of what
22 we are indicating, that we do have at margin, and if
23 you start looking at, you know, certain effects, like
24 what happens across the strainer and everything, that
25 that would certainly start looking at that margin.

1 Now we do have curves with this post-
2 containment LOCA temperature and pressure. We could
3 show you those.
4 CHAIRMAN BANERJEE: For the water or the -
5 -
6 MR. HALE: Well, it's just the containment
7 temperature and pressure.
8 DR. WALLIS: Did you get the sump
9 temperature?
10 CHAIRMAN BANERJEE: I mean, what
11 temperature --
12 MR. HALE: I'm sure we have the sump
13 temperature but I don't think we -- I mean we can get
14 that. We can show you what it is. But again, it's
15 based on whatever the LOCA pressure is.
16 MEMBER SIEBER: Right. So it's a realistic
17 temperature, right?
18 MR. HALE: Well, it's, it's -- you know,
19 it doesn't assume containment breach.
20 CHAIRMAN BANERJEE: Right, but what you
21 are really saying then is that the -- I am trying to
22 understand -- you are doing the containment pressure
23 calculation conservatively, right, so the pressure is
24 -- you are getting a maximum pressure there, and you
25 are trying to see whether this is below your design

1 pressure.

2 MR. HALE: Right, and that would tend to

3 maximize the sump water temperature too.

4 CHAIRMAN BANERJEE: Yes. But that's not

5 necessarily --

6 MEMBER SIEBER: That's not conservative

7 with respect to flashing.

8 CHAIRMAN BANERJEE: Yes. And that's what

9 you have. You don't have a minimum bound for the --

10 MR. HALE: You would have to -- you have

11 to assume at atmospheric pressure the fluid in the

12 sump is going to be saturated at atmospheric pressure,

13 yes.

14 CHAIRMAN BANERJEE: Yes.

15 MR. HALE: So that's the issue that you

16 have, you know, if you say that the temperature is

17 going to be higher then you have got additional

18 pressure in a containment.

19 DR. WALLIS: But we don't know what

20 happens when you have flashing in the degree bed?

21 MR. HALE: Well, that's the whole issue

22 that's going on with 96-06, you know -- I mean not 96

23 -- GSI-191.

24 DR. WALLIS: But it's not -- as far as I

25 know it hasn't been investigated experiment?

1 MR. HALE: I can't speak to that.

2 CHAIRMAN BANERJEE: Yes, well that's, I

3 suppose, a separate issue.

4 MR. HALE: Yes.

5 CHAIRMAN BANERJEE: We are simply trying

6 to understand whether you need containment pressure or

7 not, you know, to be able to have long-term cooling.

8 Whether you need it in the short term is another

9 question, this question is whether you need it for the

10 long term.

11 DR. WALLIS: Are we going to have copies

12 of these slides by the way?

13 MR. HALE: Yes.

14 DR. WALLIS: Because it would help me.

15 MR. HALE: We can provide copies these

16 slides.

17 MEMBER SIEBER: The water that is coming

18 in there is RWST water. You have a maximum temperature

19 you are allowed to operate as far as RWST temperature

20 is concerned. So that's where you start out.

21 CHAIRMAN BANERJEE: You're just pulling

22 RWST water up to this point.

23 MR. HALE: Yes.

24 MEMBER SIEBER: Right. And as you

25 circulate it through the core then you heat it up and

1 the pathway is not particularly efficient as a heat
2 exchanger.
3 CHAIRMAN BANERJEE: Well, yes, but -- what
4 temperature is RWST water?
5 MR. HALE: It's just ambient and it would
6 typically you know --
7 MEMBER SIEBER: But you have a maximum and
8 it's usually in the high 80s.
9 MR. HANNEMAN: This is Harv Hanneman from
10 NextEra and Point Beach. The maximum allowed RWST
11 temperature is 100 degrees Fahrenheit, and we, you
12 know, monitor that and ensure it is below that before
13 we go into a new refueling cycle.
14 It gets hotter when we use it in the
15 refueling cavity, but we cool it off to less than 100.
16
17 CHAIRMAN BANERJEE: And you have these
18 famous piggy-back pumps, right?
19 MEMBER SIEBER: Well, they are supposed to
20 be better at NPSH.
21 CHAIRMAN BANERJEE: Yes, so fine. Yes, it
22 would just be useful to have I think a time
23 temperature plot as to how you are getting -- but what
24 you are really saying here is the assumption is that
25 you are at atmospheric pressure, therefore it's 212 --

1 MR. HALE: Right.
2 CHAIRMAN BANERJEE: whatever it is.
3 MR. HALE: Right, exactly.
4 CHAIRMAN BANERJEE: You are driven by that
5 assumption.
6 MR. HALE: Yes.
7 CHAIRMAN BANERJEE: At that point.
8 MR. HALE: Right.
9 MEMBER SIEBER: And to the extent you have
10 containment pressure, that gives you margin.
11 MR. HALE: Right.
12 CHAIRMAN BANERJEE: Yes. But this is at
13 atmospheric. What, though, I don't know, is you know,
14 I have heard all sorts of different things and I get
15 confused. So if I understand, what you are saying here
16 is it's 212 because you are assuming atmospheric
17 pressure?
18 MR. HALE: Right.
19 CHAIRMAN BANERJEE: It's not a consequence
20 of the calculation which shows it's --
21 MR. HALE: No.
22 CHAIRMAN BANERJEE: coming in at 212.
23 MEMBER SIEBER: It's an assumption.
24 MR. HALE: You are assuming you have
25 saturated conditions.

1 DR. WALLIS: It could well be above 212,
2 with a realistic calculation.
3 MR. HALE: But in order for it to be that,
4 it would have to be above atmospheric pressure in the
5 containment.
6 DR. WALLIS: But these seem to be
7 arguments for going in the direction of a realistic
8 calculation.
9 CHAIRMAN BANERJEE: Yes, the 212 is not a
10 consequence of the amount of energy you have put in
11 and you know, the conservation of energy and losses
12 and heat transfer, and that's what we were after, if
13 you actually did a calculation for the sump water.
14 But what you are saying is you have done
15 it but it is with this maximum containment pressure,
16 so it's always at saturation, given a certain amount
17 of air, whatever it is, it's running at saturation.
18 But you have not done a minimum? Okay, you
19 -- thank you.
20 MR. BAILEY: Hi, I'm Stewart Bailey. I am
21 the grants chief responsible for GSI-191, and to some
22 extent I think we may be using some different
23 terminology as we talk about this or we are running
24 into some different assumptions that are used for
25 different types of analyses.

1 You were asking about maximum
2 temperatures. I am looking at some of their handouts
3 from yesterday related to environmental qualification
4 and what-not, and that's consistent with what we had
5 seen, that they are showing maximum water temperatures
6 in the 250 range.
7 So from that perspective, as we had talked
8 about, there is some for the containment being intact,
9 in order to be able to reach those temperatures in the
10 first place.
11 CHAIRMAN BANERJEE: What's the pressure
12 there, Stewart?
13 MR. BAILEY: I have that here, they are
14 getting up -- this shows them getting up close to 70
15 psi --
16 CHAIRMAN BANERJEE: For how long?
17 MR. BAILEY: in absolute -- I would say
18 half an hour, hour, something along those time frames.
19 But again, that's just their standard containment
20 accident response.
21 Now, when we were doing GSI-191, we were
22 really looking at conditions over a wide range of
23 break locations and wide range of break sizes, so some
24 of the water levels that you are seeing her, if it's
25 not based just on switchover due to reactor -- RWST

1 level, you are looking at what really is not a
2 limiting location very often.
3 You are looking at top of the pressurizer
4 and it includes cooldown of the RCS, so there is a
5 significantly less volume of water that gets dumped
6 into the sump than you would see for these other
7 containment analyses, and for cases that most likely
8 would be more limiting for suction strainer head loss.
9 I think they went over their condition --
10 their status yesterday. They have not completed their
11 testing for GSI-191, and what they are presenting here
12 is that based on minimum water levels, their
13 acceptance criteria for this simplistic case would be
14 4.2 feet.
15 Now they may be able to take different
16 sets of assumptions that would make sense and show
17 more margin in that number. What they are showing at
18 that 4.2 feet, with that low submergence, they are
19 showing a submergence of about one to three feet of
20 water, that would indicate that if that maximum DP
21 does occur with the saturated pool, then they may be
22 taking some credit, some inherent credit for
23 containment accident pressure to prevent flashing.
24 This is consistent with our discussion
25 some time ago that it ends up being in the one psi

range for some period of time.

CHAIRMAN BANERJEE: This is flashing?

MR. HALE: There are a lot of plants take an inherent credit for flashing. That's correct. They -- I have not seen PWRs or at least the majority of PWRs do not take any credit for NPSH, but due to flashing, just to show that it does not occur.

The -- I'm not sure what the effect of flashing would be, whether that would affect -- whether that would change the debris bed and allow greater flow, or whether the flashing would then increase the head loss.

Right now people have shown that they don't have flashing so we really have not addressed what the consequence would be.

So, that is what they are showing here. This plant, likely they are in my view, not having seen the test results, likely their highest pressure differentials would occur at significantly lower temperatures when their chemical precipitates.

CHAIRMAN BANERJEE: So about 150 or something?

MR. HALE: Yes, so they would have significant margin to flashing at that time, so you are being presented a very simplistic case here.

1 CHAIRMAN BANERJEE: Yes, so there's no
2 chemicals at this point?
3 MR. HALE: I'll -- I can't say -- I was
4 about to say correct, however I haven't seen their
5 final analysis so I can't answer that yet.
6 CHAIRMAN BANERJEE: We are guessing on
7 this one. But --
8 DR. WALLIS: So I think what you said was
9 you can take credit for a little bit of CAP to prevent
10 flashing, but you are not allowed to take credit for
11 that to get NPSH?
12 MR. BAILEY: Well, we have not been asked
13 to provide credit for that for NPSH, so I am not going
14 to say that that's verboten --
15 DR. WALLIS: It's just a funny world where
16 you can assume something for one thing and not for
17 another like that, but I guess that's the way it
18 works. The flashing isn't necessarily that bad. We
19 just --
20 CHAIRMAN BANERJEE: It will increase the
21 pressure loss.
22 DR. WALLIS: Yes, it would do something,
23 right, so it's best not to have to --
24 CHAIRMAN BANERJEE: It might clear out the
25 debris, too.

1 DR. WALLIS: It might. It might be good
2 that way.
3 CHAIRMAN BANERJEE: Well, I think, thank
4 you, that that status is clear and we are not going to
5 talk GSI-191 here, but --
6 DR. WALLIS: But we will remember this
7 conversation.
8 CHAIRMAN BANERJEE: We will remember it.
9 Okay. I think it's fairly clear what Stu said, so this
10 is just starting and by the time, I mean, depending on
11 the analysis you have come up with, when the chemicals
12 come in and all this sort of stuff, the temperature
13 will be somewhat different.
14 MR. HALE: So for the purposes of this
15 meeting, we are good with this one?
16 CHAIRMAN BANERJEE: Yes, I think -- well
17 what he said was useful, which is that your
18 temperatures are in the 250 degrees Fahrenheit rate,
19 and you are basically -- this is requiring that you
20 get some credit for containment integrity, because you
21 have got pressures that are going up to 70 psia,
22 right, so, for about an hour in that range.
23 So is that consistent with --
24 MR. HALE: Yes.
25 CHAIRMAN BANERJEE: What really happens.

1 And are those curves in one of the handouts that you
2 have brought?
3 MR. HALE: We have the LOCA pressure
4 temperature curves in our backup slides. We could show
5 you what those look like if you'd like.
6 CHAIRMAN BANERJEE: Well, you don't have
7 to, but it should go into the record and should be
8 available to us.
9 MR. HALE: Okay.
10 CHAIRMAN BANERJEE: I don't think we
11 should take too much time right now on that. But if
12 it's there can you make those available --
13 MR. HALE: Sure.
14 CHAIRMAN BANERJEE: To us so that goes
15 into the record, and we can look at it.
16 MR. HALE: And we have actually put those
17 in some of our REI responses where they were included
18 in there as well.
19 CHAIRMAN BANERJEE: Yes. So if you just
20 point us in that direction.
21 MR. HALE: Okay.
22 MEMBER SIEBER: You want this for a large
23 break LOC?
24 MR. HALE: Yes. You are looking for
25 pressure temperature for large break LOCA.

1 CHAIRMAN BANERJEE: Right. Right. I think,
2 you know, that there has been an ongoing discussion
3 about containment accident pressure and it is very
4 back and forth and -- but we should at least know.
5 MEMBER SIEBER: Twenty years ago.
6 MR. HALE: Okay?
7 CHAIRMAN BANERJEE: That's good.
8 MR. HALE: All right. Next slide, Harv.
9 The next thing we wanted to talk about is the
10 auxiliary feedwater system. We have got a couple of
11 pictures here that we thought we would walk through.
12 In looking at the location of the new
13 pumps, in this area, this is where the existing --
14 these are the two existing motor-driven pumps and the
15 turbine-driven pump for each unit are here.
16 The two new motor-driven pumps are
17 actually going into the rooms where the boric acid
18 evaporators used to be in the auxiliary building. So
19 as you might imagine, you've got piping running from
20 the condensate storage tanks to the new pumps, and
21 then the new pumps back to the various feedwater
22 platforms.
23 DR. WALLIS: You have got new piping you
24 have got to run.
25 MR. HALE: Yes, well let me show you the

1 next slide.

2 CHAIRMAN BANERJEE: Where is your LEFM?

3 MR. HALE: Where's the LEFM? I guess it's

4 in the turbine building somewhere, right?

5 MR. HANNEMAN: It's right where your hand

6 is.

7 MR. HALE: Yes.

8 MR. HANNEMAN: The main feedwater lines

9 for each unit are in the turbine hall.

10 CHAIRMAN BANERJEE: And those lines have

11 not been disturbed?

12 MR. HALE: No. Not at all.

13 CHAIRMAN BANERJEE: And the temperatures

14 are similar in those lines?

15 MR. HANNEMAN: This is Harv Hanneman from

16 NextEra, Point Beach. This -- the LEFM is on the

17 section of the common line downstream of the pipe

18 pressure feedwater heaters so the temperature in there

19 would be, let's see --

20 CHAIRMAN BANERJEE: Did it change due to

21 the EPU, the temperature?

22 MR. HANNEMAN: The temperatures have gone

23 up a little bit.

24 MR. HANLEY: Yes, the temperatures and the

25 final feedwater temperature are up to 450 something.

1 So we are at 431 now and it goes close to 450 I
2 believe.
3 CHAIRMAN BANERJEE: So it's gone up by
4 about 20 degrees?
5 MR. HANLEY: Correct.
6 DR. WALLIS: So when you put these new
7 pumps in, new piping, do you have to bust through
8 concrete for the new pipe?
9 MR. HALE: Oh yes.
10 MR. MEYER: It's all done.
11 CHAIRMAN BANERJEE: It's all done?
12 MR. MEYER: That's correct.
13 CHAIRMAN BANERJEE: When you installed
14 those LEFMS, how did you calibrate them in situ,
15 because in the staff SE, it's required that not only
16 do they be calibrated outside before installation, or
17 there's a clause which allows the parallel process.
18 But it also requires that they be
19 calibrated in situ against other -- various other
20 measurements that you make. Did you go through this
21 process? We didn't see your MUR, so we are just
22 asking.
23 MR. HANNEMAN: This is Harv Hanneman again
24 from NextEra and Point Beach. The original leading
25 edge flow meter was installed early in the plant life.

1 It was a Westinghouse unit at that time before Caldon
2 or Cameron bought them out.
3 But when we did the measurement
4 uncertainty recapture power uprate in the 2002/2003
5 time frame, we totally upgraded that system with new
6 sensors and the new electronics package that
7 corresponded to all of the topical reports that Caldon
8 had done to justify the measurement uncertainty.
9 The spool pieces themselves were not
10 replaced at that time. We used the original
11 Westinghouse spool pieces, but we --
12 CHAIRMAN BANERJEE: But did the original -
13 -
14 MR. HANNEMAN: didn't do a --
15 CHAIRMAN BANERJEE: only had four
16 ultrasonic beams, right?
17 MR. HANNEMAN: Right, we have an LEFM
18 check system which --
19 CHAIRMAN BANERJEE: But it's not a check
20 plus?
21 MR. HANNEMAN: It's not a check plus, it's
22 a check system and it's -- so, and based on the
23 measurement uncertainty calculations that Caldon did
24 for their flow measurement and Westinghouse took that
25 information and to calculate the total power

1 measurement uncertainty we have justified a 0.6
2 percent power measurement uncertainty now, using the
3 LEFM.
4 But the basis of the uncertainty is
5 primarily the laboratory testing of the new system. We
6 --
7 CHAIRMAN BANERJEE: Yes, if you -
8 MR. HANNEMAN: We didn't do any new in
9 situ testing to calibrate it against -- I mean we
10 checked it against the -
11 DR. WALLIS: What could you calibrate it
12 against in situ?
13 CHAIRMAN BANERJEE: Well there are various
14 ways you can -- I mean, other supporting measurements.
15 Clearly what you are saying is that this is more
16 accurate, that reduces your uncertainty.
17 But in the staff SE or SER or whatever it
18 is called, if you look at it, there are certain
19 conditions to doing this, and one of these is that
20 there be ex situ calibration, but clearly that can't
21 be done under the conditions in the plant, because the
22 Reynolds numbers are different and they are done at
23 room temperatures and viscosities here are very
24 different, so the Reynolds numbers are much higher in
25 the plant.

1 So, plus, you have got possible, you know
2 temperature stratifications or different temperatures
3 than the uniform temperatures, you can do the ex situ
4 calibration.
5 So the ex situ work has to be done in a
6 typical piping geometry. That's required by the staff.
7 So it has to be prototypical geometry and then once
8 it's in there, it has to be calibrated again against
9 whatever you can because you know, there are effects,
10 Reynolds number effects and other things, which you
11 can't do in the testing in other places.
12 So when this MUR went through, we never
13 looked at it I think, in fact we haven't ever
14 commented on it, but this has been a concern for us
15 with the new reactors that are coming up now, because
16 they are having to undertake some sort of in situ
17 calibration program.
18 MR. TOMASZEWSKI: This is Dan Tomaszewski
19 from NextEra. I don't profess to be a total expert at
20 this, but the people who do this used to work for me
21 at the plant, and we do check it in situ every start-
22 up
23 And when we went through, there was a
24 commissioning test which was the standard Caldon,
25 Cameron commission test that is run, which in fact as

1 part of the uprate, we plan on repeating that because
2 of the change in conditions due to the final feed
3 temperature and flows in that same test, as well as a
4 cross comparison.
5 Now, in every start-up, we do look at the
6 feedwater venturis plus the typical fouling factors
7 that have been historically observed at the plant, and
8 there is a comparison done during various levels in
9 the power ascension, to where we make sure that the
10 LEFM and the corrected feedwater venturis are
11 consistent with all the previous readings, and of
12 course the final power level of the plant and plant
13 parameters --
14 CHAIRMAN BANERJEE: Well, that's
15 reassuring --
16 MR. TOMASZEWSKI: And that is done every
17 cycle and of course as part of the power ascension
18 testing, we are also planning on doing that, you know,
19 check against the parameters and --
20 CHAIRMAN BANERJEE: Have your venturis
21 fouled?
22 MR. TOMASZEWSKI: The venturis do have
23 some limited fouling and we do -- there is a
24 correction that occurs between the LEFM and the
25 venturi correction factor that our LEFM computers

1 automatically perform and that we check using our
2 surveillance programs to very it is what it should be.
3 CHAIRMAN BANERJEE: And you have never
4 changed out the venturis?
5 MR. TOMASZEWSKI: To my knowledge, the
6 venturis have never been changed.
7 CHAIRMAN BANERJEE: They are --
8 MR. TOMASZEWSKI: They are inspected but
9 not changed.
10 CHAIRMAN BANERJEE: And is the fouling
11 changing with time?
12 MR. TOMASZEWSKI: I think it's the typical
13 fouling. We don't see it changing over time. But you
14 can see it changing over the beginning of a cycle to
15 the end of a cycle, and then as you go into the
16 refueling, some of the crud and coating comes off and
17 you -- and it is typically what the industry sees in
18 those applications. It's nothing that is unexpected.
19 CHAIRMAN BANERJEE: Okay. Let's think
20 about it. But what you are saying is that you would go
21 through the same procedure as you are doing now to
22 recalibrate these --
23 MR. TOMASZEWSKI: The -- comparing them
24 during the start-up of what you had expected to see.
25 CHAIRMAN BANERJEE: Is it only against the

1 venturis you are doing it, or are you doing any other
2 --
3 MR. TOMASZEWSKI: Currnetly it's only
4 against the venturis and the calometric power as
5 calculated by the venturis versus the calometric
6 thermal power as calculated by the LEFM and the
7 reactor engineers compared those as we do the power
8 ascension.
9 CHAIRMAN BANERJEE: So the issue here of
10 course is with the LOCA analysis, which you are
11 claiming a 0.6. percent uncertainty, which is allowing
12 your 1800 in some way.
13 So if you were to increase that, then it
14 would be affecting that analysis, analysis of record I
15 guess is 1800 right?
16 MR. HALE: Yes.
17 CHAIRMAN BANERJEE: Okay. Let's go on. I'm
18 sorry I got into this diversion about the --
19 DR. WALLIS: This diversion is not part of
20 the uprate discussion, is it?
21 MEMBER SIEBER: No it's not.
22 CHAIRMAN BANERJEE: Well, it's part of the
23 uprate in that flow rate's gone up through this.
24 DR. WALLIS: But it was accepted before,
25 wasn't it?

1 CHAIRMAN BANERJEE: Yes, but it wasn't
2 accepted at that flow rate.
3 DR. WALLIS: So you think there's a real
4 change in the --
5 CHAIRMAN BANERJEE: I don't know. I mean,
6 was it calibrated ex situ at that flow rate?
7 DR. WALLIS: You are saying there's a new
8 flow rate so we have to revisit the --
9 CHAIRMAN BANERJEE: We have to take a
10 look.
11 DR. WALLIS: I see. I understand.
12 CHAIRMAN BANERJEE: I mean, maybe it's
13 fine.
14 MEMBER SIEBER: Primary system --
15 CHAIRMAN BANERJEE: No, I am just saying
16 this isn't the secondary system, it's the feedwater
17 right?
18 DR. WALLIS: Right, it's the feedwater.
19 CHAIRMAN BANERJEE: Okay. I am pretty sure
20 that -- so the requirements are that it be calibrated
21 with a prototypical set-up, ex situ, outside --
22 DR. WALLIS: They can't --
23 CHAIRMAN BANERJEE: at a typical flow
24 rate.
25 DR. WALLIS: they can't copy the

1 temperature.

2 CHAIRMAN BANERJEE: They can't copy the

3 temperature but they can copy the velocity. So the

4 Reynolds numbers are wrong, but the velocities are

5 right, for what it's worth. Anyway --

6 MR. HALE: Do we have a -- is there an

7 action here that we need to follow up on?

8 CHAIRMAN BANERJEE: I think maybe by the

9 end of the day --

10 MR. HALE: Okay.

11 CHAIRMAN BANERJEE: It could be that we

12 would simply ask you to take a look at the calibration

13 information and see that your flow rates are within

14 the range of the prototypical calibration tests that

15 must have been done when you actually took credit for

16 this, you know, you are in the right -- for --

17 MR. TOMASZEWSKI: This is Dan Tomaszewski

18 again. That has been done. The vendor, we have gone

19 back to, I don't profess to be an expert because

20 Cameron is the expert, but we have given them the new

21 parameters and they have verified that our LEFM meets

22 their requirements, for what the increased flow in

23 temperature.

24 CHAIRMAN BANERJEE: Right, but in a sense

25 they may say that, but they have to present the

1 information which validates that, you know, because
2 that's a requirement as far as I understand it, in the
3 original SE, which allows these MURs.
4 There's a revision to that which has come
5 after 2010 September or October or something, but it
6 doesn't materially change the original SE that I
7 remember.
8 I looked through both of them.
9 DR. WALLIS: So if this flow meter has
10 been used in other reactors at this temperature, would
11 that be useful evidence, if it's been accepted in
12 other plants under these conditions?
13 CHAIRMAN BANERJEE: For these conditions.
14 DR. WALLIS: Would that be helpful to us
15 in the first, to know that?
16 CHAIRMAN BANERJEE: It would certainly be
17 helpful, if -- particularly if the piping is similar,
18 because we are considered about of course bends and
19 temperature profiles and all that sort of stuff, all
20 that affects --
21 DR. WALLIS: But it has been installed in
22 quite a few plants, I think -
23 CHAIRMAN BANERJEE: Right.
24 DR. WALLIS: So maybe --
25 CHAIRMAN BANERJEE: And we have never

signed off on it.

DR. WALLIS: No.

CHAIRMAN BANERJEE: That's just for information. Anyway, I didn't want to divert, so let's go back to this.

MR. HALE: Okay, Harv, if you go the next slide. This is just a pictorial, it's not intended to be a full-blown P&ID. But the highlighted -- this is for a one unit -- what the one unit's auxiliary feedwater system would look like.

These are the old pumps, okay, and this is would be the new pump on unit one, and you would have a similar case on unit two. We have new piping that is coming from the condensate storage tanks to the suction of the new pumps that were there in the auxiliary building we showed you.

New connection to service water, which is really our safety related water source. These are the valves that will be automatically switched once you reach the low pressure in the suction of the AFW pumps. I'm sorry, this one right there.

These are the recirc valves we talked about where we have provided additional capabilities so that the operators don't have to manually actuate those valves.

1 And then we have it flowing to the two
2 steam generators. I believe we have a -- the
3 containment -- we have a separate penetration for
4 auxiliary feedwater for containment and then the feed
5 line, so the containment is kind of like -- right --
6 it ties into the feedwater line inside containment, so
7 the containment line is kind of like that, right? Does
8 that make sense? Yes.
9 We don't show the containment here.
10 MR. HANNEMAN: Well, but this check though
11 is inside containment. There's another one outside.
12 MR. HALE: Okay. So the containment is
13 like here, right?
14 MR. HANNEMAN: Right.
15 MR. HALE: So as you can see, it's a
16 significant modification. It's -- and Larry can
17 confirm that based on all --
18 DR. WALLIS: So each pump's output is
19 shared between the two steam generators, is that --
20 MR. HALE: Yes.
21 DR. WALLIS: Do you have two new pumps?
22 You just show one here.
23 MR. HALE: Yes this is for one unit, okay?
24 And then you will have a similar configuration. What
25 used to be -- this didn't used to be here and you had

1 these two pumps and they supplied both units, okay?
2 So now we have a unitized system, a motor-
3 driven and a turbine-driven, feeding this unit. We
4 have the same for the other unit and then we have
5 retained the old pumps that can be used for all the
6 normal --
7 DR. WALLIS: Of course the link between
8 units doesn't exist for the new pumps?
9 MR. HALE: No, the new pumps are dedicated
10 to -- they could be aligned that way if they had
11 manual, but --
12 DR. WALLIS: There is a pipe that goes
13 there?
14 MR. HALE: Yes.
15 DR. WALLIS: Oh, there is.
16 MR. HALE: But the intention is that you
17 have unitized AFW pumps for each unit, no more shared
18 system.
19 DR. BONACA: And you are going from one
20 pump to three pumps.
21 MR. HALE: We have -- we have added two
22 new pumps. Currently we have four pumps.
23 DR. BONACA: Yes. No, I understand.
24 MR. HALE: And we have added motor-driven
25 on each unit.

1 DR. BONACA: But you have retained the old
2 pumps too, so --
3 DR. BONACA: Yes, and the idea there is
4 one, they could be used as back-ups, certainly, and
5 they also will be used for all of our normal operating
6 needs, which is similar to some of our other sites,
7 where you take the normal operating duty off the
8 safety related pumps, and you can use the standby
9 pumps for start-up and shutdown.
10 MEMBER STETKAR: How do the start-up
11 shutdown pumps work? Do they come on before aux
12 feedwater, automatically or are they strictly manual?
13 MR. HALE: No, they will be -- they are
14 currently the safety related pumps, and now we are
15 removing all those auto-start features, they will be
16 just in standby for --
17 MEMBER STETKAR: So they are just strictly
18 manual start-ups --
19 MR. HALE: Right, right.
20 MEMBER STETKAR: Okay, thanks.
21 MR. HALE: I don't know if you want to see
22 anything additional to that, I know we have covered
23 quite a bit in terms of, you know, designs and that
24 sort of thing, but it is a major modification at the
25 site, a significant investment on our part, you know,

1 and we feel a significant improvement in safety.
2 DR. WALLIS: But it uses all the old
3 piping up to the feed drains and so on, and so the
4 concern that the staff raised and then didn't resolve
5 about water hammer doesn't really exist, does it?
6 MR. HALE: No.
7 DR. WALLIS: Because it's still the same -
8 -
9 MR. HALE: Right.
10 DR. WALLIS: the same connection --
11 MR. HALE: And you have got to realize
12 that all of this piping is all cold water piping, you
13 know it's all ambient temperature.
14 Any other questions?
15 CHAIRMAN BANERJEE: Yes, so there was a
16 question here which I am going to ask you. It says
17 that if this system is not safety-grade and key
18 parameters would not be part of the TSSR program, is
19 it being credited in any safety analysis?
20 MR. HALE: Which --
21 CHAIRMAN BANERJEE: I presume the aux feed
22 system.
23 MR. HALE: No, this is safety related.
24 CHAIRMAN BANERJEE: This is safety
25 related?

1 MR. HALE: It is safety related.
2 DR. WALLIS: The new stuff is safety
3 related.
4 MR. HALE: The old stuff will no longer be
5 safety related. It will be basically a standby, non-
6 tech specs --
7 CHAIRMAN BANERJEE: But it will not be --
8 yes -- it will not be credited in any safety analysis?
9 MR. HALE: No, it will be available for
10 use for PRA for example, as additional back-up but no,
11 the safety-related function will be handled by these
12 two pumps for one unit and the other two for the other
13 -
14 CHAIRMAN BANERJEE: Okay.
15 MEMBER STETKAR: Steve, you keep the SSG
16 pumps powered from safety buses?
17 MR. HALE: They can be, but they will no
18 longer be auto-loaded, okay?
19 MEMBER STETKAR: But I mean the wires are
20 connected to the safety bus?
21 MR. HALE: Yes, yes, the wires will be. We
22 are still maintaining the same connections.
23 MR. MILLEN: This is Mike Millen from
24 NextEra. I am the ops rep. We -- our emergency
25 procedures will still retain the capability using

1 those standby pumps in the manual mode, and they are
2 capable of being loaded on the emergency diesel
3 generators as well, manually.
4 MEMBER STETKAR: Thank you.
5 DR. WALLIS: And you can -- what happens
6 if you load them both on, does the bus take that?
7 MR. HALE: No, we would not do that.
8 DR. WALLIS: You can't load both pumps at
9 the same time?
10 MR. HALE: Right, right.
11 DR. WALLIS: Even by mistake, yes?
12 MR. HALE: Right. These will now be auto-
13 loaded and only by manual action would you actually
14 load the --
15 MEMBER STETKAR: I think what Graham was
16 asking is, can the two circuit breakers physically be
17 closed at the same time.
18 DR. WALLIS: That's right. If you did load
19 both pumps, would that overload something and trip
20 something? That's the idea, but -
21 MR. TOMASZEWSKI: This is Dan Tomaszewski.
22 The time of operation on receipt of a safety signal
23 the standby pump, which does safety trip, so that it
24 won't overload the buses.
25 DR. WALLIS: Okay.

1 MR. TOMASZEWSKI: So it has an automatic
2 trip on it.
3 MEMBER STETKAR: If that's the case what
4 do the operators need to do to actually load that pump
5 on the bus, if there is a safety signal.
6 MR. TOMASZEWSKI: The manual shift
7 override -- they have the ability to override that
8 automatic trip in emergency mode.
9 MEMBER STETKAR: Okay. Thank you.
10 MR. HALE: Any additional questions
11 associated with that?
12 CHAIRMAN BANERJEE: No, I think that's
13 fine.
14 MR. HALE: Okay.
15 CHAIRMAN BANERJEE: We were going to take
16 this at the end of the day but now we took it at the
17 beginning of the day, so that's just to give John a
18 hard time because he wants to look at the electricals
19 now, so.
20 MR. HALE: Okay.
21 CHAIRMAN BANERJEE: So perhaps the thing
22 to do would be to take a break if it's okay with you,
23 for 15 minutes, come back and then we will start with
24 electricals and then go on to the PSA.
25 DR. WALLIS: And we will get the copies of

1 these slides?

2 MR. HALE: Yes. Yes. I will make them

3 available.

4 CHAIRMAN BANERJEE: So thanks very much.

5 It was very useful and we did come off the worse we

6 have done later in the day, early on

7 but we will probably need to come back and revisit but

8 it will be much shorter.

9 MR. HALE: Okay.

10 CHAIRMAN BANERJEE: Thank you. We are

11 going to go off the record until 10 o'clock.

12 (Whereupon, the above-entitled matter went off

13 the record at 9:43 a.m. and back on the record at 9:58

14 a.m.)

15 CHAIRMAN BANERJEE: Back in session and we

16 turn it over to NextEra and you can take it from here.

17 MR. HALE: Okay.

18 CHAIRMAN BANERJEE: We have an additional

19 member today, John Stetkar, who I have dragged here

20 against his will, nevertheless please start.

21 MEMBER SIEBER: He's relatively --

22 MR. MEYER: Larry Meyer again from

23 NextEra. While we are waiting, I would like to

24 introduce Tim, Tim Lensmire if you could stand up

25 please. Tim is our electrical -- one of our electrical

1 engineers at the plant, and he has got an extremely
2 keen eye for detail.
3 We rely on him an awful lot and we think a
4 lot of Tim at the plant. So he is here today to answer
5 any -- some of the questions that you all come up
6 with. Thanks Tim.
7 CHAIRMAN BANERJEE: Great, thank you.
8 MR. HALE: Okay, starting on the
9 electrical area, the emergency diesel generators at
10 Point Beach, we essentially have four diesels for the
11 two units, however the electrical system is shared.
12 We have -- one diesel out of the four can
13 accommodate both accident loads on one unit and a loop
14 on the other unit, so it provides us quite a bit of
15 flexibility in terms of emergency power sources.
16 MEMBER SIEBER: What size are they?
17 MR. HALE: They are about -- the 2,000
18 hour rating is about 2850.
19 MEMBER SIEBER: Okay.
20 MR. HALE: Okay? We have looked at the
21 capacity of the EDGs relative to the changes we are
22 making for EPU and they are within the capability of
23 the EDGs. We did make some changes, as you have heard.
24 We put the motor-driven AFW pumps, the new ones, we
25 took the old ones off and put the new ones on.

1 But also, as part of AST, we also made
2 auto-loading of the control room ventilation system,
3 which previously had been a manual action. Those are
4 all positive changes in terms of response to
5 accidents, we think.
6 MEMBER SIEBER: The diesel output is 4160?
7 MR. HALE: Yes. Yes. It's 4160. We did
8 instal a time delay for the motor-driven AFW pump. We
9 did that specifically so that it started at a fixed
10 point in time, rather than being a random load,
11 because when you have to evaluate a random load, you
12 have to assume it starts at any point and the -- some
13 of our A-train diesels, the frequency response, we
14 wanted to ensure that we had an adequate frequency
15 response for the A-train EDGs.
16 MEMBER SIEBER: Is it sequenced on, on
17 your timer?
18 MR. HALE: Yes.
19 MEMBER SIEBER: Diesel timer --
20 MR. HALE: We basically had -- we don't
21 really have a sequence per se at Point Beach, it's
22 worked with time delays, time delay relays.
23 MEMBER SIEBER: I imagine that's difficult
24 to calibrate all that?
25 MR. HALE: I can -- Tim probably knows

1 more about that.

2 MR. LENSMIRE: Tim Lensmire from NextEra.

3 Actually they are all Agastat ETR timers.

4 MEMBER SIEBER: Okay.

5 MR. LENSMIRE: They have a pretty good --

6 they are electronic timers that have pretty good

7 accuracy, so they have been calibrated pretty well and

8 consistent throughout the outages for calibrating

9 those relays.

10 MEMBER SIEBER: Okay. They do have, like,

11 a microprocessor, a counter?

12 MR. LENSMIRE: I mean, these relays don't

13 have a microprocessor within them. They are not that

14 type of digital relay.

15 MEMBER SIEBER: They are not digital?

16 MR. LENSMIRE: Well, they are Agastat ETR

17 timers, but they are not digital in that regard of

18 having software microprocessors in them, no.

19 MEMBER SIEBER: Okay.

20 MR. HALE: We did, as part of the EPU and

21 AST project, looked at the loads on the diesel and

22 removed some of the loads that were not critical to

23 operation of the diesels, to improve the margins, so

24 that we could accommodate the changes we were making,

25 and we were able to do that and show that we still

1 stayed within the 2,000 hour rating of the EDGs.

2 And although we didn't have a tech spec

3 originally at Point Beach to preform the 24-hour

4 endurance test, we have agreed and have issued changes

5 to the tech specs to incorporate that, and in fact I

6 believe we have already tested all of the diesels at

7 the new load ratings and under the new tech specs to

8 prepare for the uprate this spring.

9 So we have actually tested the diesels to

10 the new conditions. Next slide.

11 We did instal main generator output

12 breakers. This helps us under certain conditions with

13 regards to degraded voltage. The 4160 volt

14 distribution system, we did confirm that we stayed

15 within the design ratings of the equipment.

16 We did modify our loss voltage time delay

17 relays. We increased the time delay slightly, which

18 helps us through certain grid transients, so that we

19 don't lose certain equipment.

20 Both in the 48 volt and the 120 volt AC,

21 and 125 volt DC, we were able to demonstrate that the

22 equipment stayed within its existing capabilities.

23 MEMBER STETKAR: Steve, you have changed

24 some loads around, at least on 40 -- are the EFW pumps

25 fed from 4160 or --

1 MR. HALE: The new ones are now fed from
2 4160 and the old ones were fed by 40 volts.
3 MEMBER STETKAR: Forty.
4 MR. HALE: Okay.
5 MEMBER STETKAR: So you've added at least
6 those loads to 4160.
7 MR. HALE: Yes.
8 MEMBER STETKAR: Have you added or changed
9 the loads down below the 40 volt -- the 40 volts and
10 below for any of the EPU mods?
11 MR. LENSMIRE: This is Tim Lensmire from
12 NextEra. On the 480 volt distribution system there was
13 some relatively minor changes. They only added a
14 couple of kW on the safety related buses.
15 But it's been relatively minor. Most of
16 has been just replacement for like for like motors to
17 improve -- like for AST, we had to do -- replace a
18 motor to make it EQ-qualified, so it was a 75
19 horsepower with a 75.
20 There was one other change for AST,
21 changing the 50 horsepower motor to a 75 horsepower
22 motor, but the break horsepower, the fans stayed the
23 same. But it was running in its service factors so
24 they just changed the motor primarily just so it
25 wasn't running in a service factor and it was running

1 in its normal break horsepower.

2 Other than that all the changes on the 40

3 volt 120 and 125 were relatively minor in nature and

4 it wasn't significant. They were mostly minor changes.

5 The biggest change on 125 was all the

6 stuff we added for the new AFW system. But still, that

7 wasn't a significant load on the battery. There was

8 just really some relays and some lights and stuff in

9 the breaker schematics.

10 But it wasn't really significant. It was

11 minor in nature.

12 MEMBER STETKAR: The reason I ask is I was

13 trying to get a feel for what the basic loading might

14 have changed -- the third sub-bullet under the 4160

15 says that you have revised protective relay settings

16 for coordination.

17 I was curious whether you had done that in

18 an integrated fashion all the way down at voltage

19 levels below 4160, or whether that needed to do that.

20 Because you know, if you have changed loading, if you

21 don't have the right breaker -- breaker fuse

22 coordination depending on how low you get, you can

23 leave yourself vulnerable to problems.

24 MR. LENSMIRE: Again, Tim Lensmire from

25 NextEra. We did review all -- when we made some

1 changes, most of the changes were on the non-safety
2 related side of the system, so there was more changes
3 on the non-safety side where we did have to make some
4 protective devices like the main feed pumps condensate
5 pumps, which are 4 kV.
6 We are adding a new 40 volt MCC but it's
7 on the non-safety side. We did look at the protective
8 devices on the safety related side, but for the most
9 part, they were of a minor change.
10 AST is making one MTC which isn't part of
11 the EPU but it is AST -- they are making some safety
12 related setpoint changes for coordination.
13 They are putting in a new 175 amp breaker
14 and they needed to increase the supply breaker to the
15 MCC to ensure that coordination was maintained.
16 MEMBER STETKAR: Okay, so you have looked
17 at it if I understand what you are saying, at least on
18 the safety related side of the plant, but have you
19 done similar things on the non-safety related? I don't
20 know what the electrical system -- I have to -- Sanjoy
21 has recruited me for this meeting and I have
22 unfortunately not been able to do the amount of
23 homework that I would rather like to do but --
24 MR. LENSMIRE: We did the same nature on
25 the non-safety related side and it is consistent with

1 our current design on the non-safety, so what ever
2 changes we made for EPU, it was consistent with what
3 our current design was on the non-safety, so we just
4 maintained it and we made setpoint changes accordingly
5 if it was necessary, based on the -- the mod that was
6 being implemented.
7 MEMBER STETKAR: Okay. Thanks.
8 MR. HALE: Any more questions on this one?
9 All right Harv, do you want to to the next one? With
10 regards to environmental qualification, we did
11 evaluate the impact of the EPU with regards to EQ of
12 electrical equipment.
13 There were several components that we
14 ended up replacing, not necessarily because the EQ
15 conditions changed, because we were changing the
16 equipment and it was EQ equipment.
17 But there were basically four types of
18 components that we were replacing relative to EQ, and
19 -- but all in all we are qualified for the EPU
20 conditions that we identified, both from the outside
21 containment and the inside containment.
22 Now I don't know if this would be a good
23 time, but I could show you the pressure temperature
24 curves for LOCA so you could see the -- you know the
25 actual pressure temperature of LOCA and the actual EQ,

1 but it may solve that one action item where you were
2 looking for those curves.
3 CHAIRMAN BANERJEE: Is this a good time
4 for you, or will it interrupt the --
5 MR. HALE: We can pull it right up. It's
6 in our backup slides, okay?
7 CHAIRMAN BANERJEE: But have you finished
8 with the electrical part?
9 MR. HALE: Well --
10 MEMBER SIEBER: I had a question on this.
11 MR. HALE: Okay. All right.
12 MEMBER SIEBER: The pressure temperature
13 is probably not a big factor in EQ here, and -- but
14 radiation does, maybe.
15 MR. HALE: Exactly.
16 MEMBER SIEBER: And you say that you have
17 requalified, already installed and qualified
18 equipment. How did you do that?
19 MR. HALE: What we were able to confirm
20 for the equipment in most cases, that it was already
21 qualified for the conditions, even radiation.
22 MEMBER SIEBER: But not all cases, right?
23 MR. HALE: But not all cases. We had four
24 cases. Two, it was because we were replacing -- a good
25 example is the main steam transmitters: because our

1 flows were going up, we had to replace our
2 transmitters, so okay.
3 MEMBER SIEBER: Got that.
4 MR. HALE: Right.
5 MEMBER SIEBER: That's not really an EQ
6 thing.
7 MR. HALE: The only ones we had to replace
8 based on actual changed EQ conditions were the
9 instrument cables for steam line pressure
10 transmitters, and this was because of our HELB
11 analysis identified a higher temperature in one of the
12 rooms, and so we ended up replacing some of that cable
13 because of that higher temperature.
14 MEMBER SIEBER: Okay, but all the
15 radiation dose parameters were enveloped by the
16 original --
17 MR. HALE: Existing testing and existing
18 qualification, that's correct.
19 MEMBER SIEBER: Thank you.
20 CHAIRMAN BANERJEE: I think we should
21 continue with the program as we have got it, which is
22 --
23 MR. HALE: And we can come back to the
24 curves.
25 CHAIRMAN BANERJEE: Come back to that

1 later.

2 MR. HALE: Okay.

3 CHAIRMAN BANERJEE: Let's go on.

4 MR. HALE: All right.

5 CHAIRMAN BANERJEE: You have one more

6 slide?

7 MR. HALE: Yes.

8 CHAIRMAN BANERJEE: That's correct, okay.

9 MR. HALE: The last slide has to do with

10 interface with the transmission system operator. I can

11 tell you from the onset we have had a hard interface

12 with ATC, quite a bit of interchange between both of

13 us.

14 They did present changes identified that

15 were required for the uprate and then they also

16 identified some changes longer term which are really

17 related to system improvements down the line.

18 CHAIRMAN BANERJEE: Yes, I imagine that

19 your system has changed. How often do they run

20 stability calculations, because system operators and

21 system conditions change pretty frequently.

22 MR. LENSMIRE: This is Tim Lensmire from

23 NextEra. We have an interface agreement with our

24 transmission operator ATC, and what that entails, they

25 run it every five years, or if there is a significant

1 change to the transmission system that impacts
2 NextEra.
3 MEMBER SIEBER: They're under load.
4 MR. LENSMIRE: Correct, if something
5 changes significantly, they will run it immediately
6 for the change, part of the interconnection process.
7 If nothing has changed, they rerun it anyways every
8 five years, just to confirm that any minor changes
9 haven't changed anything.
10 MEMBER SIEBER: That usually takes them
11 just overnight to do that, right? If they keep it up -
12 - the input up to date? So you could actually ask for
13 a stability calculation and get a response in a day or
14 --
15 MR. TOMASZEWSKI: I think you are more
16 referring there to the real time. The actual update
17 Tim is talking about is now an overnight thing. It
18 takes them some period of time and -- because they
19 update all their models to -- but they do have a real-
20 time stability calculation that they are constantly
21 running and talking to us -- you know, especially as
22 you take equipment in and out of service on the grid.
23 MEMBER SIEBER: A unit comes off line or -
24 -
25 MR. TOMASZEWSKI: A unit or a line, more

1 rated by lines.

2 MEMBER SIEBER: You could go a weekend

3 with a very low load -

4 MR. TOMASZEWSKI: Yes.

5 MEMBER SIEBER: And the power factor goes

6 to --

7 MR. TOMASZEWSKI: Yes.

8 MEMBER SIEBER: Okay. Thank you.

9 CHAIRMAN BANERJEE: So I think what we

10 will do is we will stay with the program and we will

11 go -- the agenda and now hear from the staff before

12 the break.

13 MR. HALE: That's correct.

14 CHAIRMAN BANERJEE: Then we will come back

15 with the PSA -

16 MR. HALE: Right.

17 CHAIRMAN BANERJEE: Where you come back and

18 then the human performance and so on. If the staff is

19 ready on this one --

20 MR. BELTZ: Yes.

21 MR. HALE: All right, thank you.

22 CHAIRMAN BANERJEE: Thank you very much.

23 MR. MCCONNELL: Good morning. My name is

24 Matthew McConnell. I am a senior electrical engineer

25 in the electrical engineering branch in NRR, and I was

1 the principle reviewer of the EPU, but due to the
2 extensive nature of the Point Beach modifications,
3 obviously I think everyone in our branch had something
4 to do with the input and not the various reviews.
5 This is Singh Matharu.
6 MR. MATHARU: I am also an electrical
7 engineer in the electrical design engineering branch.
8 MR. MCCONNELL: And he basically is going
9 to be supporting me if something is outside of my
10 purview here. If I can go to the next slide please.
11 Just carrying on from what the applicant, the licensee
12 had just stated, we reviewed their modifications and
13 their proposal based on consistency and conformance
14 with the requirements 10 CFR 50.49 for environmental
15 qualification, with the requirement of the station
16 blackout rule, 10 CFR 50.63 and also their general
17 design requirement which is actually the Point Beach
18 specific general design criterion 39, but we typically
19 extend that to review against GDC-17 because there's
20 definitely some similarities.
21 Going on to the next slide please. We
22 performed a very detailed and thorough review with our
23 environmental qualification of equipment to ensure
24 that the requirements that were established pre-EPU
25 and post-EPU were remaining bounding.

1 This included both temperature, pressure,
2 humidity, radiation and the licensee did a very
3 thorough job of providing us the information in
4 comparable form, both in temperature pressure charts
5 as well as detailed graphs to show us that things will
6 remain bounded during EPU conditions.
7 And we asked a significant amount of
8 questions, including the modifications they made and
9 some of the changes they had to make to ensure
10 continued compliance, and we were satisfied with the
11 information they provided us.
12 The other significant aspect for our
13 review was with the loading on the safety equipment
14 and that's another thing, that we performed a very
15 detailed review to ensure that any modifications,
16 whether they are new modifications or existing
17 equipment, safety, non-safety, that everything was
18 remaining bounding within the equipment ratings.
19 One of the key focuses was on the diesel
20 generator to ensure that the loading requirements,
21 whether automatic or manual, would be held in check. I
22 think that if you look at the, I think, since you had
23 already discussed about the AFW, there is a proposed
24 license condition to ensure that they maintained their
25 limits within the 2,000 hour rating of the diesel

1 generator, and that was something that the staff
2 considered significant and a good cause.
3 The third bullet is essentially just going
4 over the grid stability study which was also another
5 key aspect. We wanted to ensure that any uprates in
6 power to any nuclear power plant, let alone Point
7 Beach, does not impact the stability of the grid in a
8 local area.
9 And we did a very thorough review of thy
10 grid stability study provided by the licensee, which
11 was performed by ATC, their transmission coordinator,
12 and we basically -- everything was evaluated very well
13 and within the limits bounding for the generator
14 requirements so we were satisfied with that. Next
15 slide please.
16 And just to conclude here, the electrical
17 engineering staff found the following areas acceptable
18 for operation at uprated conditions.
19 The environmental qualification met the 10
20 CFR 50.49 requirements. The offsite power systems,
21 onsite power systems and station blackout all
22 maintained within their respective requirements, so --
23 MEMBER STETKAR: Did you look at -- they
24 installed a generator breaker. You look at the breaker
25 characteristics? I know it's not safety but it's --

1 MR. MCCONNELL: Well we --

2 MEMBER STETKAR: it's got to operate on

3 every plant trip, so --

4 MR. MCCONNELL: Absolutely, we look at the

5 different design characteristics that they had

6 provided us, and whether it's their coordination

7 schemes or whatever, and everything, especially with

8 the ATC study had shown that that was a demonstrated

9 capable performance function.

10 And that's actually all we have --

11 DR. BONACA: I have a question which is

12 not specific to the electrical, but I will field it

13 anyway. This plant went to license renewal, right?

14 MR. MCCONNELL: Yes.

15 DR. BONACA: So you have a lot of

16 commitments for license renewal that you have made,

17 and have you evaluated the impact of power uprate on

18 those commitments?

19 MR. MCCONNELL: Yes, the short answer to

20 your question is yes. We actually looked, as part of

21 our EPU review, every EPU review we do, we are

22 required, if they have submitted license renewal, that

23 we evaluate against the changes in license renewal in

24 EPU conditions.

25 DR. BONACA: For example I was wondering,

1 you know, FSE is impacted both by license renewal as
2 well as power uprate. Are there any synergies there
3 that you have to pay attention to or --
4 MR. MCCONNELL: I am not sure of the
5 specific synergies or of any specific synergies. We
6 just look at the overall picture of what was assumed
7 or what was reviewed against in the license renewal
8 and see what the applicability is for EPU conditions.
9 And it can be plant -- for plant-specific.
10 I haven't really come across anything that is really
11 routine or typical in nature.
12 DR. BONACA: Okay.
13 CHAIRMAN BANERJEE: Okay. Anything else,
14 Mario, for a follow-up?
15 DR. BONACA: No. But I think it's an issue
16 we have raised before as a possibility and I think in
17 this case, I think we should keep it in mind as we
18 complete our review, about any specific areas where
19 there should be some notice and again, I mentioned the
20 flux in the rate of corrosion because both actions
21 will affect that.
22 CHAIRMAN BANERJEE: Well thank you. Is
23 there something you want to say?
24 MR. HALE: Yes, this is Steve Hale,
25 NextEra. Dr. Bonaca, we did -- are required as part of

1 our EPU process and evaluation, for each system and
2 each component, to address the impact on license
3 renewal, and I think if you look at our LAR you will
4 see in each specific question where we have addressed
5 not only the EPU impact, but also the impact of the
6 EPU on license renewal.
7 So we took a fairly detailed review of
8 that to ensure there were no issues associated with
9 extended period in conjunction with EPU.
10 CHAIRMAN BANERJEE: Thank you very much --
11 MR. MCCONNELL: Thank you.
12 CHAIRMAN BANERJEE: for that presentation.
13 We would now move on to the PSA and back to NextEra.
14 MR. JULKA: We can get started I guess.
15 Good morning first of all, and my name is Anil Julka.
16 I am the manager of PSA, also known as PRA or RRAG in
17 our company, for NextEra.
18 I think he is trying to find the card for
19 -- so I am out of Juno Beach, also support Point Beach
20 PRA work we do up there.
21 I think that's the last slide.
22 MR. HALE: Oh, is it? Sorry about that.
23 MEMBER STETKAR: Before you start, I --
24 again I have to apologize because I didn't get a
25 chance to do any homework. Could I ask you a couple of

1 just basic questions about the plant --

2 MR. JULKA: Sure.

3 MEMBER STETKAR: so I don't ask stupid

4 questions later. Is recirculation switchover at Point

5 Beach, post-LOCA circulation recirculation switchover,

6 is that manual or is it automatic?

7 MR. HALE: Hi, this is Steve Hale, this is

8 -- it is a manual action, for high pressure.

9 MEMBER STETKAR: If you get -- low

10 pressure switchover is also manual --

11 MR. HALE: Yes, okay.

12 MEMBER STETKAR: and any recirc

13 switchover. And for a -- what's the maximum allowed

14 cooldown rate on the secondary side, for example for a

15 steam generator tube rupture. That's an operational

16 question.

17 I could guess but I'm just --

18 MR. MILLEN: This is Mike Millen.

19 Operations, NextEra. The cooldown -- our normal limit

20 is our tech spec cooldown rate of 100 degrees per

21 hour. But in a cooldown, in a steam generator tube

22 rupture scenario, we are allowed to exceed that

23 cooldown rate for a short period of time.

24 MEMBER STETKAR: Okay, the normal is 100

25 but you have typical Westinghouse curves.

1 MR. MILLEN: That's correct.

2 MEMBER STETKAR: Okay.

3 MR. JULKA: Thank you. Okay, on a DSS
4 base, what we did was we updated all the full power
5 internal events model for Point Beach without the
6 modifications we have done. We changed out some of the
7 accident sequences.

8 As you have seen some of the mods, which
9 Larry mentioned yesterday and even today, we went over
10 electrical mods for the aux feedwater, service water
11 instrument, air, all those mods were incorporated.

12 And from the HRA perspective, we also
13 changed out the EPU-related times changes, which are
14 good.

15 MEMBER STETKAR: Anil, what type of HRA
16 model do you use?

17 MR. JULKA: We use the EPRI.

18 MEMBER STETKAR: Okay, but EPRI is a --

19 MR. JULKA: We use the CBDTM.

20 MEMBER STETKAR: CBDT is a logic stress.
21 How do you quantify the --

22 MR. JULKA: Timings?

23 MEMBER STETKAR: timing factors?

24 MR. JULKA: Yes, timing is also included
25 in there now, because it's a time to diagnose and

1 execute --

2 MEMBER STETKAR: Do you use HCR, do you

3 use ASEP or the curve -- time reliability curve?

4 MR. JULKA: It's a curve.

5 MEMBER STETKAR: It's a THERP time

6 reliability curves?

7 MR. JULKA: That's correct.

8 MEMBER STETKAR: Okay. Thank you.

9 MR. JULKA: So we changed those. External

10 events, we mostly did that very qualitatively. For

11 shutdown risk, we do not have a shutdown risk model

12 for Point Beach. We use the NUMARK 9106 criteria so

13 that criteria will be used accordingly for that, again

14 going forward.

15 Like I said, we did -- next slide, okay,

16 that's fine -- plant modifications were incorporated.

17 I think some of the risk reduction which came from the

18 aux feedwater, like we talked about it, aux feedwater

19 is now going to be unitized. It's going to be on 4160

20 and it's -- for each, for each unit so we don't get

21 the same penalty we used before.

22 Auto switchover for AFW suction. That

23 gives us a big benefit in the PRA space. And also we

24 not have manual alignment for the shared motor-driven-

25 pumps.

1 And I think the biggest change in the aux
2 feedwater system really came from that valve we talked
3 about, which is the recirc valve. You don't have to
4 gag open anymore. We have -- we are going to provide
5 instrument air for that, especially, you know, it's
6 going to have a tank in itself.
7 We also have, instead, you know, we have
8 four compressors. One of them is going to be self-
9 cooled now, so it is not going to rely on service
10 water anymore.
11 We had a tremendous dependency on service
12 water before because it cools the feedwater, it cools
13 the condensate.
14 So that -- just the changes to the aux
15 feedwater, changes to the instrument air, changes to
16 the service -- not relying on service water anymore, I
17 think those dependency removals have given us a
18 tremendous benefit as far as the risk is concerned,
19 and thereby improving the safety.
20 And that is consistent with the theme what
21 Larry talked about yesterday, you know, we are
22 continuously looking at, this was an opportunity for
23 us, EPU was a great opportunity to look at where else
24 we could do things to improve safety.
25 Some other things have to be done for EPU,

1 but at the same time, we took this opportunity to look
2 at things where we could improve the safety of the
3 plant and reduce the overall risk.
4 And then we had the feedwater - last one
5 is the procedure change to improve reliability of RCS
6 depressurization. Again, we were rely -- instrument
7 air isolates to the containment on an SI signal, and
8 what we are doing here is -- there's an aux spray
9 valve which can open at 250 psi differential, and we
10 can use the charging pumps for that.
11 And that procedure change was made. It
12 used to be in Appendix R procedure only. What we did
13 was put it in AOP's procedure, so this is an alternate
14 way of depressurizing, which gives us tremendous
15 benefit in the LERF area, not that much in the CDF,
16 but in LERF area it gives us a tremendous benefit.
17 MEMBER STETKAR: Are the charging pumps
18 safety-reltaed pumps, on this --
19 MR. HALE: No.
20 MEMBER STETKAR: They're going to be
21 loaded on safety buses?
22 MR. HALE: Yes.
23 MEMBER STETKAR: Can a containment
24 isolation for a charging line close automatically on
25 an SI signal, or you know, S or P or whatever you guys

1 call it?

2 MR. HALE: No.

3 MEMBER STETKAR: It doesn't, okay.

4 MR. JULKA: So the relative impact of all

5 these changes we have made, this is really a good

6 story for us because we have made changes to improve

7 safety. You see the EPU numbers and the EPU impact,

8 and most of the EPU impact by the way came from human

9 reliability action, you know some of the timings

10 changed.

11 A lot of the accident analysis did not

12 really show that much changes, but the changes we

13 really came in, the reduced timing for feed and bleed

14 for RCS LOCA, you know the timing changed, the

15 timing, what that did was that put additional stress

16 factor for us as far as HRA is concerned.

17 So that is where I think most of the

18 increase, which came from there. Now what we did was

19 we did not change any methodology, for whatever the

20 stress factors were used before, if that made us go

21 from medium to high, for a reduced time we went from

22 medium to high.

23 We didn't want to change the methodology

24 so we used the same methodology, what we used before,

25 going into this one so it shows a relative increase

1 which is true, based on the same methodology. As
2 moving forward, we could improve that methodology
3 using the new tools we have available now.
4 MEMBER STETKAR: Anil, I guess I am a
5 little confused. The reason I asked about which human
6 reliability model you were using, whether it was HCR
7 or THERP, was to understand whether you were using an
8 actual time reliability correlation.
9 But from what you just said, sounds like
10 you are just using a discreet weighting factor as a
11 function of time rather than an actual time
12 reliability correlation. Could you explain what you
13 are actually using?
14 MR. JULKA: Yes. Could you explain that? I
15 have the guy who did that at --
16 MEMBER STETKAR: Because the sensitivity
17 to time is much different whether you are using a
18 continuous function, an actual time reliability versus
19 discreet rubbles of trigger.
20 MR. DRAMEL: This is Ray Dramel and we use
21 the EPRI cause-based decision tree methodology and
22 timing does not explicitly come into play in the
23 cognitive part of that.
24 Where it does come into play is if there
25 is one more action, more than one step in the action

1 you are taking, you can credit recovery between those
2 two.
3 The less time available, the higher the
4 dependency is between those two steps, so with a
5 decrease in timing, the dependency level increased
6 between those so it's an indirect effect of timing and
7 with the decrease we saw in the basis for the events,
8 some of the actions, the dependency level went up
9 quite high.
10 And so we did not use the HCR, which is a
11 time-based correlation where the more time you would
12 have, you would expect to see higher reliability.
13 We didn't change methodologies. If we were
14 going to use that, we would have to go back and change
15 the base line to get it an accurate comparison.
16 MEMBER STETKAR: Right. Right. Okay.
17 Thanks, I just wanted to make sure I understood which
18 of the methods you were actually using.
19 DR. BONACA: You mentioned bleed and feed,
20 are the valves called qualified for bleed and feed?
21 MR. JULKA: Yes.
22 DR. BONACA: So you qualify them.
23 MR. JULKA: Yes.
24 MEMBER STETKAR: What, just out of
25 curiosity, is the difference in the steam generator

1 dry-out time pre-EPU versus post-EPU, or rather, if it
2 is not complete dry-out, whatever criteria the
3 operators use to initiated bleed and feed.
4 A lot of times it's not dry, it's you
5 know, out of indication on the wide range level or
6 something like that.
7 MR. MILLEN: This is Mike Millen from ops,
8 NextEra. The criteria has not changed. We used
9 criteria 55 inches wide range in both steam generators
10 for indication of dry-out.
11 There is a decrease in the time. It dries
12 out much quicker from what we have seen and what we
13 modeled it on the simulator, but it does not change
14 the operator response times or strategies or ability
15 to mitigate.
16 MEMBER STETKAR: I understand that. I was
17 asking for what the difference in the actual time is.
18 MR. DRAMEL: This is Ray Dramel from
19 Maracor. We redid the thermal hydraulic analyses that
20 were used to support the baseline, and pre-EPU, we
21 modeled feed and bleed as being initiated at 56
22 minutes. Post-EPU we reached the same criteria at 35
23 minutes.
24 MEMBER STETKAR: Fifty-six and 35. Thank
25 you.

1 MR. JULKA: Can we go onto the next slide
2 please. This is the corresponding impact on LERF,
3 which is consistent with the -- again, if you see the
4 LERF numbers are the same for both units. We saw a
5 little difference.
6 There's some asymmetry in the CDF side but
7 there is no -- from a LERF standpoint the numbers are
8 the same.
9 This was, again, mainly due to that
10 alternate way of depressurizing the --
11 MEMBER STETKAR: What is driving your
12 LERF? What fraction of the LERF is contributed by
13 steam generator tube rupture at Point Beach?
14 MR. JULKA: Total -- do you know the exact
15 number?
16 MR. DRAMEL: Yes. Pre-EPU, random tube
17 ruptures initiating event was a little over 50
18 percent. Post-EPS that was about 13 percent. The rest
19 of the --
20 MEMBER SIEBER: Because of the valves?
21 MR. DRAMEL: Because of the -- and that
22 was because of the inability to depressurize because
23 containment air isolates on an SI signal. Post-EPU a
24 big portion of the LERF is induced steam generator
25 tube rupture.

1 And that was in the base model, and we
2 carried that forward to this model.
3 MEMBER STETKAR: So the reduction in the -
4 - again, you have to please tolerate -- because I
5 didn't do enough homework. The reduction in the steam
6 generator tube rupture for post-EPU is due primarily
7 to better reliability of the primary depressurization
8 capability. Is that what you are saying?
9 MR. DRAMEL: Yes.
10 MEMBER STETKAR: Okay.
11 MR. DRAMEL: Yes.
12 MEMBER STETKAR: Okay.
13 MEMBER SIEBER: Let me ask about this
14 graph in the chart and the one before. It almost
15 implies that you decide you had a historic core damage
16 frequency in LERF and you decide to do the upgrade, so
17 we need these many physical changes to the plant.
18 Somebody asked the question, at that point
19 do you have increased core damage frequency made it
20 more probably and the LERF, and so we thought to work
21 on human factors, additional controls, safeguards and
22 so forth, or is the center set of bars there
23 artificial in that you have made all the design
24 changes and then after the fact, calculated where you
25 ended up in PSA space?

1 MR. DRAMEL: The center set of bars
2 reflects the minimum set of design changes that would
3 have been needed for the EPU, the new aux feedwater
4 pumps, changes in the support systems, and it's
5 somewhat of a high artificial increase because there
6 are some conservatisms in how the human error
7 probabilities were calculated.
8 But when we looked at those we said that
9 we knew there would be an increase in the human error
10 probability just due to the decrease in timing
11 available.
12 MEMBER SIEBER: Right.
13 MR. DRAMEL: Rather than go back and try
14 to take some of those conservatisms out, because you
15 would have to take them out of both the post-EPU and
16 the pre-EPU to get the good comparison, because the
17 acceptance criteria is a change in risk.
18 The plant looked at this and said we can
19 make the plant safer by obviating the need for any --
20 for the significant operator actions by making some
21 plant changes and they went ahead and changed the
22 plant to eliminate those needs.
23 So yes, the second --
24 MEMBER SIEBER: It's sort of artificial.
25 MR. DRAMEL: It's sort of artificial, but

1 they made it go away with --

2 MEMBER STETKAR: I kind of ignored the

3 center ones.

4 MR. HALE: If I could though, we did do

5 some modifications that were specifically for

6 reduction of CDF and LERF. The self-cooled air

7 compressor had no relation to EPU, had no relation to

8 --

9 MEMBER SIEBER: It's something you did.

10 MR. HALE: It's something we did. We went

11 into this with the idea of doing some things to

12 improve our overall CDF --

13 MEMBER SIEBER: Well, I took that as now

14 is a nice time to do it. We'll put it in this package

15 and that may be accounting department driven.

16 MR. JULKA: Yes, we took this opportunity

17 to really see where we could improve, and there were

18 certain mods done for because we had to do them, and

19 others were done to really improve the CDF.

20 MEMBER SIEBER: I could picture, for

21 example, with operators, at least my operators, if you

22 made a big change to the plant like this, they would

23 say, boy, I've got more to do and shorter time to do

24 it, and can you fix this, can you fix that, without

25 even looking at the PRA.

1 And I suspect that particularly with an
2 experienced staff, that's sort of the way that things
3 likely happened.
4 DR. WALLIS: Could you give an example of
5 the biggest timing changes.
6 MEMBER SIEBER: I could ask the operations
7 manager there if that's correct.
8 DR. WALLIS: Could you give an example of
9 the biggest timing changes the operators face here?
10 MR. JULKA: The one we talked about is the
11 feed and bleed timing --
12 DR. WALLIS: That's the biggest one?
13 MR. JULKA: Yes. Those are the two biggest
14 changes we had, the time to initiate feed and bleed
15 and the time to core damage.
16 DR. WALLIS: Okay.
17 MR. JULKA: Those were the two biggest
18 areas which impacted the --
19 MR. MILLEN: Yes, and this is Mike Millen
20 from NextEra operations. Yes, ops was heavily involved
21 in decisions on the modifications and -
22 MEMBER SIEBER: You had, what, five
23 operators assigned to this?
24 MR. MILLEN: Actually I will get into that
25 in a little bit but we currently have 10 SROs or

1 previous Point Beach SROs involved, gradually
2 increased over the last two years.
3 MEMBER SIEBER: To me that's a good point.
4 Okay, thank you.
5 MR. JULKA: Next slide. So overall, the
6 EPU is not a risk-based LAR submittal, but we did take
7 the opportunity. We wanted to be risk neutral or
8 better than risk coming out of the EPU.
9 We have managed to make the mods and the
10 changes we have made to the -- reducing the operator
11 burdens. We have managed to reduce the CDF and also
12 the LERF. We have reduced our dependence on service
13 water. Service water contributed to our almost, over
14 30 percent of CDF before and now it doesn't show up
15 and after EPU, it will not show up in the top 10
16 rankings.
17 Improved aux feedwater design. We already
18 talked about it and also the instrument air. So those
19 are the main things with the elimination of several of
20 the risk-significant operator actions. We already
21 talked about three of them, the switchover, the mini-
22 recirc valves, don't have to gag them anymore, and
23 restoring air to the containment.
24 So those three things have given us a
25 tremendous benefit. So overall, I feel pretty good. We

1 are going to continue to improve the model as we go
2 forward, because I think as you heard from Ray, there
3 are some conservatisms in there.
4 For this exercise we didn't want to change
5 that. We wanted the delta from what is there to what
6 the EPU is going to do so we can have a good
7 comparison between the two.
8 MEMBER SHACK: In your initial application
9 you were going to look at the spray valve by putting a
10 back-up compressed air supply in it. You changed that
11 to an operator action.
12 MR. JULKA: That's right, because we found
13 out that the valve was capable of operating with a 250
14 psiv. We didn't really need the modifications so we
15 changed our response later on.
16 MEMBER SHACK: Also, there still would
17 have had to have been an operator action to initiate
18 it, and it was actually the auxiliary spray valve, so
19 the operators would have had to initiate auxiliary
20 spray. The modification was to put an air bottle on
21 there, but even if it was there, you don't need it
22 anyway, you just start the charging pumps and the
23 valve ill open.
24 So it's not that we replaced it with an
25 operator action. The operator action would have been

1 there anyway.

2 MEMBER SHACK: Same operator --

3 MR. DRAMEL: Same operator action.

4 MR. JULKA: That's the end of my

5 presentation unless you have any other questions for

6 us.

7 CHAIRMAN BANERJEE: Anybody? John? Jack?

8 MEMBER SIEBER: None.

9 CHAIRMAN BANERJEE: Any questions? John?

10 Mario, any questions? Well then thanks very much and

11 we'll go onto the next part of the agenda which is

12 human performance, which is still in your hands.

13 Thank you. The slides are not all in

14 order, right? This is just an IQ test for us to find

15 the --

16 MEMBER SIEBER: That's what church is for.

17 CHAIRMAN BANERJEE: Oh, we need to just

18 give the transcriber a brief break. We can chat.

19 (Whereupon the above-entitled matter went off

20 the record at 10:44 a.m. and back on the record at

21 10:55 a.m.)

22 CHAIRMAN BANERJEE: We are back on the

23 record now and we are going to start with the human

24 factors, right? Human performance, whatever it is

25 called now. All right. We are back. Thank you.

1 MR. MILLEN: Good morning. My name is Mike
2 Millen. I am the operations lead for the EPU project
3 at Point Beach, NextEra. I am a licensed senior
4 reactor operator at Point Beach and before being
5 assigned to the project I was an assistant operations
6 manager.
7 To start out I will discuss operations
8 involvement in the project. As far as resources I was
9 assigned full-time to the project in 2008, was then
10 mentioned earlier, we have currently increased the
11 support. Until now we have 10 senior reactor operators
12 or previously-licensed Point Beach senior reactor
13 operators supporting the project.
14 We also have some reactor operators and
15 plant auxiliary operators supporting primarily in the
16 area of procedure revisions and reviews.
17 Our operations support has provided input
18 into the modifications on review and approval of all
19 the modifications, reviewing the licensing submittals,
20 development of the post-modification and power
21 ascension testing plans, work order and tagout reviews
22 for the work during both online and outage periods,
23 procedure revisions and validations of the procedures
24 in the simulator which I will talk about in a little
25 bit here, and along with system engineers, performing

1 margin reviews.

2 In the area of human factors, we have
3 followed our design guidelines for optimization and
4 human factors for our new controls in the control
5 room.

6 Primary changes in the control room or
7 design changes were due to the addition of the new aux
8 feedwater pump controls and the addition of the main
9 feed isolation valve control switch and indications on
10 the control boards.

11 There also have been some meter scaling
12 changes based on a new steam flows and feed flows and
13 pump currents related to the new condensate and feed
14 pumps.

15 The most significant improvement in human
16 factors for operations in the control room is that the
17 new motor-driven aux feed pump controls are located on
18 the secondary control panel, where the steam generator
19 level indicators are, which is near where our existing
20 turbine-driven ops feedwater pump controls are.

21 Our existing 480 volt motor-driven
22 auxiliary feedwater pumps that are shared between the
23 two units are located on a separate, shared safeguards
24 equipment control panel, with no steam generator level
25 indicators for either unit on it, which requires

1 operators to communicate and coordinate to perform,
2 control the steam generator level.
3 The other item, I believe was mentioned
4 earlier, we had been involved in all the modification
5 reviews and have incorporated design changes based on
6 some ops input.
7 Some of these do also include equipment
8 locations in the plant, things like valves, drains,
9 vents for the new equipment for ease, not just for
10 operations, but maintenance purposes.
11 Next slide please. In the area of
12 implementation, senior operations personnel are
13 assigned as start-up test directors and the test
14 organization is reporting to the start-up test
15 directors.
16 The senior ops personnel are ex-assistant
17 ops managers such as myself or senior shift managers.
18 The start-up test director will work as --
19 interfaces and works with the on-shift shift manager,
20 the operating crew, the operations relief crew and the
21 test organization to perform the post-mod and power
22 ascension testing.
23 And I will be covering that in more detail
24 in the slides on power ascension testing. Next slide.
25 In the area of simulator and procedure

1 changes, we did modify our unit two simulator, which
2 is our EDPU unit, prior to power uprate, for all the
3 auxiliary feedwater, AST and EPU modifications.
4 What that allowed us to do is facilitate
5 the EOP validations in the simulator, actually run the
6 simulator under -- with EPU parameters and evaluate
7 plant response and facilitate operator training. I'll
8 talk more about the training here in a little bit.
9 Our plan -- our unit one simulator will be
10 modified prior to this fall's unit one EPU outage.
11 In the area of procedure changes, pretty
12 much all of our emergency-operated procedure set was
13 revised and the major -- the primary changes to those
14 procedure sets -- the reason it affects all of them is
15 because it's things like the new aux feed pumps, which
16 are throughout the procedure set.
17 But the primary changes were due to the
18 addition of the new auxiliary feedwater pumps, the
19 initiation of containment spray on sump recirculation,
20 and the addition of the main feed isolation valve,
21 which is a factor in feedwater isolation.
22 One key item there is that with those
23 changes, the mitigation strategies and procedural
24 guidance for the operators has not changed
25 significantly. Next slide please, Steve.

1 In the area of training, for the last two
2 years we have been conducting training. Operators have
3 had classroom training almost every cycle for the last
4 two years. As we developed the EPU modifications we
5 were able to give more detailed training.
6 MEMBER STETKAR: Mike, I'm sorry, on the
7 procedures, you said that the basic mitigation
8 strategies haven't changed. does basic layout, format
9 of the procedures remain essentially the same as they
10 were?
11 MR. MILLEN: Yes, they do. It's a log two
12 column format --
13 MEMBER STETKAR: Yes. Okay. Okay. Thanks.
14 MR. MILLEN: We have followed a systematic
15 approach to training. We were able, because we did
16 modify the unit two simulator, we were able to perform
17 operations training in the simulator this first cycle,
18 in 2011, which just completed last week actually.
19 We do have additional classroom and
20 simulator training for all the operators planned
21 during the outage. This is going to include equipment
22 walkdowns. Once the new equipment is installed in a
23 plant, we will we doing familiarization and procedure
24 walkdowns with the operators.
25 We also will be performing just in time

1 training. This is -- we do just in time training every
2 outage for certain evolutions, but we will also be
3 doing it for the operators and test engineers involved
4 in individual testing, selective testing activities,
5 during post-modification and power ascension testing.
6 We also have had maintenance and technical
7 training ongoing for the last two years. In that area
8 the primary group that was affected was
9 instrumentation and controls. We did a lot of the new
10 digital controls on the feedwater heaters.
11 And our program training materials are
12 also being updated. Next slide please.
13 So in the area of operator response times,
14 they have been affected and we do have a couple of new
15 operator actions as well as having eliminated an
16 operator actions, but they are not, overall the effect
17 is not significant.
18 The first two bullets there, is primarily
19 due to the increased decay heat, our time to cold
20 shutdown has increased slightly. Our time to boil
21 during shutdown operations that we monitor, and we are
22 sure we have per the NUMARK guidelines, containment
23 closure by time to boil, that has decreased.
24 We do have two new actions that we had
25 discussed yesterday, and that is a new action to

1 establish containment spray once we have established
2 the containment sump recirculation.
3 And then after a period of containment
4 spray on sump recirculation, a two-hour period, we
5 have a new action then to transfer from the
6 containment spray recirculation back to the cold leg
7 recirculation with the SI pump to address the boron
8 precipitation concerns.
9 I'd like to mention that both those
10 actions are performed in the control room and they are
11 proceduralized, there are direct steps in sequence in
12 the EOP and they are fairly simple and
13 straightforward.
14 To establish containment spray sump
15 recirculation once we secure the spray pump on
16 injection, we secure the spray pump. We align the
17 suction of the spray pump up to the RHR pump and then
18 we restart the containment spray pump.
19 And it's similar on the tail end, when we
20 are going to secure containment spray recirculation,
21 we secure the containment spray pump, we align the
22 suction of the SI pump up to the RHR pump, and then
23 start the safety injection pump to the cold leg.
24 So they are straightforward times and we
25 have validated those in a simulator. We can do them in

1 five minutes or less.

2 DR. BONACA: The question I have is on the

3 steam generator tube rupture. The sequence times that

4 are documented here, I am looking for and I can't find

5 the location, but --

6 MR. MILLEN: I did not include that bullet

7 on this slide. I was going to mention it. The one

8 thing -- what I wanted to mention there is that our

9 steps and strategies and times for mitigation of a

10 steam generator tube rupture have not changed.

11 There is nothing new that the operators

12 are doing and we have -- we train and evaluate our

13 operators on steam -- design basis steam generator

14 tube rupture.

15 For the last year successfully the

16 operators demonstrate that they can mitigate a tube

17 rupture and not overfill the steam generator, and I

18 did -- in fact that is what we had demonstrated for

19 the staff when they came for their planned visit in

20 January.

21 So there was really no time to the

22 operator, no changes to the operator actions and the

23 timings -- times that the operators perform those

24 actions in.

25 The one effect from EPU is that we

1 actually get a little more margin because there is
2 less initial mass in the generator, but the operators
3 consistently, over the last years in training,
4 demonstrate that they don't overfill and we mitigate
5 the tube rupture.
6 MEMBER STETKAR: I mean, it takes you a
7 little longer to get down to the temperature you need
8 on the primary side at whatever -- it's the reason I
9 ask about whatever cooldown rate you are allowed to
10 do, and I -- did you change the allowed cooldown rate
11 curves in the procedures at all?
12 MR. MILLEN: The cooldown rate remains the
13 same. We are able to exceed the 100 degree per hour
14 cooldown rate during that phase of a tube rupture
15 cooldown. The one item we did change was the -- we, as
16 part of the EOP setpoint revisions for the EPU, one of
17 the setpoints that was recalculated was the cooldown
18 table with increased accuracy, and I think they gave
19 us another 10 degrees or so. It was --
20 MEMBER STETKAR: Margin higher?
21 MR. MILLEN: Margin higher, so --
22 MEMBER STETKAR: Oh, okay, that is
23 probably enough to make up for the difference in the
24 time.
25 MR. MILLEN: That was one of the EOP

1 changes, setpoint changes. There were other EOP
2 setpoint changes as a result of the EPU.
3 DR. BONACA: Yes, there was a time, three
4 minutes if I remember, to identify the fault at the
5 steam generator and to try to isolate that and cool
6 down through the unaffected steam generator, and this
7 seemed to be a challenge in -- you are telling me that
8 you are going down through these exercises on the
9 simulator, so they are successful.
10 MR. MILLEN: Yes, that is correct. It was
11 discussed earlier, we also removed the action from
12 operators to manually transfer aux feed suction to
13 service water, that is automated now.
14 I did want to discuss a little bit about
15 the improved capability to respond to certain
16 secondary transients. Relative to our power level, we
17 have more margin with the new condensate and feed
18 pumps than the existing condensate and feed pumps.
19 And a couple of examples there are certain
20 plant transients that do occur. We have heater drain
21 tank pumps at Point Beach. We normally run two of
22 them.
23 For example, if one heater drain tank pump
24 would trip for whatever reason in the existing plant,
25 the operators would have to reduce power approximately

1 10 percent to maintain adequate feed pump suction
2 pressure.
3 In the EPU plant, as we modeled it in the
4 simulator and we don't have to do a power reduction at
5 all. And probably even more important, is if we would
6 trip both heater drain tank pumps due to say, a heater
7 drain tank level instrumentation problem, because they
8 do trip on low level.
9 That would require the operators to
10 manually trip the plant in the existing plant and then
11 with newer, beefier condensate pumps, we are able to
12 only have to reduce power approximately 10 percent to
13 mitigate this trans. That's correct.
14 There is benefit, as Larry mentioned
15 yesterday, with some additional margin on the
16 secondary side.
17 MEMBER STETKAR: Mike, before you go to --
18 oh, you are done. Before you leave, what are you doing
19 in terms of training the operators for the auxiliary
20 feedwater system versus the old auxiliary feedwater
21 system.
22 In other words, you have operators who
23 have run the plant for some number of years who are
24 used to using those pumps over there, and now they
25 have to somehow learn that they use those pumps over

1 there under certain conditions, but they basically
2 ignore them.
3 That's an unlearning type behavior, which
4 oftentimes is more difficult to do with operators than
5 just saying, oh, you have one of these things -- a new
6 one over here.
7 MR. MILLEN: Right, and they --
8 MEMBER STETKAR: How are you handling
9 that?
10 MR. MILLEN: That actually was the primary
11 focus of the training that we have done this cycle, in
12 the area of auxiliary feedwater and AST, and I would
13 like to mention, we have a dual unit control room that
14 is a common control room and operators that are
15 licensed are licensed on both units.
16 Our simulator is also a dual unit
17 simulator. It models a control room and both units are
18 able to be -- we perform training on both units.
19 The interesting thing is that what we have
20 done in this training cycle is we have trained on
21 auxiliary feedwater pump, not just focusing on the EPU
22 unit, unit two, but both units, and we have ran the
23 operators through a number of aux feedwater scenarios,
24 uses, actually if the new pumps, you heard if the new
25 pumps don't work, we can override the signal and use

1 the standby pumps to prevent entering at critical
2 safety function procedure.
3 So we have trained them on and using I
4 think the dynamics of both units for the aux feed
5 system helps quite a bit.
6 MEMBER STETKAR: Okay. Thanks.
7 MR. MILLEN: Next slide please. The next
8 area I will cover is power ascension and testing, and
9 I will be giving an overview of the plan, organization
10 and I will discuss the actual conduct of the testing,
11 and here is where we will get to the section where we
12 discuss large transient testing and some comparisons
13 with LOFTRAN, and when we get to that point, I will
14 turn it over to Steve for that discussion.
15 We did develop a comprehensive test plan.
16 It is modeled after recent successful power ascension
17 programs, Ginna, Kewaunee, Hope Creek, and Vermont
18 Yankee.
19 We had engineering folks that did the
20 power ascension testing at Hope Creek and Vermont
21 Yankee helped us with the plan. We actually went and
22 did benchmarking at Ginna and I talked to them about
23 their lessons learned.
24 Our uprate implementation ascension test
25 procedure is going to direct the overall sequence of

1 power ascension, including our hold points. Along the
2 way we will have individual test procedures, post-
3 maintenance testing that is going on, to demonstrate
4 that our equipment performs satisfactorily.
5 CHAIRMAN BANERJEE: You are going to do
6 all of this vibration walkthroughs and things like
7 that?
8 MR. MILLEN: Yes, at all the power
9 plateaus, we also have a lot of data acquisition
10 activities going on. We have instrumentation we are
11 installing, higher accuracy, RTDs, ultrasonic flow
12 meters, pressure instruments at different drain
13 locations on feedwater heaters, a lot of
14 instrumentation, and recorders for that will be done.
15 We will also be using the plant process
16 computer that monitors quite a number of points. That
17 is -- that data gets gathered at each plateau as well
18 as recording of information as we are moving power,
19 and as was mentioned yesterday, the vibration
20 monitoring specifically is called out in each of those
21 areas.
22 Then the overall approach is that before
23 we move on, whether we are doing test procedures, all
24 the data acquisition, the vibration monitoring, it's
25 all evaluated against acceptance criteria, items

1 resolved.

2 We go through a test review board also for

3 approval.

4 CHAIRMAN BANERJEE: So, the acceptance

5 criteria, you have reached some agreement with the

6 staff with regard to that. What happens if you don't

7 meet the acceptance criteria?

8 MR. MILLEN: I have other slides on that

9 but what happens is if we don't meet the acceptance

10 criteria or say we are approaching an -- because we

11 will be monitoring, if we approach an acceptance

12 criteria, or should exceed it, we will reduce power to

13 the -- the previously evaluated acceptable

14 configuration, or depending on what the situation is,

15 operations will respond in accordance with our

16 operating plant procedures.

17 CHAIRMAN BANERJEE: But you have, say,

18 accelerometers and things like that also, right?

19 MR. MILLEN: Accelerometers, I don't --

20 CHAIRMAN BANERJEE: What? You didn't have

21 any?

22 MEMBER SHACK: They had them at Ginna.

23 They didn't mention anything about accelerometers

24 here.

25 MR. BAIN: This is Bob Bain from Shaw. For

1 piping systems we are not using acclerometers. We
2 discussed this briefly.
3 CHAIRMAN BANERJEE: Yes, but in Ginna they
4 had them, right?
5 MR. BAIN: They had -- actually I
6 implemented the program for Ginna. I wrote the program
7 for Ginna. I did the power ascension testing in
8 November of 2006 for Ginna, for two weeks.
9 For the main piping systems on the main
10 steam feedwater, all the affected systems due to
11 increased flow for flow-induced vibration, it was a
12 displacement-based program, like we have been using
13 for the last 12 years, like we were using here at
14 Point Beach.
15 Of course we have had two dry runs at
16 Point Beach, because of the outages we did in November
17 of 2008, and December of 2009.
18 We -- this same program that we are
19 outlining, we actually did the same process with the
20 plateaus, and as far as vibration, we used both those,
21 unit one outage in 2008 and unit two outage in 2009,
22 and followed the same process we are going to use for
23 the full power uprates, which was the same process
24 that was actually used at Ginna, which I know, because
25 I did that one as well.

1 But no accelerometers, and again,
2 displacement-based, and --
3 CHAIRMAN BANERJEE: But where was it in
4 Ginna?
5 MR. BAIN: I'm sorry?
6 MEMBER SHACK: They were on some of the
7 internals, where --
8 MR. BAIN: Yes, right, yes, so -- and for
9 equipment for example, your pumps, the turbines for
10 example, and it had been standard practice to use
11 acclerometers, but I think as I said yesterday,
12 acclerations in piping systems are very, very low, and
13 really, most accelerometers are not accurate to the
14 readings you want when you -- you know, measuring the
15 types of things we -- in piping systems.
16 CHAIRMAN BANERJEE: What are the
17 frequencies?
18 MR. BAIN: Piping system frequencies are
19 going to be anywhere from two Hertz to maybe it's 15.
20 A simple cantilever, you know, like where -- the
21 classic socket weld failures, cantilever frequencies
22 range from eight to 15 Hertz, and if the classic
23 failure mode, and if we are observing basically -- as
24 Mike said, online, you know, shift by shift plateau by
25 plateau --

1 CHAIRMAN BANERJEE: So how do you see
2 these things if you don't even measure it?
3 MR. BAIN: Well, of course I -- it's 38
4 years, but you can actually -- the eye is -- you know,
5 OM3, you know, which is, it is ASME OM3, which again,
6 I brought 2003 reconciled through 2007.
7 There's different VM levels and an
8 acceptable method is VM3, which is visual, with people
9 experienced like myself. You can actually detect
10 vibrations --
11 CHAIRMAN BANERJEE: So this is eye of the
12 beholder?
13 MR. BAIN: Yes, it is, exactly. Basically
14 it's a -- expertise-based system. You can detect
15 displacements as low as 1/32 of an inch. And again,
16 most systems, in turbine plants, large displacements
17 on turbine plant piping, 1/32 inch creates no stress
18 near the endurance limit, which is what you are
19 talking about, failure mode.
20 So -- and 10 Hertz for example, let's say
21 a classic failure mode is at a million cycles. At 10
22 Hertz it takes about 24 hours to get a million cycles.
23 So since we do this stuff online, really,
24 hour by hour, shift by shift, plateau by plateau, we
25 have made, on both the dry runs in 2008 and 2009, we

1 actually made online, simple modifications to
2 alleviate and mitigate complications of vibration.
3 It's --
4 CHAIRMAN BANERJEE: So you get a
5 qualitative number. How does that meet acceptance
6 criteria? Say we are worried about vibrations due to
7 the increased flow on this secondary side, which would
8 be an obvious thing to worry about, right?
9 MR. BAIN: Yes. OM3 will give you a
10 stress-based criteria. A stress-based criteria. The
11 idea basically is if you can hold the stress below the
12 endurance limit, you can have an infinite number of
13 cycles, and the whole methodology on this whole
14 displacement is to ensure the displacement results in
15 a stress that is below the endurance limit.
16 CHAIRMAN BANERJEE: How do you measure the
17 displacement? Is it by eye?
18 MR. BAIN: Simple hand tools. Again, OM3
19 again provides simple hand tools, including eye,
20 rulers, simple hand-held devices. At Point Beach we
21 use a combination of simple, hand-held tools.
22 And again, the accuracy -- and the myth
23 that we basically --
24 CHAIRMAN BANERJEE: Is there insulation
25 and stuff on there?

1 MR. BAIN: But on all systems, you either
2 have external vents and drains, valves, flanges,
3 there's always some portion of the system. And the
4 nice thing, also, about Point Beach, as we said
5 yesterday, it's a very small, compact plant.
6 Virtually all the turbine plant piping is
7 accessible, but there's always some place you can
8 measure a fairly accurate reading, and again, the
9 reading is basically taken a maximum value, and
10 actually the methodology we use is we assume the
11 maximum displacement is a pure sine wave, displacement
12 sine wave, which is very conservative.
13 Tend to be proactive in this approach, and
14 --
15 CHAIRMAN BANERJEE: If this is not a sine
16 wave, what sort of a wave is it?
17 MR. BAIN: Well, in real life if you --
18 well, when we -- at Beaver Valley, when we did the
19 same program for example, we had a few peak
20 displacements that would have exceeded the endurance
21 limit, so we actually measure about 50,000 cycles.
22 The real curve would look more like this
23 if you will, you know, whereas if you take that peak
24 and assume that that peak happens all the time, so I
25 am basically saying that's the sine wave of the peak,

1 if you can show that displacement results in the
2 stresses below the endurance limit, it's impossible to
3 have a failure.
4 CHAIRMAN BANERJEE: Nothing is impossible.
5 MR. BAIN: Well, yes --
6 (Laughter.)
7 MEMBER SHACK: There really is an
8 endurance limit.
9 CHAIRMAN BANERJEE: I guess I'm skeptical.
10 But the other uprates of this magnitude that we have
11 seen have not been in PWRs, but we have had strain
12 gauges and all sorts of stuff on many, many of them.
13 MR. BAIN: BWRs particularly, because of
14 the inaccessibility, like you say, particularly the
15 inaccessibility of piping, and you generally have
16 instrument piping, because it's just places you can't
17 get to that you ascend through power, basically.
18 That's not true at PWRs, which is why
19 Ginna, Beaver Valley, Millstone, Comanche Peak --
20 CHAIRMAN BANERJEE: But this is an
21 unusually large uprate, I mean Ginna was the same, but
22 yes.
23 MR. BAIN: Yes, similar, yes, and we have
24 made a few fixes at Ginna. We have a series of
25 baseline analyses, so going into this, since we have

1 been doing this at Point Beach now for about 2-1/2
2 years, you have a set of acceptance criteria.
3 So you know in advance what each piping
4 system can accommodate and when you see something that
5 is worse than that, you take immediate action, which
6 we have done on these two dry runs, yes.
7 CHAIRMAN BANERJEE: So there is some form
8 of acceptance criterion --
9 MR. BAIN: Yes.
10 CHAIRMAN BANERJEE: related to this and if
11 you somehow exceed this, you come down in power and
12 you fix the problem?
13 MR. BAIN: Yes, and since you --
14 CHAIRMAN BANERJEE: But what would fixing
15 the problem mean?
16 MR. BAIN: You are on a short clock, so if
17 -- and again, since we are out there continually, the
18 idea is to make a quick fix. This was what we did both
19 on unit one and unit two outages.
20 If it was ever our determination that we
21 couldn't do a quick fix, because -- actually there's
22 forms we have to sign off at every plateau, and if the
23 displacement profiles are unacceptable, we actually
24 have the capability to hold or to downpower.
25 CHAIRMAN BANERJEE: But what is a quick

1 fix? What --

2 MR. BAIN: So, some examples, when we

3 reached one plateau, we installed a new bypass, and

4 with the new feedwater heaters, when we did the fourth

5 and fifth point heaters, in 2008, they had installed a

6 new bypass, and there was a design scheme with a

7 certain way out with a certain hangar configuration.

8 As soon as they installed those hangars

9 and they began to power up, we saw really what would

10 be an unacceptable vibration configuration. So we saw

11 that within the first half hour.

12 And we were out there really with the pipe

13 fitters, the construction force and basically told

14 them to undo the hangar and move the hangar, and that

15 was done in less than two to three hours, and it was

16 just that simple movement of moving a hangar,

17 basically de-tuning the system, de-tuning the system.

18 And with that simple de-tune, the

19 vibration disappeared. As we said yesterday, this

20 thing is very asymptotic. You hit a resonant response

21 it's going to go like that.

22 MEMBER SIEBER: And that's been the

23 standard practice for years and years and years.

24 Typically extension drains, they are the biggest

25 problem?

1 MR. BAIN: Yes.

2 MEMBER SIEBER: And on the new

3 construction, that is something you always check and

4 there's -- I have never seen a big mod where you

5 didn't have to change hangars.

6 MR. BAIN: Yes.

7 MEMBER SIEBER: Next thing is instrument

8 lines, the thing that is difficult to do, which you

9 can do acoustically, is vessels or other components

10 that have internal devices where you actually can't

11 physically see them. Vibrometers also work pretty

12 well.

13 CHAIRMAN BANERJEE: So the concerns with

14 higher steam flow are obviously whether you can get

15 some acoustic wave phenomena --

16 MEMBER SIEBER: Resonance.

17 CHAIRMAN BANERJEE: Yes, that is due to

18 valves and standoffs and things like that --

19 MR. BAIN: Absolutely, yes.

20 CHAIRMAN BANERJEE: Which have been

21 observed in other plants which have --

22 MR. BAIN: Yes.

23 CHAIRMAN BANERJEE: been uprated. Not

24 necessarily in PWRs, but we understand the problem --

25 MR. BAIN: To a lesser degree, yes, yes.

1 CHAIRMAN BANERJEE: Yes.

2 MR. BAIN: But as you said, I'll use St.
3 Lucie's example, you know, a part of the FPNL suite
4 because we are also doing that. We are already making
5 over a dozen modifications, because unlike Point
6 Beach, as we said yesterday, which is a very tight
7 plant, it doesn't have a lot of these things you
8 mention, these cantilever vent and drain problems.

9 St. Lucie did, and they are already making
10 a full cycle in advance, preemptive modifications, by
11 changing the vent and drain configurations, valve
12 configurations and weights.

13 CHAIRMAN BANERJEE: All right, I mean, I
14 think we have got the picture of what you are going to
15 do. How you are going to fix a problem, I guess you
16 would have to figure out if and when you have it.

17 But your main inspection procedure for
18 vibrations is going to be sort of visual or manual,
19 let's put it that way. You have no instrumentation,
20 which is recording that.

21 Okay.

22 DR. WALLIS: This is a slow and deliberate
23 manner. Could you just indicate the time span between
24 these steps, order of magnitude?

25 MR. MILLEN: I think -- Jay mentioned

1 yesterday discussing the fuel conditioning. I believe
2 we did get our cycle specific restrictions for this
3 power uprate.
4 We do have the plateaus below -- we will
5 be using our refueling outage plateaus for chemistry
6 holds and --
7 DR. WALLIS: Your plateaus are -- goes
8 over several days or something?
9 MR. MILLEN: Yes, it's actually going to
10 take probably over a week.
11 DR. WALLIS: Okay, that's what I was
12 after, just the length of time, yes.
13 MR. MILLEN: Yes. We are still fine-tuning
14 the amount of time at each plateau, when we evaluate
15 the data, go through all the approvals to continue and
16 move on, but over a week.
17 And as discussed, we will be stopping at
18 pre-determined power levels. Once we are at
19 approximately 85 percent power level where the
20 previous -- we were exceeding previous rate of thermal
21 power -- we will stop there and from that point on, in
22 three percent increments, five more three percent
23 increments up to the full 100 percent EPU power.
24 And we discussed the data being evaluated
25 and I will discuss the test review board here in a

1 little bit.

2 The next slide is -- we do intend on

3 performing our post-modification power ascension

4 testing. We will demonstrate our performance over

5 plant controls and the enhanced control upgrades,

6 primarily those digital controls on the feedwater

7 heaters will continue to operate reliably.

8 And here is where I will turn it over to

9 Steve, as far as the no large transient testing.

10 MR. HALE: We have already talked a little

11 bit about the experience with LOFTRAN, predicting

12 plant transience. As we had indicated previously, we

13 had both Westinghouse and Shaw, in fact some of the

14 members, like you have heard, were actually involved

15 with the Ginna uprate, both Westinghouse and Shaw's

16 standpoint.

17 They did use analyses for Ginna for

18 predicting behavior of the plant for various testing

19 that they performed, and they used LOFTRAN to predict

20 what they expected it to be, after going through their

21 -- and in review of their start-up test report, we

22 found that their analyses were very close to what

23 actually happened when they went through their

24 transient testing.

25 DR. WALLIS: They did large transient

1 testing?

2 MR. HALE: Yes. They did, like they did a

3 turbine trip from 30 percent power, which was, I think

4 their normal place, where they do their turbine trip

5 testing, you know.

6 CHAIRMAN BANERJEE: That was Ginna.

7 MR. HALE: That was Ginna, yes. But the

8 point here is that they had done LOFTRAN forecasts of

9 all of their testing that they performed, and they got

10 good correlation between their actual test results and

11 what LOFTRAN had predicted, and this is based on you

12 know, looking at their power escalation test report

13 and looking at that representation.

14 They actually did an evaluation which

15 showed good correlation between their predictions and

16 their actual testing.

17 With regards to -- they did do some load

18 swing tests. They looked at various parameters, as you

19 can see here, and they found good correlation of

20 LOFTRAN relative to those, and also with the turbine

21 trip test.

22 So in general, the Ginna folks did --

23 CHAIRMAN BANERJEE: Where was that turbine

24 trip test done?

25 MR. HALE: That was in their power

1 ascension test program.

2 CHAIRMAN BANERJEE: Okay. Okay.

3 MR. HALE: Okay. So the intent here was

4 really just to communicate that there has been some

5 good correlations done with regards to LOFTRAN and its

6 ability to predict plant performance.

7 It's quite good at control systems and

8 that sort of thing and predicting actual plant

9 operation under certain transient conditions, and we

10 plan to follow and use the same LOFTRAN predictions

11 and projections for Point Beach.

12 CHAIRMAN BANERJEE: In the past, we have

13 dealt with matters like this, where large transient

14 tests have been considered, and at least in -- some of

15 the materials people on this committee were concerned.

16 I will read something here.

17 Since integral tests are for plants

18 respond to transient initiators can reveal otherwise

19 undetected flaws, these tests should be conducted to

20 confirm that plant modifications made to support the

21 upgrades have been installed as designed and function

22 properly in an integrated manner to bring the plant to

23 safe and stable conditions.

24 What do you have to say about that, as

25 there might be people on the committee who still

1 believe that?

2 MR. HALE: Well, my -- at least my

3 perspective is that I believe that we have good

4 correlation for the large transient testing --

5 CHAIRMAN BANERJEE: It's not the

6 correlation. What they are talking about, I guess, is

7 that it's not the prediction of the transient by the

8 LOFTRAN or whatever, it's the stressing of the plant

9 after the upgrades to show that there are no

10 undetected flaws or things like that.

11 That's more the argument which was put

12 forward by some of the committee members. So do you

13 have a view on that?

14 MR. HALE: Yes I do. I believe that it's -

15 - that with the operating experience that we have had,

16 with the codes that we do have, that it's -- I think

17 it's not a good idea to make a plant go through

18 something like a trip or something like this

19 intentionally.

20 I think that you know, we are all taught

21 to minimize plant transience and that sort of thing,

22 and I think we have enough information both in the

23 operating experience area and with our correlations,

24 to say that we don't need to do that. We don't need to

25 put that kind of a risk on the plant.

1 CHAIRMAN BANERJEE: Or a stress on the
2 plant.
3 MR. HALE: Or a stress on the plant.
4 CHAIRMAN BANERJEE: Well, that's the
5 counter-argument.
6 MR. HALE: Yes.
7 CHAIRMAN BANERJEE: Right. We'll have to
8 discuss it at some point.
9 MEMBER SHACK: Those were added comments
10 you were reading from.
11 CHAIRMAN BANERJEE: Yes, but nonetheless,
12 they were comments, right? Okay.
13 MEMBER STETKAR: Steve, as long as we are
14 talking about transients, somebody can get the thing
15 back up.
16 MR. HALE: Okay.
17 MEMBER STETKAR: You mentioned -- I'm an
18 electrical guy and I don't understand thermal
19 hydraulics.
20 DR. WALLIS: It's just like electricity.
21 MEMBER STETKAR: You mentioned you
22 installed a generator breaker. How does that affect
23 the electrical system post-trip response? What happens
24 now to bus transfers or whatever?
25 MR. MILLEN: I can explain that. The

1 current plant design without the generator, direct
2 generator output breaker, our non-safeguards bus
3 would, when the generator trip would fast-transfer
4 over to our station auxiliary or off-site power
5 transformer, if you will.
6 With the addition of the generator
7 breaker, on a normal trip, the generator would
8 disconnect itself but the main transformer would
9 remain energized from the grid, from the high-side
10 breaker, and so all the plant non-safety buses would
11 remain energized from off-site power, without having
12 to transfer over to the start-up transformer, which
13 provides off-site power to the safeguards bus.
14 That's the major difference.
15 MEMBER STETKAR: I didn't have an
16 electrical drawing, thanks.
17 MEMBER SIEBER: And if the main unit
18 transformer fails, you can still arrange the safety
19 buses to the grid?
20 MEMBER STETKAR: We can, but there would
21 be a manual transfer at that point, yes.
22 MEMBER STETKAR: So you took away the fast
23 bus transfer on the non- -- is that right?
24 MR. MILLEN: That's correct, yes.
25 MEMBER SIEBER: In the grand scheme of

1 things, I don't know what the data would show, but in
2 my personal experience, the likelihood of a
3 transformer failure is bigger than the likelihood of a
4 generator failure.
5 MEMBER STETKAR: Well, but I mean, any
6 turbine trip will also take the -- open the output
7 breaker but you are right, transformers go away at a
8 measurable frequency.
9 MEMBER SIEBER: Some of them do.
10 MR. HALE: Are they ready to go back?
11 MEMBER STETKAR: The reason I asked that
12 was to think about if there were any electrical
13 transients that your, you know, could be introduced
14 with a new electrical system design you are not
15 testing, by doing some sort of load rejection type
16 test on, on your start-up program that people have
17 done in the past, to look at thermal hydraulic things.
18 I am thinking more about electrical
19 systems operations.
20 MR. MILLEN: We actually already have
21 tested that on unit two, because we had a plant trip
22 on unit two. We already put the generator breaker and
23 the transformer in our unit two, so we have already
24 had that --
25 MEMBER STETKAR: You've had a real-time

1 test --

2 MR. MILLEN: operating experience, yes.

3 Continuing on, our EPU power ascension test program

4 will be verifying the following: that our systems and

5 equipment affected by EPU are operating within our

6 design limits; that the core is operating as designed;

7 that the steam generator water level control, reactor

8 control systems and feedwater heater and MSR control

9 systems are all stable.

10 We will be monitoring system radiation

11 levels as well, acceptable and stable. We did utilize

12 some OE from Ginna in that area. We will be monitoring

13 general area and local environmental conditions as

14 well during the power ascension testing. Next slide,

15 Steve.

16 This is a little on the organization, the

17 start-up testing organization. They will report to the

18 plant general manager. It's run by the senior ops

19 start-up test director.

20 The test organization reports to the test

21 directors. We do have a multi-disciplinary team. It

22 will be engineering, systems, designs and our PDM

23 engineers, our preventive programs engineers,

24 operations, chemistry, radiation protection and

25 maintenance.

1 I discussed briefly our test review board.
2 Once all the data acquisition and testing results are
3 gone over and measured against acceptance criteria and
4 any issues resolved, results are presented to the test
5 review board.
6 That's chaired again by the operations
7 start-up test director. They will be involved in the
8 review of all the test results. At certain power
9 plateaus, including those from 85 percent on up, we
10 also include our plant operations review committee and
11 plant general manager approvals in the process.
12 And our test procedure is also classified
13 as an infrequently performed test and evolution, which
14 has additional senior management oversight.
15 Next slide. Just wanted to highlight
16 several additional post-maintenance surveillance and
17 monitoring testing that will be performed on the
18 secondary system.
19 We will be performing steam generator
20 level deviation tests and what we will do there is
21 take our controls from automatic to manual, deviate
22 the level, return the controls to automatic and watch
23 and validate the system response to recover.
24 We will be doing that at various power
25 levels. We will be doing a similar evolution with our

1 feedwater heater level controls as well. We will also
2 be doing our post-maintenance testing of course, on
3 our new feedwater pumps and condensate pumps, and our
4 heater drain tank pumps, same heater drain tank pumps
5 but we have upgraded controls on the drain and dump
6 systems for the heater drain tank.
7 And we also will be doing power system
8 stabilizer and some voltage regulator response testing
9 during power ascension.
10 MEMBER SIEBER: I presume somewhere in
11 there you will be -- have instrument techs that may
12 modify, reset break settings and so forth, update your
13 scaling manual?
14 MR. MILLEN: Yes. We will be doing valve
15 tuning, quite a few different things, and those will
16 all be resolved at those power plateaus before
17 continuing on.
18 MEMBER SIEBER: Right. Okay. Thank you.
19 MR. MILLEN: Next slide. The test
20 procedure itself, we will be maneuvering the plant
21 with the normal operating procedures the operators are
22 used to. There's coordination with the power ascension
23 test procedure built in as one-time changes.
24 The power ascension test procedure will
25 coordinate the various hold points during power

escalation, and will also kick out any individual test activities and data acquisition activities at those plateaus.

Also, we will have all the sign-outs for ensuring everything was resolved with acceptable approvals prior to allowing the operations -- operators to move on.

CHAIRMAN BANERJEE: Could you just provide us at some point, it's not necessary with the plateaus and the times and you know, because it's hard to keep it all in mind.

MR. MILLEN: Yes. Our --

CHAIRMAN BANERJEE: If you've got that somewhere.

MR. MILLEN: We are stopping at our 30 percent plateau, which is normal chemistry hole. We are doing a bunch of feed and condensate system testing with swapping the pumps etcetera.

Then we will be stopping at approximately 50 percent power level, 75 percent power level.

CHAIRMAN BANERJEE: And what would you check at 50 percent?

MR. MILLEN: We'll be doing again feedwater train swaps, we'll be doing these level deviation tests, feedwater heater testing, steam

1 generator level testing, all the performance
2 monitoring and the systems at all these various
3 plateaus.
4 So primarily in the lower power levels the
5 testing -- additional testing that we will be doing
6 will be related to the feed and condensate systems.
7 CHAIRMAN BANERJEE: But under EPU
8 conditions, you'll be going in smaller steps?
9 MEMBER SIEBER: Ninety-five and 100.
10 MR. MILLEN: Yes. From 85 percent we will
11 be going in three percent increments.
12 CHAIRMAN BANERJEE: Okay, so that's the
13 standard three percent you are doing.
14 MR. MILLEN: Right.
15 CHAIRMAN BANERJEE: Okay. But perhaps if
16 you could just tabulate this for us, or a slide on it,
17 so we have a summary. I'm sure that that would be of
18 interest even to the --
19 MR. HALE: Like power level versus time.
20 CHAIRMAN BANERJEE: Yes, power level
21 versus time, particularly under the EPU conditions. Of
22 course, you have changed so much of the plant that
23 it's worth doing all the way up, yes.
24 MR. MILLEN: We have discussed system
25 monitoring plans. We have also -- this is -- has been

1 developed for systems both directly and not directly
2 impacted by EPU. By that I mean some of the systems
3 were very minorly impacted, but we will be monitoring
4 those as well.
5 And we discussed previously that if any
6 unexpected plant conditions that occur, or we see
7 ourselves approaching an acceptance criteria before we
8 get there, power will be reduced to the last
9 acceptable operating configuration or as directed by
10 our operating procedures if we have to trip the plant.
11 CHAIRMAN BANERJEE: I really don't have my
12 arms around this acceptance criteria very clearly yet,
13 you know, so obviously there are all sorts of things
14 related to what, instrument performance and chemistry
15 and these types of things, right, plus vibration, so
16 can you just give me an overview of what these
17 acceptance criteria are?
18 MR. MILLEN: Yes. The acceptance criteria
19 essentially are based on -- in some cases analysis
20 assumptions, or in the secondary plant, on parameters
21 that have been selected, design parameters essentially
22 to prevent any plant transients from occurring, and
23 that's what we are looking for, that the control
24 systems are --
25 CHAIRMAN BANERJEE: Can you give me an

1 example?

2 MR. MILLEN: Let's see.

3 MR. HANLEY: Mike?

4 MR. MILLEN: Yes.

5 MR. HANLEY: This is Norm Hanley from
6 Shaw. We'll be looking at feed reg bell behavior, if
7 it starts to oscillate or if we predict that it should
8 move three percent in that step, we will be watching
9 it, if it's moving five percent or two percent, so
10 that we will evaluate those feed pump section
11 pressure, because we don't want to lose suction on the
12 feed pumps that could cause the transient.

13 As Mike said, we'll be looking at heated
14 drain tank levels, so that we can anticipate that if
15 we take another step, will it be a problem with the
16 control valve going wide open, or low level on a tank
17 and etcetera.

18 So we monitor the plant, not only from the
19 numbers, but we also look at where the levels are in
20 the heaters and where the control valves' behavior of.

21 And we have predicted values for each step
22 so we can monitor those, so that before we get to a
23 critical parameter, we can see it happening.

24 CHAIRMAN BANERJEE: Okay, so that is the
25 performance of the control systems to maintain various

levels and these sorts of things, but also you have installed new instrumentation and all sorts of new things.

Are you also going to be looking at how things are performing?

MR. HANLEY: Yes, for instance, we -- on our heater level systems, we installed new valves, new transmitters, new level monitors and they are all integrated with the level control system, so we will be monitoring behavior.

If we predicted it to move two percent, or if we predicted the level to stay at 22 inches, we will monitor it even as we move power to see how well it behaves.

And we did that already with the four and five heaters, a pretty good success that we could see how that control system behaved, plus the new instrumentation that was installed with it.

CHAIRMAN BANERJEE: And the other criteria, I guess, are with regard to things like vibrations and things like that, right?

MR. MILLEN: Yes, there's vibration criteria listed in our plan one. Norm mentioned feed reg bells. We have set an acceptance criteria for 100 k pounds per hour, peak to peak oscillations during

1 our power ascension, so we have selected those various
2 criteria for main feed pump recirc valves to open at a
3 certain flow rate.
4 We have set -- identified what those
5 maximum/minimum flow rates are for the main feed pump
6 recirc valve to operate under.
7 CHAIRMAN BANERJEE: Okay.
8 MR. MILLEN: Those type of criteria. And
9 to be clear, some of our criteria are level one, we
10 call them level one acceptance criteria, which is a
11 safety-significant criteria.
12 We also have a level two acceptance
13 criteria, which are not safety-significant but we
14 still would hold until we understand what the system
15 interaction was or what the issue was that was causing
16 us to exceed the non-safety significant criteria
17 before moving on, and achieve resolution of that.
18 MR. HANNEMAN: This is Harv Hanneman from
19 NextEra, Point Beach. Norm Hanley was talking mostly
20 about balance of plant parameters and mentioned
21 vibration also, but we are also of course monitoring
22 NSSS parameters, so delta t's pressurizer level flows,
23 you know power levels, and we have the level one and
24 two acceptance criteria for those as well, that we
25 will be monitoring, so --

1 MR. MILLEN: And we do have a -- you know
2 we have implemented a regimented plan for test review
3 board review of those results against the acceptance
4 criteria.
5 Again, it's chaired by the operations
6 start-up test director. There's an engineering manager
7 also that is going to provide somewhat independent
8 review of those results from the testing organization,
9 and again at the selected plateaus, or if a level one
10 acceptance criteria had been approached or exceeded.
11 Also we will require our plant operations
12 committee and the plant general manager approval of
13 resolution of those items before we move on.
14 That's my last slide. If there's any other
15 questions?
16 CHAIRMAN BANERJEE: Well, I think --
17 Graham, do you have any questions?
18 DR. WALLIS: I was just wondering if these
19 --
20 CHAIRMAN BANERJEE: You have to come
21 closer to the mic.
22 DR. WALLIS: Well, I was accused of being
23 too loud the other day, so. The -- you know some of
24 these criteria could be checked automatically if you
25 have a computer that simply does it. You don't have to

1 have people doing all that. I assume that's what you
2 do.
3 MR. MILLEN: We take the records from the
4 computer, but we do manually check all the
5 instrumentation off the recorders, validate that it
6 didn't go on --
7 DR. WALLIS: Someone writes things down
8 instead of -- yes, okay. This is all standard stuff
9 though, isn't it, so it's being done at other plants.
10 I don't really have a problem with it.
11 CHAIRMAN BANERJEE: The unique thing about
12 the uprate would be if you get things like -- well you
13 have a new, almost a new feedwater -- auxiliary
14 feedwater system, but other than that you have got
15 problems with --
16 DR. WALLIS: But there's nothing specific
17 that we are looking for, like vibrations in the steam
18 drier or something, you know. There's nothing specific
19 that we are focusing on.
20 CHAIRMAN BANERJEE: Well vibrations are
21 one thing, obviously --
22 DR. WALLIS: But in a very general way.
23 CHAIRMAN BANERJEE: because you have got a
24 higher steam flow coming out.
25 DR. WALLIS: Right.

1 CHAIRMAN BANERJEE: So, but -- okay. John,
2 do you have any issues that you need to discuss or
3 would like to?
4 MEMBER STETKAR: No. Thank you.
5 CHAIRMAN BANERJEE: Okay. Jack?
6 MEMBER SIEBER: No I don't.
7 CHAIRMAN BANERJEE: Bill, Mario? Okay
8 then, I think what we will do is probably just break
9 for lunch right now, come back at one o'clock, so that
10 gives you -- we are a little ahead of --
11 MEMBER SIEBER: Extra five minutes.
12 CHAIRMAN BANERJEE: Yes. Gives you more
13 than an hour for a lunch, and then we will have the
14 staff come and talk to us about human factors review
15 and we will follow the schedule, and then if we have
16 any questions with regard to the power ascension and
17 testing, we might ask them at that point but we don't
18 expect a presentation or anything on that.
19 So -- and then at the end of the day, if
20 there are any -- we will summarize and if there are
21 any unresolved things, we will bring it up.
22 I don't think you need to present the
23 pressure temperature curves in the containment,
24 because they were in the slides that we didn't have
25 before, but now your back-up slides are with us. I've

1 got a copy of those, and if any of the members want to
2 see it, they'll ask, then we can show them.
3 MEMBER SIEBER: I would like them.
4 CHAIRMAN BANERJEE: Okay. In that case, we
5 will see that then, at the end of the day though.
6 MR. HALE: Okay, we will put it up on the
7 screen.
8 CHAIRMAN BANERJEE: Yes, after the staff,
9 we will come back and have a session, wrap-up with you
10 whatever issues there are.
11 MR. HALE: I think we should be able to
12 address the additional discussion items that we had as
13 well.
14 CHAIRMAN BANERJEE: Great. Okay. So with
15 that we will take a break until one.
16 (Whereupon, the above-entitled matter went off
17 the record at 11:55 a.m. and went back on the record
18 at 1:00 p.m.))
19
20

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

2 1:00 p.m.

3 CHAIRMAN BANERJEE: We are going to go

4 back. Are you ready?

5 MR. BELTZ: We are ready to begin the

6 afternoon session. The first topic that we are going

7 to discuss is the human factors review by Kamishan

8 Martin.

9 MS. MARTIN: Good afternoon. I am

10 presenting the information today on behalf of -- as

11 support for the review. I didn't actually perform the

12 review. The individual who did the evaluation has

13 since retired. So I didn't actually do the review.

14 This review dealt with the programs and

15 procedures and training and plant design, and the main

16 purpose of this review was to make sure that the

17 changes due to the uprate do not adversely affect the

18 operator actions or operator performance at the plant.

19 The first area that we evaluated or that

20 was evaluated as a part of this review deals with

21 changes to the emergency operating and abnormal

22 operating procedures, and the licensee indicated that

23 these procedures were verified and validated through a

24 detailed process, and they provided the details of

25 their V&V process as a part of our review, and they

1 also indicated that these changes to the EOPs and AOPs
2 do not -- they are not significant and they do not
3 significantly affect the operator actions or the
4 mitigation strategies as a part of the emergency
5 response.
6 There are a couple pf significant
7 procedural changes that were identified by the
8 licensee, which included continued use of containment
9 spray and changes to the auxiliary -- the AFW
10 configuration, which was I think discussed earlier by
11 the licensee.
12 The other -- the next portion of the
13 review involved the changes to operator actions as a
14 result of this EPU. There were a few, about four
15 significant operator actions which were sensitive to
16 the uprate identified by the licensee as a part of
17 this review.
18 Two of the operator actions that were
19 identified actually were eliminated and due to
20 automated and I think t hat was discussed during the
21 licensee's presentation concerning the AFW
22 configuration.
23 So two of the identified actions were
24 actually automated. The other action called for a
25 reduction in the time available for individuals to

1 perform the actions regarding the initiation of the
2 RHR and cold leg recirc to minimize boron
3 precipitation.
4 The time reduction was from 14 hours to
5 four hours and it didn't actually involve a change to
6 the operator action or the time it takes to perform
7 the operator action, just a change in the procedures
8 is how long they have before they have to initiate the
9 actions.
10 The other operator action which is the
11 most involved evaluation concerned the steam generator
12 tube rupture analysis. Again this is not an actual
13 change to the operator action, but just something that
14 was identified as an action that is sensitive to the
15 power uprate.
16 And it was determined by the evaluation
17 that the operator actions in the analysis are bound by
18 the current licensing basis. The operators are not
19 required currently to terminate the break flow within
20 30 minutes.
21 And they used detail simulations to
22 determine that the operator actions still there are
23 relatively short amount of time credited for the
24 operators to complete the actions. They are bound by
25 the 30-minute time period which is in the current

1 licensing basis for steam generator tube rupture
2 analysis.
3 CHAIRMAN BANERJEE: So at one point, I am
4 just looking at the Ginna letter. We had some concerns
5 about the reduction in time available for various
6 operator actions, and though it turned out to be okay,
7 there were comments here that they used an EPRI
8 calculator to estimate these changes and we sort of
9 had worries that this would be the major n-factor of
10 the EPU which is on human performance.
11 So what does the staff think? Is there
12 going to be enough time for all these actions, or is
13 there real impact, because somebody who is now part of
14 the -- was part of the ACRS was concerned about it.
15 MS. MARTIN: The impact, as I understand
16 it from reviewing all the documents, is not to say
17 that the operators would not have time to complete the
18 actions, because the original time was 14 hours.
19 CHAIRMAN BANERJEE: Right.
20 MS. MARTIN: And the time was reduced to
21 four hours. The operator actions don't actually take
22 that long to complete, but the time were changed
23 because of other parts of the analysis.
24 So as far as this -- my review is
25 concerned, there wasn't a major impact on the

1 operators actually having time to complete their
2 actions, because there's such a big ratio, four hours
3 as opposed to a matter of minutes for them to complete
4 the action.
5 And the main reason why this was found to
6 be acceptable was because of the verification and
7 validation details that was provided as a part of the
8 evaluation, where they looked at the various number of
9 teams and time constraints and the ordering of the
10 sequence of the actions, all of the actions that were
11 involved with all of the emergency response scenarios.
12 So because of the detailed V&V that was
13 provided as staff requested more information
14 determining -- how did you determine whether or not
15 you can actually do all of these actions in this
16 accident scenario. So this wasn't a point of major
17 impact for the evaluation.
18 CHAIRMAN BANERJEE: So you are saying that
19 even though there was a very large effect on the time
20 available, time available was still so long that it
21 didn't matter, more or less?
22 MS. MARTIN: I wouldn't say it doesn't
23 matter, but I would say it does not adversely affect
24 the operators' ability to complete the action, because
25 the time was still large, and this was verified to the

1 staff because of how they explained their validation
2 process and all of the details that they looked at.
3 CHAIRMAN BANERJEE: This was -- the four
4 hours you are talking about, the boron, right?
5 MS. MARTIN: Right, the precipitation.
6 CHAIRMAN BANERJEE: Precipitation, right.
7 MS. MARTIN: So that's why the time
8 changed. It didn't change due to anything dealing with
9 human performance.
10 CHAIRMAN BANERJEE: Okay, let's go on.
11 MS. MARTIN: Okay. The next area we looked
12 at were changes to the control room displays and
13 alarms and including the SPDS. There weren't any
14 significant changes to the system or the control room
15 due to the uprate and the licensee described the
16 changes as mostly calibration and rescaling to account
17 for the power uprate.
18 And they also identified that the process
19 the they would use to make the changes would be in
20 alignment with their human factors design document,
21 which specifies certain human factors things that they
22 have to look at when they make these changes.
23 But these are just setpoint and
24 calibration changes mostly, so nothing significant in
25 this area.

1 And the last piece that is considered as a
2 part of the evaluation deals with the operator
3 training program and the control room simulator, and
4 the licensee has made commitments to providing the
5 training to the operators that is necessary before
6 implementation of the changes to the actual site
7 including the simulator, which is used -- they will
8 change the simulator to use and run different
9 scenarios that would align with all of the other
10 analyses that were a part of the uprate analysis.
11 Nothing significant in this area.
12 So the staff concluded that this -- that
13 their analysis was acceptable because of the issues
14 dealing with the operator actions not affecting their
15 ability to complete them or adversely affecting
16 operator performance, and we feel that they have taken
17 the necessary actions to identify all the changes that
18 need to be made and also included into their training
19 program and changes to the simulator and changes to
20 their procedures as a part of the uprate process.
21 CHAIRMAN BANERJEE: This is definitely not
22 my area of expertise so Jack, do you have anything?
23 John as well.
24 MEMBER SIEBER: I would I guess -- one of
25 these actions require operations outside the control

1 room, is that correct?

2 MS. MARTIN: The identified changes due to

3 the uprate were mainly operator actions that were in

4 the control room, yes.

5 MEMBER SIEBER: Okay. But nothing is new

6 outside the control room, right? No new actions were

7 required.

8 MS. MARTIN: There were no new identified

9 significant actions outside of the control room. In

10 fact these weren't actually new. They just were

11 sensitive to the uprate.

12 MEMBER SIEBER: Yes, that makes a big

13 difference because that automatically takes an

14 operator out of service for other things, when he has

15 to travel outside the control room, and makes the

16 communication more difficult and so forth. Okay, thank

17 you.

18 CHAIRMAN BANERJEE: Thanks.

19 MR. TSIRIGOTIS: Hi, my name is Alexander

20 Tsirigotis. I am a mechanical engineer for the

21 Mechanical and Structural Civil Engineering Branch.

22 The licensee provided the -- in the

23 licensing report, a summary of the evaluations that

24 they performed for EPU conditions, and we reviewed

25 their evaluations and results from those evaluations

1 for the structural integrity of the main components,
2 safety-related components of the plant.
3 These included the -- all the pressure-
4 retaining components and the supports, reactor
5 pressure vessel and supports, control rod drive
6 mechanisms, steam generators and supports, reactor
7 coolant pumps, pressurizer and supports, pressure
8 vessel internals and the core support structures, and
9 also the seismic and dynamic qualification of the
10 mechanical and electrical equipment. Of course the
11 seismic is not affected by the EPU.
12 When the staff did this review of the
13 licensee's evaluations, the reviews are based on the
14 codes and standards rule of 50.55a and we had to make
15 sure that the licensee uses codes and code additions
16 that are in the current design basis.
17 Also we looked at the applicable GDCs and
18 although the licensee -- the Point Beach was licensed
19 before the Appendix A of 10 CFR 50 was issued.
20 The licensee contains GDCs in their FSAR
21 that are, if not equal, at least comparable to the
22 GDCs that we look at, and the licensee provided a
23 comparison for these GDCs
24 we also looked at the SRP guidance and the
25 guidance that is provided by the NRC Review Standard

1 for Power Uprates, the RS 001.

2 So not only as far as the structural

3 integrity goes of the planned system specs for

4 components affected by the EPU, our system structure

5 is the main steam, condensate, feedwater, extraction

6 steam and heater drains, mainly because the EPU

7 increases the flow in the steam and feedwater by

8 approximately 22 percent.

9 CHAIRMAN BANERJEE: Is it 22 percent?

10 MR. TSIRIGOTIS: Yes, it's approximately

11 22 percent. I mean it's 21.7 is what I calculated. I

12 asked the licensee to provide me with tables which

13 show the parameters, the operating parameters, the

14 calibrating parameters and the parameters that will be

15 at EPU conditions.

16 CHAIRMAN BANERJEE: So it's more than the

17 percentage in power? The power increases 17 --

18 MR. TSIRIGOTIS: The power increases by 17

19 percent from the current, but from the original I

20 believe it's about 18.5 because they have a 1.5 MUR in

21 the past.

22 CHAIRMAN BANERJEE: Yes.

23 MR. TSIRIGOTIS: So, because of the flow

24 increases, it affects the stresses in the pipe because

25 in the steam line, you have the TSV fast closure

1 transient. In the feedwater you have the valves, the
2 control valves that close, you know, they could create
3 a water hammer that bounces back and forth from the
4 pumps and the valves until it attenuates.
5 The licensee evaluated the additional --
6 the effects of the additional flow, and they provided
7 us with values, with the pipe stresses, nozzle loads,
8 that include loads due to the increased flow mainly
9 from water hammers and steam hammers.
10 DR. WALLIS: They actually had estimates
11 of water hammer loads?
12 MR. TSIRIGOTIS: Pardon?
13 DR. WALLIS: Did they actually predict
14 water hammer loads?
15 MR. TSIRIGOTIS: Yes they did.
16 DR. WALLIS: And did they increase with
17 the EPU?
18 MR. TSIRIGOTIS: Yes they did.
19 DR. WALLIS: Why?
20 MR. TSIRIGOTIS: Because the flow is
21 increased, so --
22 DR. WALLIS: So when you bring it to rest
23 you have a --
24 MR. TSIRIGOTIS: Right, when you close the
25 thermal stop valve for instance.

1 DR. WALLIS: So these are water hammers --
2 MR. TSIRIGOTIS: Closes very fast.
3 DR. WALLIS: Due to valve closure.
4 MR. TSIRIGOTIS: Yes, yes.
5 DR. WALLIS: And not due to condensation?
6 MR. TSIRIGOTIS: No.
7 DR. WALLIS: Or something like that.
8 MR. TSIRIGOTIS: No, I don't believe so,
9 no.
10 DR. WALLIS: Okay, I understand that.
11 MR. TSIRIGOTIS: Yes, yes.
12 CHAIRMAN BANERJEE: But what -- they use
13 some computer quote to calculate these or --
14 MR. TSIRIGOTIS: Yes.
15 CHAIRMAN BANERJEE: they just did a hand
16 calculation?
17 MR. TSIRIGOTIS: I did not -- no, they
18 used a computer code to -- they calculated time
19 histories. That's how the whole thing starts, with
20 time histories so then they provide, you know, a
21 response.
22 CHAIRMAN BANERJEE: Which code, do you
23 remember?
24 MR. TSIRIGOTIS: I don't remember.
25 MR. BAIN: This is Bob Bain from Shaw. The

software to predict the forcing functions for main steam turbine trip was an in-house short call code, STEHAM. It's been benchmarked. It's qualified for reuse.

For feedwater we analyzed both the reg valve transients and the new FIV transients and we have an in-house call called WATHAM that has also been benchmarked against industry software for developing forcing functions for dynamic events.

CHAIRMAN BANERJEE: So this develops the forcing function, but then the hammer itself is some sort of a compressible calculation, right, that you have to --

MR. TSIRIGOTIS: It's a pressure --

CHAIRMAN BANERJEE: Pressure wave, yes.

MR. BAIN: Yes, it is, yes, and as Alexander said, it's a time-dependent dynamic analysis.

MR. TSIRIGOTIS: Right.

CHAIRMAN BANERJEE: And your code does this, this is --

MR. BAIN: Yes it does, yes.

MR. TSIRIGOTIS: That establishes a response, you know, forces frequencies and that response goes into the pipe stress analysis program,

1 yes, that combines these.

2 MEMBER SIEBER: These are all caused by

3 mechanical features like check valve closures and so

4 forth --

5 MR. TSIRIGOTIS: Right.

6 MEMBER SIEBER: as opposed to --

7 CHAIRMAN BANERJEE: Condensate pumps.

8 MEMBER SIEBER: traditional water hammer,

9 which is forming a steam bubble and having a steam

10 bubble --

11 MR. BAIN: This is no -- this is not void

12 formation.

13 MEMBER SIEBER: Right, and it seems in my

14 experience that the condensation type water hammers

15 are more sever.

16 MR. TSIRIGOTIS: Yes, they are, because

17 they pile up. When the steam comes into play, it piles

18 up that water right up against that elbow and takes it

19 home.

20 MEMBER SIEBER: And so you really haven't

21 analyzed every water hammer event. You have analyzed

22 the ones that are a function of system operations?

23 MR. BAIN: Yes, these are anticipated

24 design transients. Those events you mentioned like

25 steam bubble collapse, void formation, those are

1 unanticipated transients and basically the system
2 design is -- at the plant is to prevent those,
3 preclude those events from happening.
4 Those are not anticipated transients, yes.
5 MR. TSIRIGOTIS: Usually the plants and
6 the lines like the bypass lines and things like these,
7 they have drains to drain the condensate when this
8 line is not in operation, you know, so that when it
9 needs to go into operation, you don't have that much
10 of an accumulation of condensate in the line.
11 But you are right, those steam hammers or
12 water hammers can be --
13 MEMBER SIEBER: Severe.
14 MR. TSIRIGOTIS: I have experienced those
15 myself in plants and they are not fun to deal with. So
16 the licensee found out that a lot of the systems and a
17 lot of the piping needs to be replaced mainly in the
18 feedwater extraction steam and heat drains.
19 In the main steam, they didn't have to
20 replace any line. They only had to do repairs of pipe
21 supports.
22 DR. WALLIS: They had to replace them
23 because of these structural considerations?
24 MR. TSIRIGOTIS: Pardon?
25 DR. WALLIS: They had to replace the line

1 because of these dynamic effects?

2 MR. TSIRIGOTIS: Well, some of the piping

3 had to be replaced to accommodate replacement of

4 equipment, like the feedwater pumps had to be

5 replaced, and the heaters had to be replaced. Some of

6 the drains of the heaters had to be replaced. So --

7 DR. WALLIS: They didn't have to be

8 replaced because of these dynamic effects?

9 MR. TSIRIGOTIS: No, I don't think so. No.

10 I don't believe so

11 MR. BAIN: Again, Bob Bain from Shaw. All

12 the piping replacements that were performed as part of

13 the EPU were only because of plant equipment and

14 configuration. None of the piping was replaced due to

15 loadings.

16 MR. TSIRIGOTIS: It was to accommodate

17 replacement of major equipment.

18 MR. BAIN: Supports were, but not piping.

19 MR. TSIRIGOTIS: Right, supports yes,

20 supports were added on the lines to accommodate for

21 the higher loads and also existing supports were

22 reworked or are planned to be reworked. It was a total

23 of about 130 pipe supports. I asked the licensee to

24 provide me a list of the supports and the different --

25 and a description of the different repair work that

1 they needed to do to them, mainly welding, add braces,
2 replace struts and springs with different sized ones,
3 stuff like that.
4 So we made sure that the evaluations of
5 Point Beach were done with the current design basis
6 codes and we made a comparison of the stresses. We
7 received the summaries of pipe stresses and loads of
8 nozzles and compared those with the allowable ones and
9 they met the allowable value.
10 CHAIRMAN BANERJEE: So these short codes,
11 are they accepted for this sort of thing? What's the -
12 -
13 MR. TSIRIGOTIS: Yes, they are, yes. The
14 design basis codes of the plant are accepted. Some of
15 them are mentioned in the FSAR as well, and where the
16 licensee used a different code from the original code
17 of construction, they provided enough justifications
18 to show that either reconciliation exists, or they
19 reconciled the differences.
20 CHAIRMAN BANERJEE: Well, I imagine a lot
21 of the codes were different, right?
22 MR. TSIRIGOTIS: Yes.
23 MEMBER SHACK: That's my question.
24 MR. TSIRIGOTIS: This is an older plant
25 and the original code of construction for piping was

1 the B31.1 of 67 and later on different evolutions took
2 place, wherein the licensee had to use different
3 codes, like for instance, with 7914 walkdowns,
4 estimates of systems had to be taken. Those were
5 evaluated with a 1977 code before the licensee has
6 code reconciliation, a formal code reconciliation for
7 those two codes, you know, and that's what they used
8 for pipe stress analysis.
9 MEMBER SHACK: But there's the code and
10 then there's the analytic code that is used to do the
11 analysis. I assume that's different too, but that has
12 been -- how is that accepted?
13 MR. TSIRIGOTIS: Well, sometimes you might
14 have a different code for installation and you might
15 have a different code for analysis. Is that what you
16 are going to?
17 MEMBER SHACK: Yes.
18 MR. TSIRIGOTIS: Okay.
19 MEMBER SHACK: Well no, there's the
20 acceptance code and then there's the computer code
21 that actually does the calculations.
22 MR. TSIRIGOTIS: Oh, the computer code, I
23 was not talking about the computer code.
24 MEMBER SHACK: I know you weren't.
25 CHAIRMAN BANERJEE: We understood that but

1 --

2 MR. TSIRIGOTIS: All right. Okay. All

3 right. The computer codes that the licensee used are

4 pipe stress analysis codes --

5 MEMBER SHACK: Are those reviewed and

6 accepted by the NRC?

7 MR. TSIRIGOTIS: Those are codes that are

8 not necessarily reviewed by the NRC but they are codes

9 that they have a QA program and --

10 MR. BAIN: The piping code that was used

11 on Point Beach is NUPIPE. NUPIPE was benchmarked in

12 the 1979 vintage, when we had those bulletins 79.02,

13 79.14, 79.07, the time, the software at the time Stone

14 and Webster was using, now Shaw, NUPIPE was

15 benchmarked with the usual 72 classic coffee table

16 hov-guard bend, the full suite of NRC required sample

17 problems.

18 So the software is fully benched against

19 NRC standards.

20 MEMBER SHACK: So it's a `79 vintage

21 benchmarking, it's still --

22 MR. BAIN: Yes, and we -- and Shaw has a

23 V&V in-house program that -- standards that as we

24 upgrade and change modules, we continually, the last

25 time about a year or so ago, ran the same suite of NRC

1 benchmark problems that we always do, which as
2 Alexander said, is a corporate requirement to keep
3 that software NRC-qualified.
4 CHAIRMAN BANERJEE: What about the water
5 hammer codes?
6 MR. BAIN: The water hammer codes were
7 reviewed not officially by the NRC. We have done in-
8 house benchmarks against RELAP, which is you know, a
9 code used oftentimes by the NRC.
10 DR. WALLIS: RELAP?
11 MR. BAIN: Yes, RELAP5.
12 DR. WALLIS: RELAP predicts water hammer?
13 MR. BAIN: Yes, it does.
14 CHAIRMAN BANERJEE: Well, it predicts
15 pressure.
16 MR. BAIN: Yes, yes. It does not predict
17 loads. These are pressure time histories, yes.
18 CHAIRMAN BANERJEE: The only problem with
19 things like RELAP, and I am sure with your code, is
20 there's a lot of numerical diffusion, which is why we
21 don't use them as water hammer codes normally, which
22 is why Stan Fabic, when he was at Westinghouse, wrote
23 WHAM, which is a method of characteristics code, it
24 doesn't diffuse.
25 But I am not going to follow up on this

1 right now. But I imagine WHAM still exists somewhere
2 in Westinghouse.
3 MEMBER SIEBER: Good name for it, too.
4 CHAIRMAN BANERJEE: All right.
5 MEMBER SHACK: Well, you mentioned your
6 code does FIV too, also?
7 MR. BAIN: Yes, the FIV, the new FIV,
8 again Bob Bain from Shaw. FIV actually has two
9 scenarios. One is the rapid closure of those forcing
10 functions as Alexander said, were addressed from a
11 dynamic point of view, but the FIV also is included as
12 part of the structural model of the feedwater piping
13 for its added weight and just configuration change
14 that was required to instal the new FIV.
15 MR. TSIRIGOTIS: For flow-induced
16 vibrations, Point Beach has a program in place where
17 they have performed the walkdowns, but I think it was
18 about five or six walkdowns --
19 MR. BAIN: Yes, we are up to seven now,
20 but yes.
21 MR. TSIRIGOTIS: And they looked at
22 piping. They took data, and they established a base
23 line. Then during the outage, at different plateaus
24 during the EPU, at different plateaus in the start-up,
25 they will inspect these lines and will take more data,

1 and they will compare the data.

2 If they find out that -- the data are

3 compared, the results of the flow-induced vibration,

4 the criteria for the displacements for the flow-

5 induced vibration are the ASME OM part three, and

6 that's what the licensee is going to use to see if

7 there's any issues with flow-induced vibration and

8 they need to take action.

9 The OM part three provides inspection

10 criteria for displacements that did arrive from the

11 pipe diameter, the spans of the pipes that supported

12 that, and the alternate stresses.

13 MEMBER SHACK: -- to get to an endurance

14 limit.

15 MR. TSIRIGOTIS: Right, and they use

16 alternating stresses, you know, the endurance limit,

17 and things like that.

18 CHAIRMAN BANERJEE: What about internal

19 vibrations?

20 MR. TSIRIGOTIS: The internal vibration

21 for the vessel internals?

22 CHAIRMAN BANERJEE: No, no, no, the vessel

23 is less important.

24 MR. TSIRIGOTIS: Or the steam generator

25 internals, is that what you are referring to? For the

1 internals of the steam generator, the licensee looked
2 at the additional flow, excuse me, looked at the
3 additional flow that the EPU will add.
4 They also looked -- there's a bulletin
5 88.2 that was issued on the fluid elastic stability
6 ratio.
7 CHAIRMAN BANERJEE: 88.2. Yes. Go ahead.
8 MR. TSIRIGOTIS: And in there, the elastic
9 fluid stability ratio has been established as one,
10 which looks at the effective velocities and not
11 critical velocities you know.
12 And the licensee followed that bulletin
13 and provided justification that the fluid elastic
14 stability ratio will not exceed one.
15 CHAIRMAN BANERJEE: So how did they do
16 that? Because the licensee did not have a clear answer
17 as to what the velocity was at the tube bend.
18 MR. TSIRIGOTIS: At the tube bend? I'm not
19 quite sure how they performed that. They used the
20 alternated stresses endurance limits and --
21 DR. WALLIS: How did they know the
22 amplitude though?
23 MR. TSIRIGOTIS: The amplitude?
24 DR. WALLIS: Of the oscillation, if there
25 was one?

1 CHAIRMAN BANERJEE: I assume there's
2 vortex shedding which drives the -- but they have to
3 know the velocity and we didn't get a clear answer yet
4 on this. They are trying to get it for us. I am just
5 wondering, did they actually look at this?
6 MR. TSIRIGOTIS: The actual velocity?
7 CHAIRMAN BANERJEE: Yes, otherwise how do
8 you calculate the vortex shedding?
9 MR. TSIRIGOTIS: The ratio of the two
10 velocities.
11 CHAIRMAN BANERJEE: Right.
12 MR. DOMINICIS: I was going to say, this
13 is Dave Dominicis from Westinghouse. We had the --
14 velocity is known. We did not have it yesterday at the
15 time when the question was asked.
16 CHAIRMAN BANERJEE: Right.
17
18 MR. DOMINICIS: But it's in the
19 calculations.
20 CHAIRMAN BANERJEE: Do you have it now?
21 MR. DOMINICIS: Yes, we have it.
22 CHAIRMAN BANERJEE: So you have it now and
23 you can tell us what it was?
24 MR. DOMINICIS: Steve has it, I think.
25 That was one of the open issues.

1 CHAIRMAN BANERJEE: Okay, so that was the
2 open issue?
3 MR. DOMINICIS: Yes, it wasn't that it
4 wasn't known, it just -- we didn't have the answer
5 yesterday.
6 DR. WALLIS: If we know, what are we going
7 to with the value?
8 CHAIRMAN BANERJEE: It's a two-phase flow,
9 right?
10 DR. WALLIS: We know there have been fewer
11 such interactions at the top of steam generators, and
12 tubes have shaken, but I'm not aware of a technology
13 that really is predicting that, so I don't know what
14 to do if I am told a velocity.
15 CHAIRMAN BANERJEE: Well, in two=phase
16 flow the only work that is significant in this area
17 was by Michel Pettigrew at Chalk River, which I know
18 of.
19 DR. WALLIS: Is there a criterion of some
20 sort?
21 CHAIRMAN BANERJEE: Well, I think he did,
22 but I'm not sure that -- where this is coming from,
23 because what is the basis of the -- that you are
24 looking at for the vibrations, the oscillations that
25 you might get in this tube bend region, and even in

1 the longitudinal region, for the two-phase flows.
2 Because you are now at a higher velocity,
3 right?
4 DR. WALLIS: Right.
5 CHAIRMAN BANERJEE: You are 20 percent
6 higher or whatever, so how do we know what is going to
7 happen to the internals? It's experience, and that's
8 what they have been sort of pointing out to us, that
9 with other steam generators, that there are similar
10 conditions, though we haven't yet compared the
11 velocities.
12 DR. WALLIS: Right.
13 CHAIRMAN BANERJEE: Once we compare the
14 velocities, we will feel a little bit more
15 comfortable, but other than that is there any
16 predictive tool?
17 MR. TSIRIGOTIS: Other than the history of
18 similar steam generators that they haven't had any
19 issues in the past?
20 CHAIRMAN BANERJEE: Yes.
21 MR. TSIRIGOTIS: Other than that?
22 CHAIRMAN BANERJEE: Is there any
23 predictive tool, that is really what he is asking,
24 Professor Wallis.
25 MR. TSIRIGOTIS: The prediction is only if

1 you, I guess, if you know the velocities, okay.
2 CHAIRMAN BANERJEE: Which they know, they
3 are saying.
4 MR. TSIRIGOTIS: Yes, if the velocities
5 are known, there is a critical velocity at which the
6 component will not be acceptable, which reaches a
7 velocity.
8 DR. WALLIS: This is a Strouhal number,
9 this is a sort of a --
10 MR. TSIRIGOTIS: Right.
11 DR. WALLIS: vortex shedding around the
12 pipe that --
13 MR. TSIRIGOTIS: So they take the ratio of
14 the two and --
15 DR. WALLIS: And they compare this with a
16 frequency, a natural frequency or something?
17 MR. TSIRIGOTIS: That's a different -- I
18 believe that's a different calculation of the natural
19 frequencies.
20 DR. WALLIS: Find the oscillation, is that
21 it? It's not like the telephone wire oscillation, is
22 it?
23 MR. TSIRIGOTIS: No.
24 CHAIRMAN BANERJEE: I guess we can ask the
25 applicant, because that is an open issue, but from

1 your point of view, really, how did you satisfy
2 yourself that whatever they did, this was one of the
3 main issues that we were concerned about, was the
4 increased potential for vibration due to the increased
5 flow.
6 MR. TSIRIGOTIS: Right.
7 CHAIRMAN BANERJEE: And particularly of
8 internals. We know that externally you can do
9 inspections and so on, and satisfy yourself that as
10 you go up slowly. But what's happening internally is
11 not so easy to see so that is what we were asking.
12 MR. TSIRIGOTIS: Well, once they stated
13 they followed the bulletin 88.02 and the fluid elastic
14 stability ratio and the -- and for that in their
15 evaluations they have also shown that the flow-induced
16 vibration remains below the endurance limit, we --
17 CHAIRMAN BANERJEE: Does the 88.02 -- I
18 don't know this bulletin -- apply to two-phase flows?
19 MR. TSIRIGOTIS: To what?
20 CHAIRMAN BANERJEE: To two-phase flows,
21 steam water flows? Because in this region, it's a
22 mixture.
23 MR. TSIRIGOTIS: The 88.02 bulletin came
24 out because I believe in one of the nuclear plants
25 like North Anna, there was a tube rupture. And I don't

1 have it with me, but --

2 CHAIRMAN BANERJEE: We can find the

3 bulletin, but it applies to this type of a problem?

4 MR. TSIRIGOTIS: Two-phase flow?

5 CHAIRMAN BANERJEE: Yes.

6 MR. TSIRIGOTIS: I don't remember off-hand

7 but I can look into it.

8 CHAIRMAN BANERJEE: Okay. If it applies to

9 two-phase flow then somebody evaluated some database

10 and came up with, you know, so that would be --

11 MR. TSIRIGOTIS: I'll take that action.

12 I'll look into it.

13 CHAIRMAN BANERJEE: Because in the region

14 of interest, which is near the tube bend, up where the

15 velocities are higher, before the separators, the

16 interest is to make sure that there aren't vibration

17 and fretting problems which can lead to enhanced --

18 MR. TSIRIGOTIS: Where there's tube wear.

19 CHAIRMAN BANERJEE: possibility of tube

20 wear, yes.

21 MR. TSIRIGOTIS: Right.

22 CHAIRMAN BANERJEE: Yes. Okay. I think

23 that's fine.

24 MS. ABBOTT: If I could add -- my name is

25 Liz Abbott and I am the director of EPU licensing for

1 NextEra and FPL. We certainly share the concern and
2 interest in our steam generator performance, you know
3 especially since the condition of our steam generators
4 right now is in very good shape, with very few tubes
5 plugged and no known active degradation mechanisms.
6 So in evaluating this EPU, we did
7 authorize Westinghouse, who is the engineer of record,
8 to evaluate all the impacts on the steam generators,
9 including the potential for flow-induced vibration in
10 the U-tube region.
11 My regrets that we did not bring our steam
12 generator from Westinghouse here to directly address
13 those questions, but we have been pulling up some
14 additional information per your request and I would
15 like to share a little bit of that with you today.
16 For Point Beach, at the entry to the U-
17 tube region the flow velocities are 19.7 feet per
18 second. In comparison, Kewaunee was 16.4 at their
19 current power level, Indian Point 2 is 17.6 and Indian
20 Point 3 was 18.4, so relatively close.
21 Certainly this is part of the evaluation
22 that is included in our licensing report, summarized
23 in our licensing report and has detailed evaluations
24 backing it up.
25 And as I mentioned, we too share that

1 concern, and certainly would not be proceeding forward
2 unless we were confident, based on the analysis of our
3 vendor, Westinghouse, to demonstrate --
4 CHAIRMAN BANERJEE: What about the tube
5 bend region?
6 MS. ABBOTT: Pardon me?
7 CHAIRMAN BANERJEE: What about the tube
8 bend region? What are the velocities?
9 MS. ABBOTT: That is the area that I am
10 referring to.
11 CHAIRMAN BANERJEE: This is in the tube
12 bend region?
13 MS. ABBOTT: Yes.
14 CHAIRMAN BANERJEE: Of what? Steam, water,
15 or the mixture?
16 MS. ABBOTT: This is the velocities in
17 that region --
18 CHAIRMAN BANERJEE: Velocities of what?
19 MS. ABBOTT: I'd have to get -- do you
20 know?
21 DR. WALLIS: It's high quality, yes.
22 CHAIRMAN BANERJEE: Is it steam with water
23 in it?
24 MS. ABBOTT: I would anticipate so, in the
25 U-tubes it hasn't been through the driers or

1 separators --

2 DR. WALLIS: It hasn't been dried yet.

3 MS. ABBOTT: at that point, so.

4 CHAIRMAN BANERJEE: Well, it hasn't been

5 through the drier, it's a two-phase mixture right?

6 MS. ABBOTT: Yes.

7 MEMBER SIEBER: It's going to be water

8 drops --

9 CHAIRMAN BANERJEE: So what's the void

10 fraction?

11 MR. TSIRIGOTIS: Right at the top?

12 CHAIRMAN BANERJEE: Yes.

13 (Simultaneous speaking.)

14 CHAIRMAN BANERJEE: We need a more clear

15 answer.

16 MS. ABBOTT: Yes.

17 MS. ABBOTT: But I guess the objective was

18 to show some relative comparison of where other plants

19 were operating and basically that would show that we

20 are within the four, five, six percent of where Indian

21 Point 3 is the closest, is operating at the projected

22 conditions.

23 DR. WALLIS: I think that's the state of

24 the art. There is no theory, it's just that this is

25 experience.

1 CHAIRMAN BANERJEE: Right. Well, but this
2 was our point of view, too, and that's valuable. So
3 you are saying that in the tube bend regions, some
4 sort of velocity, which we are not sure what it is, is
5 of the same -- what, yours is 19 whereas Indian Point
6 is -- the higher one is 18, Kewaunee is about 16,
7 right?
8 DR. WALLIS: What's done about it is to
9 hold the tubes with some kind of a stiffer support,
10 isn't it?
11 CHAIRMAN BANERJEE: It depends whether
12 there are broach plates, and yes, there's all sorts of
13 things we -- but really what we are asking the staff
14 here is how did they assure themselves that your
15 analysis, or your engineer's analysis was right. That
16 is what is going on right now. We will come back to
17 you in a moment. So let's go on.
18 MR. TSIRIGOTIS: Okay.
19 CHAIRMAN BANERJEE: Thank you.
20 MR. TSIRIGOTIS: So the licensee also has
21 in place monitoring for loose parts for the internals
22 of the steam generators with monitors at different
23 places like at the tube sheets of the steam generator,
24 and this monitoring system causes alarms if the
25 acoustic resonance reaches some specific value.

1 CHAIRMAN BANERJEE: What sort of monitors
2 are these?
3 MR. TSIRIGOTIS: This is loose-part
4 monitoring. They have a very comprehensive system from
5 what I understand, with a system of acousting monitor
6 sensors --
7 CHAIRMAN BANERJEE: Okay.
8 MR. TSIRIGOTIS: that are placed at
9 different locations and an alarm is initiated if the
10 sound energy level exceeds a preset threshold. So the
11 effect of the increased flow, of the increased EPU
12 flow, is checked during -- also during the two
13 outages, the first two outages on the steam generator
14 upper internals, they do inspections in the first two
15 outages after the EPU, to see if there is any issues.
16 CHAIRMAN BANERJEE: So these acoustic
17 monitors are on the tube sheet or how -- on the
18 outside?
19 MR. TSIRIGOTIS: The locations? On the
20 primary side of the steam generator tube sheet, and on
21 the secondary side of the steam generator tube sheet.
22 I would believe that the monitors are --
23 CHAIRMAN BANERJEE: Outside.
24 MR. TSIRIGOTIS: outside, I would believe
25 so, therefore the sensor -- some kind of a transducer

1 I would -- you know -- sets an alarm off.

2 CHAIRMAN BANERJEE: So it's below the tube

3 sheet, above the tube sheet and --

4 MEMBER SHACK: Well, I don't know what is

5 going to move the tube sheet.

6 CHAIRMAN BANERJEE: Yes.

7 MEMBER SHACK: All the components that are

8 not going to have flow-induced vibration.

9 MR. TSIRIGOTIS: Well, if anything --

10 CHAIRMAN BANERJEE: No, this is for loose

11 parts.

12 MR. TSIRIGOTIS: a loose part is going to

13 end up in that area.

14 DR. WALLIS: Oh, it's a broken part. I

15 thought you were listening for rattling. You're not

16 listening for rattling.

17 MEMBER SIEBER: That's right, you are

18 looking for high frequency --

19 DR. WALLIS: You are listening for things

20 banging around, loose things that are really loose, I

21 mean --

22 MR. TSIRIGOTIS: Right.

23 DR. WALLIS: they aren't attached to

24 anything.

25 MR. TSIRIGOTIS: Right.

1 DR. WALLIS: Okay.

2 CHAIRMAN BANERJEE: Suppose they find it,
3 what do they do if they do this, and -- what can they
4 do about it, loose parts rattling around?

5 MR. TSIRIGOTIS: Well, they will need to
6 determine whether they need to shut down and remove it
7 and see where it came from, they do a --

8 CHAIRMAN BANERJEE: But is there some sort
9 of a criterion which says that if the noise is more
10 than a certain amount, you've got to --

11 MR. TSIRIGOTIS: I don't know what the
12 threshold value is, but there is a threshold value I
13 believe, inputted into the device, that sets off an
14 alarm.

15 MEMBER SIEBER: My memory is not good on
16 this, but I think there is a certain frequency that
17 corresponds to loose parts that is different than
18 flow-induced acoustic noise, and if you hear it, you
19 probably have something. It comes then to a question
20 of whether you shut down right away or --

21 CHAIRMAN BANERJEE: Well, there's more
22 concern about this because the velocities are going up
23 and -- is that --

24 MEMBER SIEBER: More impacts.

25 CHAIRMAN BANERJEE: Yes, more impacts.

1 MEMBER SHACK: The application does have a
2 prediction of the wear rate due to the flow-induced
3 vibrations, and it has a predicted increase, and then
4 it -- they are all proprietary numbers so we can't
5 quote them.
6 CHAIRMAN BANERJEE: Right. This is the
7 Westinghouse analysis. Okay. Thank you. So let's move
8 on then.
9 MR. TSIRIGOTIS: Any other questions?
10 CHAIRMAN BANERJEE: No, I think it's
11 clear. Let's see. Bill do you have any questions, or
12 Graham, or --
13 DR. WALLIS: This is a point which isn't
14 covered by walkdown. This is an internal flow-induced
15 vibration.
16 MEMBER SHACK: I mean, they do make a
17 prediction and the staff does evaluate it, and found
18 it acceptable.
19 CHAIRMAN BANERJEE: So we have to ask why.
20 MEMBER SHACK: I'm not exactly sure who
21 did it, but somebody wrote that it was okay.
22 CHAIRMAN BANERJEE: I mean, the question
23 is, how was the evaluation done. I mean, not -- from
24 the staff's point of view, did you do any confirmatory
25 work or was it that you --

1 MR. TSIRIGOTIS: Any what?

2 CHAIRMAN BANERJEE: Did you do any

3 confirmatory work or did you --

4 MR. TSIRIGOTIS: No. I just looked at the

5 result values that they provided, what they provided

6 in the tables and that's where I based my deduction.

7 CHAIRMAN BANERJEE: Yes, so if the results

8 in the tables are right, then of course what you are

9 saying is it's acceptable. How do you know that they

10 are in the right ballpark, even, you know, this is a

11 very tricky business, the wear due to flow-induced

12 vibration.

13 MR. TSIRIGOTIS: How do I know that they

14 are in the right ballpark? That's the question?

15 CHAIRMAN BANERJEE: Yes, yes, roughly.

16 MR. TSIRIGOTIS: I compared the same

17 values -- I compared the data that they have with

18 previous plants also, and they seem to be in the same

19 realm.

20 CHAIRMAN BANERJEE: Yes, as we heard,

21 there's not too many plants which are -- I mean, even

22 the nearest ones are still lower velocities, so how do

23 you know what, based on the previous plants like

24 Indian Point or --

25 MR. TSIRIGOTIS: The ones that I looked

1 was Comanche Peak and Millstone, Millstone 3.

2 CHAIRMAN BANERJEE: Are they higher

3 velocity?

4 MR. TSIRIGOTIS: They are similar

5 evaluations.

6 CHAIRMAN BANERJEE: But if their flow-

7 induced vibration, then, you are saying they have

8 similar flows per unit area in the secondary side or?

9 MR. TSIRIGOTIS: No, those flows were

10 lower for -- they had -- the method of evaluation was

11 similar, that's what I was saying.

12 CHAIRMAN BANERJEE: Oh, okay. This was the

13 Westinghouse method.

14 DR. WALLIS: Does the method of evaluation

15 have a rho v squared or something in there which you

16 can use?

17 MR. TSIRIGOTIS: Yes. Rho v squared is how

18 you predict --

19 DR. WALLIS: Okay so your 22 percent

20 becomes a 40 -- 50 percent or something, when you

21 square it. Can you put that in a formula or something

22 and --?

23 MR. TSIRIGOTIS: Yes, there is a formula.

24 DR. WALLIS: So --

25 MEMBER SHACK: They modify the wear rates

1 by rho v squared, squared.

2 DR. WALLIS: The wear rate, and that's due

3 to shaking of the tubes, or something else?

4 MEMBER SHACK: Well that's shaking versus

5 you know, rubbing.

6 CHAIRMAN BANERJEE: And that's why you

7 need the void fraction, which is the question I was

8 asking, because otherwise you can't get rho.

9 MEMBER SHACK: They have turbulence

10 displacement values, fluid elastic instability values.

11 CHAIRMAN BANERJEE: Okay. I think we have

12 probably got what we can out of this, so let's move on

13 to the -- continue with this.

14 DR. WALLIS: Are we going to get an answer

15 though?

16 CHAIRMAN BANERJEE: We'll summarize. We

17 probably need to follow this up a little bit more, but

18 --

19 MS. KHANNA: That's fine, and we will take

20 an action on this as well.

21 MR. TSIRIGOTIS: Yes, I have already done

22 that.

23 COURT REPORTER: Could you identify

24 yourself please?

25 MS. KHANNA: I'm sorry. Meena Khanna.

1 MR. TSIRIGOTIS: The structural
2 evaluations that they perform, they met the design
3 basis code allowable values and the staff determined
4 that they were acceptable for the EPU conditions.
5 CHAIRMAN BANERJEE: Okay.
6 MR. TSIRIGOTIS: Any questions on the
7 structural integrity of any of the --
8 CHAIRMAN BANERJEE: I think by and large
9 we will ask each of the people here, but we also heard
10 from the applicant.
11 MR. TSIRIGOTIS: Yes.
12 CHAIRMAN BANERJEE: So they talked about
13 the walkdowns and explained in detail, also their
14 power ascension plans, so I think we have got a good
15 idea and you are helpful in saying that you have also
16 looked at it and concluded this was okay.
17 So we will come back in a moment but let's
18 have some -- any questions from Graham first, perhaps.
19 DR. WALLIS: Well, I think this steam
20 generator thing probably goes back to Westinghouse and
21 the way in which they evaluate these kind of issues.
22 They have a lot of experience --
23 CHAIRMAN BANERJEE: Well, that's separate
24 from the fact
25 that the staff is evaluating them.

1 DR. WALLIS: But there is a method and
2 it's been presumably checked with a lot of steam
3 generators. We just don't have that presentation here
4 today, so we can't evaluate it, but I think that's
5 where it is.
6 CHAIRMAN BANERJEE: Okay. So --
7 MEMBER SIEBER: Yes, you'd have to ask the
8 applicant, and they can ask Westinghouse if they want
9 to.
10 CHAIRMAN BANERJEE: Yes, but the main
11 point is that the staff is satisfied with that, you
12 know, in some ways we cannot -- yes, we can hear from
13 the applicant, but we don't have necessarily the
14 bandwidth to evaluate this in detail ourselves, I mean
15 we are looking to you to --
16 MEMBER SIEBER: Well, that's actually a
17 different question.
18 CHAIRMAN BANERJEE: Yes, that's the
19 question really.
20 MEMBER SIEBER: Well, what the staff knows
21 is the second question. But what the analysis --
22 DR. WALLIS: We haven't really been --
23 MEMBER SIEBER: shows is the primary
24 question.
25 DR. WALLIS: We haven't been presented

1 with a clear rationale, really. That's what I'm
2 missing, so --
3 CHAIRMAN BANERJEE: What you are saying is
4 that we need to hear from the applicant, and is that
5 your feeling too, Jack?
6 MEMBER SIEBER: Yes.
7 CHAIRMAN BANERJEE: Is that -- are you
8 satisfied with what is there, Bill, or do we need to
9 know more?
10 MEMBER SHACK: Well, you know, I have the
11 feeling that this is all Westinghouse proprietary
12 design information. I mean, you know, the flow-induced
13 vibration is a serious consideration they have to
14 design and you know --
15 CHAIRMAN BANERJEE: We can have a closed
16 session.
17 MEMBER SHACK: We could have a closed
18 session and go over it, but I think the real proof of
19 their analysis is that in fact they produce steam
20 generators --
21 CHAIRMAN BANERJEE: Which work.
22 MEMBER SHACK: that by and large work.
23 (Laughter.)
24 CHAIRMAN BANERJEE: When you say it like
25 that, yes.

1 MEMBER SHACK: There's many years of
2 experience to say that however empirically founded
3 their approach is, it's adequate for engineering
4 purposes.
5 DR. WALLIS: But what are the limits to
6 its application?
7 MEMBER SHACK: Well that's --
8 DR. WALLIS: Can you apply it to unlimited
9 velocity?
10 CHAIRMAN BANERJEE: That's what we are
11 trying to find out right now, right?
12 MR. HALE: My name is Steve Hale from
13 NextEra. You know, we had planned to go over our
14 action items and what we can do, we can actually
15 arrange to have the Westinghouse fellow that actually
16 performed the analysis on the phone, while we go
17 through those action items.
18 So there, I think you can, you know --
19 CHAIRMAN BANERJEE: That would be helpful.
20 MR. HALE: give you a chance to quiz him
21 in terms of some of these questions, because that's
22 the right person to talk to, I believe.
23 CHAIRMAN BANERJEE: Yes, all we want to
24 maybe satisfy ourselves with right now, is that this
25 is not an extrapolation outside the conditions --

1 MR. HALE: Understood.

2 CHAIRMAN BANERJEE: that's within the

3 wealth of the knowledge of what they have done before.

4 MEMBER SIEBER: Right.

5 MR. HALE: Right, so as one of those

6 action items, we will line him up, and -- yes, what

7 would be a good time, I guess?

8 CHAIRMAN BANERJEE: Well, at the end of --

9 I think what we can do is -- we have to go through the

10 process until we -- I think we should let the staff

11 finish their presentation.

12 MR. HALE: Okay.

13 CHAIRMAN BANERJEE: And --

14 MS. ABDULLAHI: We would need a break

15 because I would have to disconnect the people who are

16 listening to an open session and then have a closed

17 session set up, if that's what you want.

18 MR. HALE: I don't believe the phone call

19 with Westinghouse would have to be a closed session.

20 CHAIRMAN BANERJEE: We need simply -- yes,

21 if we --

22 MR. HALE: Just ask questions --

23 CHAIRMAN BANERJEE: Yes. If we needed to

24 have more information, we will let you know at the end

25 of the day, and that is a separate issue.

1 MEMBER SHACK: Well you do, for example,
2 seem to consider proprietary the increase in the
3 vibration, at least it's in the report as proprietary
4 information.
5 So I mean, if somebody asks a question, it
6 seems like they are going to get to proprietary stuff
7 pretty quickly.
8 CHAIRMAN BANERJEE: Well, we could do a
9 closed session. That's not a problem. All right. So
10 let's do this. What we will do is we will try to still
11 adjourn at about -- not adjourn, we will go off the
12 open session and we will have a break, maybe around
13 2:45 or probably -- and then come back around 3 and --
14 MEMBER SHACK: We should go through all
15 the open items first, all the action items we can
16 cover in an open session and just say this is the last
17 one.
18 CHAIRMAN BANERJEE: Yes, so we'll start
19 that at 3, and then this could be the last one and
20 then we will close it. All right. That is a good idea.
21 And then we will just close the session. Okay? And we
22 will just have a separate transcript kept for that.
23 It's the usual procedure.
24 Okay, so Mario, do you have any issues
25 that you need to pick up?

1 DR. BONACA: I am looking for a document.

2 CHAIRMAN BANERJEE: Okay. All right. I

3 think, Alexander, thanks very much. We will probably

4 end up with a couple of action items that we would be

5 interested in, but at the moment, let's move on now,

6 Terry, thanks.

7 We will move on to the HELB.

8 MR. JESSUP: Good afternoon. I'm Billy

9 Jessup from the civil mechanical engineering branch,

10 division of engineering in NRR.

11 I am going to be presenting the

12 information relative to the staff's review of the high

13 energy line break reconstitution, which was performed

14 in concert with the EPU.

15 As NextEra indicated yesterday in their

16 introductory slides, an effort was undertaken during

17 the EPU project to update the existing high energy

18 line break analysis.

19 During the reconstitution of the high

20 energy line break program, NextEra reassessed the

21 piping systems identified as high energy, and also

22 upated the methodologies used to postulate certain

23 break locations and determined the environmental

24 conditions resulting from a high energy line break.

25 The staff's review of licensee's proposed

1 updates was performed primarily by three branches:
2 myself in civil mechanical; Balance-of-Plant; and
3 containment and ventilation.
4 I'll be presenting the staff's review for
5 fluidity's sake, but the cognizant staff are
6 available.
7 As you will note on the slide, the primary
8 acceptance criteria related to high energy line breaks
9 is Point Beach General Design Criterion 40, which
10 requires engineering safety features to be adequately
11 protected against the dynamic effects and missiles
12 that could result from plant equipment failures.
13 Point Beach GDC 40 is similar to GDC 4 but
14 the construction permits for Point Beach were issued
15 prior to the issuance of the Appendix A GDC from part
16 50.
17 The current licensing basis requirements
18 related to the high energy line breaks at Point Beach
19 are based on the Giambusso letter criteria, which were
20 issued in 1972, and these included requirements
21 relative to the postulation of pipe failures outside
22 containment. Next.
23 CHAIRMAN BANERJEE: Who was Giambusso? I
24 don't remember that name, but was he a commissioner
25 or?

1 MEMBER SIEBER: I haven't heard that name
2 for a long time.
3 MR. JESSUP: Was he a branch chief or
4 director, assistant director, whatever, back in 1972,
5 someplace, yes, with NRC -- or AEC at the time, yes.
6 AEC,
7 CHAIRMAN BANERJEE: Was Vic Stello his
8 boss or did Vic Stello work for him?
9 MR. JESSUP: That I don't know.
10 MR. BELTZ: That predates me.
11 MEMBER SIEBER: It's hard to say.
12 DR. WALLIS: So the NRC started soon after
13 that?
14 MR. JESSUP: Pardon?
15 DR. WALLIS: You said it was AEC at the
16 time?
17 MR. JESSUP: Oh, 1972 was AEC.
18 DR. WALLIS: When was it NRC, that was
19 pretty soon after that?
20 MR. JESSUP: Seventy-four, 75, something
21 like that, that's when the break-out came.
22 CHAIRMAN BANERJEE: All right. Okay. Were
23 you born at that time?
24 (Laughter.)
25 MR. JESSUP: Okay. The review performed by

1 the staff in the Balance-of-Plant branch covered the
2 licensee's identification of high energy systems or
3 portions of the systems, jet impingement protection
4 measures, and flooding analyses.
5 Based on the pressure and temperature
6 criteria used to define high energy lines at Point
7 Beach, the licensee indicated that eight systems would
8 satisfy the criteria as a high energy line.
9 With respect to the protection measures
10 for pipe rupture and jet impingement, the staff found
11 the licensee's assess acceptable, given that the EPU
12 doesn't affect the existing pipe whip and jet
13 impingement protection features.
14 The internal flooding analysis performed
15 by the licensee, which included flooding due to high
16 energy line breaks, were deemed acceptable based on
17 the fact that the current internal flooding
18 evaluations are unchanged as a result of EPU.
19 CHAIRMAN BANERJEE: So, the second point,
20 the EPU does not affect this. Is it because -- I mean
21 you have got more energy that comes out, but you are
22 saying the rate at which it comes out is the same?
23 MEMBER SIEBER: Well, the pressure and the
24 temperature are the same.
25 DR. WALLIS: The initial effects are the

1 same, it's just breaking a pipe at a certain pressure
2 and temperature.
3 MR. SMITH: This is Ed Smith from
4 Balance-of-Plant. What's meant by that are a couple of
5 things. One, the criteria that they used is the same.
6 They are not changing their criteria.
7 CHAIRMAN BANERJEE: No question.
8 MR. SMITH: That's the main thing.
9 CHAIRMAN BANERJEE: Yes.
10 MR. SMITH: The protective features they
11 were proposing were the same. We did not look at every
12 individual break point and go inspect the plant, you
13 know, other people will do that as time goes on.
14 So basically, we are saying, guys, they
15 are not changing anything the way they have been
16 providing for jet impingement, from what was
17 previously approved.
18 DR. WALLIS: But also, I think, you need
19 to say that the phenomena are the same.
20 MR. SMITH: Right.
21 DR. WALLIS: And therefore these are
22 appropriate.
23 MR. SMITH: Yes.
24 DR. WALLIS: Right. Are they? If they
25 phenomena had been significantly changed, they might

1 be inappropriate. But the phenomena are essentially
2 the same. You've got the same pressure in the system
3 and the same temperature and the same fluid, the same
4 pipe, so it's the same break, isn't it?
5 CHAIRMAN BANERJEE: But not the same
6 quality.
7 DR. WALLIS: But not for last -- not for a
8 long time.
9 MR. SMITH: There may be slight
10 differences as far as -- in the cell things, but
11 overall what we are saying is the features that they
12 have and are proposing to keep in the criteria
13 for any additional that they may need, okay, basically
14 how they are going about it is the same as was
15 previously approved.
16 So we could conclude that for this aspect
17 of high energy line, it's going to be okay. It's okay
18 because it is the same that has been previously
19 approved.
20 CHAIRMAN BANERJEE: Well, but, I think you
21 have to in addition invoke what Graham is saying, that
22 -- or even as Jack says -- that the pressure
23 temperature of this in the single phase regions is the
24 same, so what issues from the jets is likely to be the
25 same, so the reacion forces and everything else are --

1 that that should be similar at least.

2 Okay, so -- I think we agree with that so

3 let's move on.

4 MR. JESSUP: Okay. The existing flood

5 mitigation features also remain adequate for EPU

6 implementation.

7 MEMBER SIEBER: Do you have pipe whip

8 restraints inside containment for steam lines? That

9 was sort of a common feature in the early plants.

10 MR. HANNEMAN: This is Harv Hanneman from

11 NextEra, Point Beach. No, we don't have specific pipe

12 restraints for steam line rates --

13 MEMBER SHACK: -- they went through a leak

14 before break analysis.

15 MR. HANNEMAN: But this -- the high energy

16 line break analysis relates to high energy pipe breaks

17 outside containment. So this particular topic here

18 does not relate to inside containment.

19 MEMBER SIEBER: Yes, when leak before

20 break became acceptable as an alternative, a lot of

21 people removed their pipe whip constraints.

22 MEMBER SHACK: Just on this one I am a

23 little confused. You say -- since they did come up

24 with additional breaks, when they adopted the new

25 methodology, does that mean that even with those new

1 breaks the flooding was okay?

2 MR. JESSUP: What the gentleman who

3 reviewed the flooding analysis said, is it's still

4 bounding with -- what they already have in their SAR

5 bounds anything, any additional or expansion,

6 whatever, of flooding as a result of the under EPU

7 conditions.

8 MEMBER SHACK: Okay, and the new breaks

9 require no new pipe whip or jet impingement features?

10 MR. JESSUP: That I cannot specifically

11 answer. What I said was the criteria, where they were

12 going to put them in, remains the same. Therefore, for

13 my part of assay -- the criteria is acceptable.

14 Whether or not they -- I assume that they

15 put them in, but have I actually verified that? No.

16 DR. WALLIS: I don't see how you can say

17 this is acceptable just because the criteria are

18 acceptable. I mean you can say I'm going to design

19 this thing using all the basic laws of physics. It

20 doesn't mean to say that whatever you design is

21 acceptable. You've got to say it's appropriate for the

22 use.

23 MR. JESSUP: Okay. You want to use that --

24 use the words, that's fine, yes. But the point is,

25 they say they are going to -- they have breaks, when

1 they have breaks, they are going to be looking at it
2 for jet impingement, if needed.
3 DR. WALLIS: They are going to be looking
4 at --
5 MR. JESSUP: And if needed, impingement
6 barriers will be installed.
7 DR. WALLIS: So they haven't done this
8 yet? They haven't done this yet?
9 MR. JESSUP: I -- they would have to be
10 done, I guess, prior to EPU.
11 DR. WALLIS: Yes, they would. Okay.
12 MR. JESSUP: Let them -- I'd have to ask
13 the licensee to address that.
14 MR. HANNEMAN: This is Harv Hanneman from
15 NextEra Point Beach again. We only identified a very
16 limited number of additional breaks. There was one
17 additional break in the turbine hall below the
18 operating deck and there is no safety related
19 equipment or critical components in that area, so we
20 determined it does not -- that particular new break
21 did not require any pipe whip restraints or jet
22 impingement features.
23 The only other additional breaks we
24 identified were, there was a three inch auxiliary
25 steam line that supplies the turbine driven aux feed

1 pump but the additional breaks were located in the
2 component cooling heat exchanger room.
3 We have pipe whip restraints and jet
4 impingement features in that room to cover an existing
5 or existing breaks which are very close to where the
6 new breaks were identified, and therefore we
7 determined that we were adequately covered by the
8 existing pipe whip and jet impingement features.
9 So that was the basis for determining that
10 no additional features were required.
11 MEMBER SIEBER: They put in a new train of
12 aux feed in each unit and all of that, from the pump
13 discharge, is HELB piping, right?
14 MR. HANNEMAN: Again, Harv Hanneman. The
15 aux feedwater additional piping is not high energy
16 line break. It does not meet the criteria for being
17 above 200 degrees and greater than 275 pounds, so --
18 DR. WALLIS: It is under pressure, but it
19 doesn't have the right temperature to be HELB?
20 MR. HANNEMAN: Correct. It's around 100
21 degrees Fahrenheit, so, it comes from the condensate
22 storage tank or the --
23 DR. WALLIS: How about the new feedwater
24 heaters? Aren't they -- don't they involve some new
25 HELB?

1 MEMBER SIEBER: Some are, some aren't.

2 MR. HANNEMAN: We did not -- based on our
3 analysis of pipe break locations, we did not identify
4 any new breaks in that area. As I said there was only
5 -- in the turbine well there was only one additional
6 break location that was in a main steam line below the
7 operating deck.

8 MR. JESSUP: Next slide. The mechanical
9 and civil engineering branch staff reviews the
10 postulation -- the criteria for postulating pipe
11 breaks and also the methods of analysis used for
12 evaluating dynamic effects resulting from any pipe
13 breaks.

14 With respect to the criteria used to
15 postulate pipe breaks outside containment, the
16 licensee proposed to utilize the 1977 edition of the
17 ASME code section III with winter `78 addenda.

18 MEMBER SIEBER: That plant's not built to
19 that code though, right?

20 MR. JESSUP: No, the code of instruction -
21 -

22 MEMBER SIEBER: -- there's more than one?

23 MR. JESSUP: There's a formal code
24 reconciliation to the provisions they are using. Based
25 on the use of this -- the revised provisions, the

1 licensee did indicate that new breaks would be
2 required to be postulated.
3 However the licensee stated that no
4 additional adverse dynamic effects will realize due to
5 the postulation of these new breaks.
6 Additionally, no whip restraints or
7 barriers were removed and the NRC staff concluded that
8 this criteria does provide reasonable assurance that
9 adequate protection exists, such that SSCs are
10 protected from the dynamic effects of postulated
11 breaks.
12 MEMBER SHACK: Okay, where I got confused
13 was they did this reconciliation in 1988, and now they
14 are reconciling the high energy line break, is that
15 the way it goes?
16 MR. JESSUP: Now, when I read these
17 submittal, they indicated that for EPU, they analyzed
18 these lines in accordance with this code, which they
19 have the reconciliation to.
20 MEMBER SIEBER: Right, I think the
21 original one was B31.1. They built the plant, got it
22 licensed and --
23 MEMBER SHACK: Right, it's just I am --
24 they did the original high energy line breaks with the
25 original code.

1 MEMBER SIEBER: Correct.

2 MEMBER SHACK: They reconciled in 1988,
3 and now in 2011, we seem to have a new HELB and I just
4 sort of wonder why it wasn't done as part of the 1988
5 --

6 MEMBER SIEBER: Where did it come from?

7 MR. JESSUP: I guess that's part of the
8 whole HELB reconstitution effort that was undertaken.

9 MEMBER SHACK: Okay.

10 MEMBER SIEBER: Well, when was the
11 reconstitution made? Was that just before the EPU or
12 is that --

13 MR. HANNEMAN: Harv Hanneman, NextEra,
14 Point Beach. We started a reconstitution project
15 before the EPU project started, and that was to
16 address some corrective action issues that were
17 identified, but we didn't have the proper
18 documentation to back up everything in our HELB
19 program.

20 And so when they started that, and then
21 the EPU project started, we made a decision that we
22 wanted to do all of the HELB reconstitution efforts at
23 the EPU conditions so we only had to do it once.

24 And so we just integrated the projects
25 together, and the EPU project absorbed the HELB

1 reconstitution into our project, and so we did
2 everything at EPU conditions then.
3 MEMBER SIEBER: Right, but up until a
4 couple of years ago, the plant complied with B 31.1.
5 MR. HANNEMAN: Yes, the original HELB --
6 MEMBER SIEBER: Reconstitution didn't
7 occur when --
8 (Simultaneous speaking.)
9 MEMBER SHACK: No, but they reconciled to
10 a new pipe code in 1988. That's where I get confused.
11 MR. HANNEMAN: But we didn't redo the HELB
12 --
13 MEMBER SHACK: You didn't redo the --
14 MR. HANNEMAN: at that time.
15 MEMBER SHACK: I wasn't sure what a
16 reconciliation meant if you didn't redo the HELB
17 analysis, I guess is another way of putting my
18 question, that you know, when you say you reconciled
19 it, I would have thought that somehow you would have
20 had to reconcile the HELB analysis too, but apparently
21 not.
22 MR. HANNEMAN: Well, the reconciliation
23 was kind of a generic reconciliation that the 1977
24 code met all the requirements of our original code of
25 record. That didn't mean we redid all of our piping

1 analysis at that time.

2 MEMBER SHACK: Say that again.

3 (Laughter.)

4 MEMBER SIEBER: This could go on for

5 another day.

6 MR. HANNEMAN: The reconciliation was a

7 comparison of the 1977 code to the original code of

8 record, which was the B 31.1, 1967, and it confirmed

9 that if you met the 1977 code edition with the winter

10 1978 addenda, that you would, by default, meet all the

11 requirements of the original B 31.1 code of record.

12 But we didn't immediately redo all of the

13 piping analysis or the HELP analysis at that time.

14 MEMBER SHACK: Yes, but I'm sort of with

15 Jack. I would have thought -- I would be interested in

16 showing the vice versa, that --

17 MEMBER SIEBER: Yes, but they didn't do

18 that.

19 MEMBER SHACK: if I met the B 31.1 I would

20 also meet the 1977. That's what I thought the point of

21 the reconciliation --

22 MR. HANNEMAN: But we didn't reconcile in

23 that direction, no.

24 MEMBER SIEBER: No, that's not what they

25 did. They said if I build something new, I am going to

1 build it to this newer code, but they didn't do
2 anything with the --
3 MEMBER SHACK: The older code.
4 MEMBER SIEBER: existing plant until now.
5 MR. HANNEMAN: Until now, when we redid
6 the high energy line breaks.
7 MEMBER SHACK: Okay, so now when you do
8 this, you do it to the `77 code, okay.
9 MEMBER SIEBER: It's a mind-twister.
10 CHAIRMAN BANERJEE: Bill, I hope you have
11 got this, between you and Jack, straight, because I
12 have no idea what is going on.
13 MR. BELTZ: There's a lot of logic
14 involved.
15 MEMBER SHACK: I think I understand it
16 now. That was a helpful discussion.
17 CHAIRMAN BANERJEE: Otherwise, continue
18 until you have.
19 MEMBER SHACK: Yes, continue.
20 MR. JESSUP: The review performed by the
21 containment and ventilation branch related to the HELB
22 program reconstitution, covered the mass and energy
23 releases resulting from high energy line breaks, and
24 the compartment and temperature -- compartment and
25 pressure and temperature responses due to HELBs.

1 The licensee's HELB analysis focused on
2 the compartments in the primary auxiliary building,
3 the containment facade and the turbine building.
4 For the determination of HELB mass and
5 energy releases, the licensee incorporated the use of
6 LOFTRAN, which is an NRC-approved code, and NRC's
7 RELAP5 code.
8 With respect to the compartment pressure
9 and temperature responses that resulted from HELBs,
10 the licensee incorporated the use of the GOTHIC code,
11 which has been approved for use by the NRC staff
12 previously in other sites.
13 During the staff's review, spot checks
14 were performed on several inputs related to the GOTHIC
15 analysis used in the high energy line break analysis.
16 The staff requested additional information
17 regarding how the inputs to the GOTHIC differed from
18 the inputs used in the current analysis of record,
19 which used the compare code.
20 And based on the information that the
21 licensee provided, the staff accepted the licensee's
22 revised licensing basis, which utilizes GOTHIC to
23 determine the pressure and temperature responses which
24 result from high energy line breaks.
25 And in summary, the staff reviewed the

1 licensee's proposed changes to the HELB program at
2 Point Beach and found them acceptable.
3 The review included the identification of
4 high energy lines, the break postulation criteria and
5 the environmental conditions associated with the
6 breaks.
7 And the staff concluded that all the
8 regulatory requirements related to the HELB
9 reconstitution, high energy line breaks at Point
10 Beach, remain satisfied following implementation of
11 the revised methodologies and the reasonable
12 assurances provided by the proposed changes.
13 CHAIRMAN BANERJEE: Okay. Questions?
14 MEMBER SIEBER: None from me.
15 CHAIRMAN BANERJEE: Graham, do you have
16 any questions?
17 DR. WALLIS: I guess it's all right. I
18 mean, there seems to be all this emphasis on the
19 methodology, and not on how it was used and what it
20 predicted, but I guess that's the way it works.
21 CHAIRMAN BANERJEE: Well, the predictions
22 I presume were acceptable.
23 DR. WALLIS: Well, the approach is
24 acceptable and the methodology is acceptable. Were
25 there any surprises or anything in what it predicted?

1 It was okay? Did you not look at what it predicted, or
2 it has to be done yet? It hasn't been done yet?
3 MR. SALLMAN: No, the pressures -- the
4 temperatures were predicted.
5 DR. WALLIS: They were predicted.
6 MR. SALLMAN: Yes, they were predicted.
7
8 DR. WALLIS: They were all reasonable.
9 MR. SALLMAN: Some of them were bounding -
10 -
11 DR. WALLIS: Okay.
12 CHAIRMAN BANERJEE: Were there any
13 problems with the predictions? That's really the --
14 MR. SALLMAN: I didn't see any problems.
15 CHAIRMAN BANERJEE: Okay. So the
16 methodology is okay and the predictions are okay.
17 MR. SALLMAN: Predictions are okay, yes.
18 CHAIRMAN BANERJEE: Because this staff is
19 all about methodology.
20 DR. WALLIS: Why didn't you say that? Or
21 is there something in the law that only makes you look
22 at the methodology? I mean, when you teach students
23 methodologies, it doesn't mean to say that what they
24 predict on exam is right.
25 CHAIRMAN BANERJEE: Well, they checked the

1 inputs and so on.

2 MR. SALLMAN: Yes, we checked the inputs,

3 assumptions and we asked were there differences

4 between the current and the --

5 DR. WALLIS: You checked the use of the

6 methodology?

7 MR. SALLMAN: Yes.

8 DR. WALLIS: Okay. Thank you.

9 CHAIRMAN BANERJEE: You did some

10 confirmatory calculations?

11 MR. SALLMAN: I had the GOTHIC file and I

12 checked the inputs, electronic file actually, and I

13 checked the inputs. You can blame me for the poor

14 summary slide.

15 CHAIRMAN BANERJEE: I think in your

16 previous slide, you state these things but probably

17 here you should too. Certainly this is a topic where

18 you are going to have to make a presentation to the

19 full committee, at least briefly, to outline what

20 happens. You might want to summarize that you find the

21 results acceptable too.

22 Bill do you have any questions?

23 MEMBER SHACK: No.

24 CHAIRMAN BANERJEE: Mario?

25 DR. BONACA: No.

1 CHAIRMAN BANERJEE: Okay, I think, then
2 that ends our --
3 MEMBER SIEBER: Open session.
4 CHAIRMAN BANERJEE: Yes, but we may want
5 to have a few questions to the staff about any other
6 topics, like the power ascension program, and you
7 know, testing, that you didn't want to make a
8 presentation but we said we might ask you about your
9 thoughts about that.
10 MR. BELTZ: We talked to the reviewer and
11 he should be available if you need.
12 CHAIRMAN BANERJEE: He will be available?
13 MR. BELTZ: I believe he said he would be
14 available this afternoon. He had something until 2
15 o'clock and he might be --
16 CHAIRMAN BANERJEE: Okay, so --
17 MS. ABDULLAHI: I need two minutes' break
18 because I need to call in Ivan.
19 MEMBER SIEBER: We were going to take a
20 break.
21 CHAIRMAN BANERJEE: Yes, let's -- yes, we
22 can take a break and then you can get Ivan on. We can
23 come back from the break and if your reviewer is here,
24 we will discuss power ascension and testing. If not,
25 we will go to the applicant and talk about maybe the

1 open items and then we will end up eventually with a
2 closed session, where we can ask about the
3 Westinghouse methodologies and results.
4 DR. WALLIS: When do I get copies of these
5 backup slide that I want to take with me that I
6 haven't got yet?
7 CHAIRMAN BANERJEE: Yes. We have the
8 copies of the backup slides, don't we?
9 DR. WALLIS: Where are they?
10 MS. ABDULLAHI: I think they have been
11 sent electronically, am I right?
12 DR. WALLIS: They have been sent
13 electronically?
14 MS. ABDULLAHI: Terry sent me an email I
15 didn't --
16 MR. BELTZ: We made plenty of copies of
17 backup slides.
18 CHAIRMAN BANERJEE: Okay.
19 DR. WALLIS: Where did they go?
20 CHAIRMAN BANERJEE: I think we can go off
21 the record right now, so let's go off the record.
22
23 (Whereupon, the above-entitled matter went off
24 the record at 2:20 p.m. and back on the record at 2:41
25 p.m.)

1 CHAIRMAN BANERJEE: Let's go back in
2 session. We are in open session still and I think we
3 want to deal with any open items that the applicant
4 may want to discuss. So we are in your hands, Steve.
5 MR. HALE: Okay.
6 MEMBER SHACK: That looks exciting.
7 CHAIRMAN BANERJEE: We like that.
8 MR. SALLMAN: Again, Steve Hale NextEra.
9 These are some of the plots out of the documents in
10 calculations related to the mixing volume question on
11 -- you know, we talked about in the lower plenum.
12 I have got Brett Kellerman here to explain
13 these, but these are various velocity plots and if you
14 would Brett, kind of summarize them and I will turn
15 the slides for you.
16 MR. KELLERMAN: Okay. Brett Kellerman from
17 Westinghouse.
18 CHAIRMAN BANERJEE: Do you want to come up
19 there?
20 MEMBER SHACK: It depends -- all you can
21 see --
22 CHAIRMAN BANERJEE: You can look at the
23 slide better there. Okay. Go ahead. Wherever you are
24 comfortable.
25 MEMBER SIEBER: You can see it here.

1 MR. KELLERMAN: Yes, just to set up the
2 scenario here, this is you know, where the problem
3 picks up on the boric acid build-up and accumulation.
4 The high-head pump on the cold leg has been stopped
5 and this is just injection into the upper plenum with
6 saturated 212 degree coolant.
7 The figure we have here is the liquid
8 phase velocity at the bottom of this low power
9 peripheral channel. You can see the net flow through
10 all the hash is negative into the lower plenum through
11 that region.
12 The next couple of slides or figures are
13 more average power channels. It's divided up in the
14 two sets of average channels defined by the structures
15 above in the upper plenum.
16 But here it is generally going around
17 zero, maybe slightly positive on average, and then the
18 next slide is a little bit more positive in the
19 average power channels, and the next slide is for your
20 -- the hot assembly where it is more clearly positive
21 up-flow into the core from the lower plenum.
22 DR. WALLIS: I don't know why you are
23 focusing on the lower plenum. You have got the water
24 coming in from the top.
25 CHAIRMAN BANERJEE: But this is right at

1 the bottom of the core.

2 DR. WALLIS: I know, but the -- you are

3 injecting into the upper plenum, right, and the water

4 goes down from the upper plenum down the low -- the

5 cold channels and comes up in the core and doesn't

6 that, and it's boiling in the core?

7 Doesn't that just inject boron into the

8 upper plenum, where there is plenty of dilution?

9 MR. KELLERMAN: The void fraction's pretty

10 low in the upper plenum.

11 DR. WALLIS: But there is water and you

12 are injecting into it.

13 MR. KELLERMAN: Oh yes.

14 DR. WALLIS: You are injecting more than

15 you need for boiloff.

16 MR. KELLERMAN: Yes.

17 DR. WALLIS: So you are carrying out

18 stuff.

19 MR. KELLERMAN: In the analysis we don't

20 take credit for --

21 DR. WALLIS: But I would think that is

22 where the action is, is the -- even if the lower

23 plenum did nothing, you would still be carrying boron

24 out from the upper plenum, because of the mixing in

25 the core and the injection --

1 CHAIRMAN BANERJEE: Can you give the
2 argument as to why you don't take credit for that? I
3 mean, this was a question which I asked as well, why
4 don't you take credit for entrainment out -- is there
5 a reason for it?
6 MR. KELLERMAN: I believe the challenge we
7 have run into there is since the injection is into the
8 upper plenum, the injected water could be impinging on
9 the structures in the upper plenum, and that is your
10 source of entrainment rather than the water that is
11 coming up entrained out of the pool --
12 DR. WALLIS: But if you are putting in
13 more water than you boil off it has got to go out.
14 CHAIRMAN BANERJEE: Well, that is what he
15 is explaining.
16 DR. WALLIS: But it doesn't matter whether
17 it's entrained or bubbles or whatever, it's got to go
18 out --
19 CHAIRMAN BANERJEE: No, he's saying the
20 water you inject in maybe going out and the other
21 stuff just circulates --
22 DR. WALLIS: I don't believe --
23 MEMBER SIEBER: It never goes through.
24 DR. WALLIS: that's ridiculous.
25 CHAIRMAN BANERJEE: It seems ridiculous,

1 but that's the assumption they have made all along, I
2 guess and it's pretty conservative --
3 MR. KELLERMAN: That's the licensing basis
4 for the plant, that they have --
5 CHAIRMAN BANERJEE: I understand the
6 rationale now.
7 DR. WALLIS: So it just squirts in there
8 and it goes straight out the break without falling
9 down and making a pool?
10 MR. KELLERMAN: The only amount that goes
11 down is what you need to replace the boiloff. And that
12 takes boron with it and --
13 DR. WALLIS: But that's ridiculous.
14 CHAIRMAN BANERJEE: Well it depends. The
15 velocity, Graham, is not very high. We shouldn't get
16 into an argument, but that is what they are doing.
17 DR. WALLIS: I know, I understand.
18 CHAIRMAN BANERJEE: It's less than a foot
19 per second coming out, so you may not have a huge
20 entrainment, but tell me, this is --
21 MR. KELLERMAN: This is at the inlet, not
22 the outlet.
23 CHAIRMAN BANERJEE: this is at the bottom,
24 yes. So his question was what is it at the top?
25 DR. WALLIS: Well, if it's a very low

1 velocity coming out, it's just bubbles then. It's not
2 droplets.
3 CHAIRMAN BANERJEE: It's within their
4 assumption structure, let's stay within it right now.
5 Okay, so now this is at the bottom of the core, and
6 you showed circulation patterns it seems to me.
7 How do you -- the question really was more
8 related to the penetration into the lower plenum, why
9 you can take credit for half that volume, right? So
10 this shows what you said, which is you get downflow
11 through the outer channels, upflow through the core,
12 it's about less than a foot per second going through
13 the -- up -- and a little big negative coming down.
14 Why is it penetrating into the --
15 MEMBER SIEBER: It's going to be sort of
16 like a manometer is it not?
17 MR. KELLERMAN: Well there's a number of
18 phenomena that would get mixing going in the lower
19 plenum. You could still have a convective type mixing
20 going on. Another is due to just instabilities driving
21 flow back and forth like a density wave oscillation or
22 geysering and chugging, that can induce a pretty
23 strong mixing in that region.
24 MEMBER SIEBER: Is this calculated or
25 measured?

1 MR. KELLERMAN: This is the code result.
2 MEMBER SIEBER: Code result.
3 MR. KELLERMAN: Yes, calculated.
4 CHAIRMAN BANERJEE: But let's follow your
5 argument for a moment. What you have got is let's say
6 saturated water coming down, liquid velocity. What is
7 the density of that water compared to the water in the
8 lower plenum?
9 DR. WALLIS: It's lighter isn't it?
10 CHAIRMAN BANERJEE: Is it lighter or
11 hotter?
12 DR. WALLIS: It's lighter than the boron
13 stuff.
14 MR. KELLERMAN: I probably should have
15 plotted up the temperatures from the analysis too, but
16 it should be pretty much at saturation in this lower
17 plenum region.
18 You know, maybe not at exactly at the
19 beginning of this figure, but very shortly thereafter
20 it would become saturated because it's a relative --
21 well for the analysis it's a big chunk of water but
22 relative to the amount of energy stored, like in the
23 reactor vessel valve or the -- there's some pretty
24 thick support plates in here too that the water, given
25 that there's nothing coming down the downcomer, it

1 would quickly go up to saturation.

2 CHAIRMAN BANERJEE: What's the density of

3 this going to be, compared to the lower plenum water?

4 If it is heavier than the lower plenum, then it will

5 go down.

6 MR. KELLERMAN: Right, as you build up

7 solute, our analysis here just --

8 CHAIRMAN BANERJEE: But the lower plenum

9 water is cold, or colder.

10 MEMBER SIEBER: It has to be colder.

11 CHAIRMAN BANERJEE: Is the lower plenum

12 water colder than this, 212, or --

13 MR. KELLERMAN: Not likely.

14 CHAIRMAN BANERJEE: Well what do you think

15 the temperature in the lower plenum is?

16 DR. WALLIS: How could it be warm? The

17 stuff is heated as it comes down through the core.

18 MR. KELLERMAN: Right, and there is no

19 cool water coming in anywhere. It's at saturation.

20 CHAIRMAN BANERJEE: The lower plenum, you

21 think, is also at saturation?

22 MR. KELLERMAN: Very close to it, yes.

23 DR. WALLIS: So stratification is driven

24 by density due to boron, then?

25 CHAIRMAN BANERJEE: So it goes down.

1 DR. WALLIS: So the boron goes down, sits
2 on the bottom of the lower plenum.
3 CHAIRMAN BANERJEE: That's what they are
4 saying, yes. Which is sort of reasonable. I think it's
5 okay. I understand the mechanism.
6 DR. WALLIS: But you don't understand the
7 whole thing do you?
8 CHAIRMAN BANERJEE: No, but I am not
9 worrying about that right now. All I am saying is that
10 if what -- if the lower plenum is at saturation, and
11 this is at saturation, this has boron in it --
12 DR. WALLIS: Then you are going to have
13 boiling in the core, if everything is at saturation
14 and you are removing heat. This will really stir up
15 the core.
16 CHAIRMAN BANERJEE: Yes, and this would
17 sink anyway, if the lower plenum is at saturation.
18 MR. KELLERMAN: Right.
19 CHAIRMAN BANERJEE: So I'm going to assume
20 that what you said is correct, which is that the lower
21 plenum is at saturation. If it is at saturation, then
22 the mechanism is clear. What happens is it comes down
23 from the outer channels and sinks, it sinks.
24 DR. WALLIS: How can it stay at
25 saturation? If it's heated it's going to boil.

1 CHAIRMAN BANERJEE: No, the lower plenum--
2 DR. WALLIS: It's going to stay at
3 saturation.
4 CHAIRMAN BANERJEE: This is water. This is
5 a liquid.
6 DR. WALLIS: Yes, but he says it keeps on
7 getting heat from the metal, then it is going to make
8 bubbles.
9 CHAIRMAN BANERJEE: This is at the bottom
10 of the core, right?
11 MEMBER SIEBER: It's underneath the core.
12 DR. WALLIS: But he said the lower plenum
13 is heated up by the metal, to saturation. Then if it
14 still gets heat, it's going to make bubbles, isn't it?
15 CHAIRMAN BANERJEE: Well, that's even
16 better, there'll be more mixing, correct?
17 DR. WALLIS: It will stir things up, yes.
18 CHAIRMAN BANERJEE: It'll sir it up.
19 MR. KELLERMAN: We're adding enough
20 coolant to remove decay heat plus any structural --
21 any --
22 DR. WALLIS: Yes but he'll have it coming
23 in the top.
24 MR. KELLERMAN: Right.
25 CHAIRMAN BANERJEE: Can you show us the

first picture you showed, the peripheral channels? I think all we want to do is satisfy ourselves that we see a mechanism for mixing in the lower plenum.

MEMBER SIEBER: Well there's two questions. One of them, is there mixing, second one, is 50 percent the right number?

MEMBER SHACK: Good enough number, yes.

MEMBER SIEBER: Okay.

DR. WALLIS: I think we need to get a much better picture of the overall phenomena that this is --

MEMBER SIEBER: Yes the percentage defines the item and what you are looking for is the time.

CHAIRMAN BANERJEE: Would you -- if you did a sketch of this with sort of -- did you do some form of a PIRT or anything --

MR. KELLERMAN: Yes, there's an Owners Group program and a number of projects to develop an approved methodology for the boric acid precipitation analysis that's separate from but in parallel to the GSI-191 work that you have been seeing for a number of years now.

We have done two PIRTs so far that have been provided to the staff. They should be available.

CHAIRMAN BANERJEE: Did you do one for

1 upper head injection?

2 MR. KELLERMAN: Not specifically, but the

3 phenomena are detailed that you know, I think we have

4 all the phenomena covered for this UPI design. It's

5 quite extensive, the detail in the PIRTs that have

6 been done.

7 CHAIRMAN BANERJEE: So the PIRT for the

8 case where you are coming down the downcomer and

9 through the plenum and up into the core, and stuff is

10 sinking down into the plenum, it's clear what is

11 happening and what you might be able to claim there

12 and you are saying half plenum or whatever, the stuff

13 in there.

14 But the upper head injection, the

15 mechanism, if I understand it is that some liquid,

16 which is shown there, penetrates down the peripheral

17 channels, goes down and if it's more dense than the

18 liquid in the lower plenum.

19 And if you make the extreme assumption

20 that the lower plenum liquid is at saturation, but not

21 boiling, so it's not mixing, this plume will still

22 sink, right?

23 DR. WALLIS: It depends on how much boron

24 it has in it, if it's just temperature.

25 CHAIRMAN BANERJEE: If they're the same

1 temperature --

2 DR. WALLIS: But I don't understand why it

3 should be at the same temperature. There's nothing

4 magical about it being at saturation.

5 MR. KELLERMAN: That's the conservative

6 assumption --

7 DR. WALLIS: How do you know if it's even

8 conservative?

9 CHAIRMAN BANERJEE: He's not assured of

10 it. He thinks that the lower plenum liquid might be

11 colder or something.

12 MR. KELLERMAN: It's not very likely

13 because we have shut off the --

14 DR. WALLIS: Then it's probably boiling

15 very gently, sort of simmering, because you are still

16 adding heat and you are not cooling it. Well I think

17 this can be resolved but I don't think we have enough

18 information at this meeting to do it, and I really

19 think you have to consider what happens at the upper

20 plenum.

21 That's probably -- there's probably much

22 more action and mixing going on from stuff being

23 injected from the core into whatever is being injected

24 than there is going on at the lower plenum, which

25 tends to be pretty stagnant apart from gentle

1 convection currents.

2 So the action is really between the core

3 and the upper plenum, isn't it? That's what I would

4 say.

5 CHAIRMAN BANERJEE: But that's not the

6 licensing basis.

7 DR. WALLIS: But that's ridiculous, to

8 assume things which have nothing to do with reality.

9 CHAIRMAN BANERJEE: Look Graham, that is

10 often the case.

11 DR. WALLIS: Well, I object to that.

12 CHAIRMAN BANERJEE: Yes.

13 DR. WALLIS: I think that that is

14 misleading and when it gets used in some new

15 situation, can actually give a bad answer, which is

16 really harmful.

17 CHAIRMAN BANERJEE: Well, you also must

18 say that the other case, not taking entrainment into

19 account --

20 DR. WALLIS: But it's not entrainment. If

21 you put extra water in, it has to go out. It doesn't

22 have to be entrained. It's got to go out.

23 CHAIRMAN BANERJEE: Well, what the

24 licensing basis I suppose of the calculation is that

25 the water you are adding, most of it is going out of

1 the break and only the amount that penetrates --

2 DR. WALLIS: But it won't do that because

3 it's got all the structure in the way to stop it.

4 CHAIRMAN BANERJEE: Yes.

5 DR. WALLIS: Well.

6 CHAIRMAN BANERJEE: I don't think we can

7 argue this here.

8 MEMBER SIEBER: We can't solve this here.

9 CHAIRMAN BANERJEE: We can't solve it. We

10 only want to know whether making the assumption of

11 half the lower plenum is reasonable or not. What you

12 are saying is that might not be reasonable, but the

13 fact remains that most of the water is going to you

14 know, that goes out, or some part of it, will be

15 coming from the core and will take the boron out in

16 any case.

17 So you are saying that there is a

18 different phenomenon which probably is --

19 DR. WALLIS: But the water that goes down

20 the cold channel has to come up through the core, and

21 that stuff has to go into the upper plenum, where it

22 is stirred up by all this stuff coming in through the

23 injection and taken away. What's wrong with that?

24 That's what happens.

25 CHAIRMAN BANERJEE: That's too close to

1 reality. All right. Are we -- you are not satisfied
2 with this? Are you going to --
3 DR. WALLIS: I -- well I am not satisfied
4 with this emphasis on the lower plenum.
5 CHAIRMAN BANERJEE: Okay.
6 DR. WALLIS: It's just not the main actor
7 you know.
8 CHAIRMAN BANERJEE: But are you going to
9 try to change the basis of --
10 DR. WALLIS: I'm just a consultant and my
11 job is to tell you what reality is. Your job as a
12 committee member is to get into regulatory space and
13 figure out what to do.
14 CHAIRMAN BANERJEE: God help us, yes.
15 Right. Okay, so I think that what -- the only thing
16 that might be useful is to blow this up a little so we
17 can look at the oscillations, and put it into the
18 record.
19 At the moment we can't -- it looks like
20 hash to us, you know. So we see some part of it
21 anyway. It looks to me like the velocity is negative
22 here, but just want to make sure that that is true,
23 and --
24 MEMBER SIEBER: A flow diagram would be
25 helpful.

1 CHAIRMAN BANERJEE: Yes, perhaps a sketch
2 showing what you feel is the --
3 MEMBER SIEBER: showing what the
4 passageways are and what --
5 CHAIRMAN BANERJEE: It's clear what you
6 are saying is it is coming down and it is coming up
7 and it is entraining some fluid from the lower plenum
8 as it goes up. Okay. So --
9 MEMBER SIEBER: That would help me.
10 CHAIRMAN BANERJEE: It would help, be
11 helpful.
12 MR. HALE: Okay.
13 CHAIRMAN BANERJEE: So before we move on,
14 just let me ask the other members, is there -- Graham
15 has already told us his objections. We understand
16 them. Mario, Bill, Jack, any questions? Okay.
17 So then we can move on. So the only
18 actions here is to give us a sketch of some portion of
19 this which is a little bit more --
20 MR. HALE: Okay.
21 CHAIRMAN BANERJEE: Okay, and to give a
22 little diagram showing what the flow pattern looks
23 like.
24 MR. HALE: Okay.
25 CHAIRMAN BANERJEE: Thanks.

1 MR. HALE: We had this curve put together,
2 I believe there was a question --
3 DR. WALLIS: Oh, could, I'm sorry, I'm
4 sorry, I'm trying to write up this thing. Could you
5 tell me how much you are injecting in the upper plenum
6 compared with how much you need to cool the core? You
7 are injecting a lot more? Or are you injecting just
8 enough to remove the decay heat?
9 MR. KELLERMAN: In this phase of the
10 accident, this is when the significant portion of the
11 RHR has to be diverted to the containment sprays for
12 the radiological purposes.
13 So the flow into the upper plenum is 500
14 gallons per minute and that's pretty low.
15 DR. WALLIS: What do you need to cool the
16 core by evaporation?
17 MR. KELLERMAN: I don't know the number
18 exactly off the top of my head. I could go calculate
19 it and be back in a few minutes.
20 DR. WALLIS: No, you could tell me before
21 I leave.
22 MR. KELLERMAN: Okay.
23 DR. WALLIS: Okay. Thank you.
24 CHAIRMAN BANERJEE: Just put it into the
25 record.

1 DR. WALLIS: Sorry.

2 MR. KELLERMAN: No problem. This is the
3 curve we had talked about earlier. This was looking at
4 the top of the strainers and then time, from the time
5 we were at the -- if you recall, two inches above the
6 sump, to the time that we reached the level where the
7 RWST was fully drained.

8 CHAIRMAN BANERJEE: Okay. That's useful.

9 MR. KELLERMAN: Okay.

10 CHAIRMAN BANERJEE: Yes. It tells us --
11 that was the point you showed us. Okay. Thanks.

12 MEMBER SIEBER: That's large-break.

13 MR. HALE: LOCA pressure temperature
14 curves, you know, I don't know, I guess he had escaped
15 there you go. Just let me get out of here. Then we go
16 to the backup slides.

17 There was some interest in looking at the LOCA
18 curves. This is LOCA. This is containment of course.
19 LOCA containment pressure versus time.

20 CHAIRMAN BANERJEE: When does your recirc
21 come on?

22 MR. HALE: The recirc would come in
23 approximately I believe for the single -- this is a
24 single train case I guess, to maximum pressure. You
25 are probably looking about an hour into the event. But

1 you are probably in here.

2 This is 24 hours here, and I would say you

3 are probably in the -- about an hour or so, would be

4 when you would actually, depending on how many trains

5 you have operating you are going to have a single RHR

6 pump pumping the RWST down at the --

7 DR. WALLIS: That's not 24 hours, is it?

8 That's three hours or something.

9 MEMBER SIEBER: Almost in the middle.

10 DR. WALLIS: You need 100,000 to get --

11 CHAIRMAN BANERJEE: 24 hours is right on -

12 -

13 DR. WALLIS: 24 hours is 100,000, not

14 10,000.

15 CHAIRMAN BANERJEE: That line there, the

16 green line is 24 hours.

17 DR. WALLIS: The green line, that's right.

18 MEMBER SHACK: The hundred, ten, yes, this

19 is 24 hours here.

20 DR. WALLIS: That's half way between

21 there.

22 CHAIRMAN BANERJEE: That's three hours.

23 MR. HALE: This is 24 hours here.

24 DR. WALLIS: Now this is a conservative

25 upper bound, isn't it, to containment pressure?

1 MR. HALE: Yes, this is what actual
2 containment pressure is calculated to be, assuming
3 worst case --
4 DR. WALLIS: Worst case -- the best
5 estimate would be lower.
6 CHAIRMAN BANERJEE: Right. But as you
7 showed in your previous curve, by the time your reset
8 comes on, your level is above the sump screen.
9 MR. HALE: That's correct.
10 CHAIRMAN BANERJEE: That's a conservative
11 calculation, the level, or not?
12 MR. HALE: Yes, it's conservative level,
13 assumes minimum volumes and in -- you know, it doesn't
14 include any spillage from the reactor coolant system,
15 it doesn't assume any spillage from the accumulators.
16 That's strictly RWST volume that goes into
17 that. So -- and of course, again, when you get into
18 smaller breaks, locations of breaks, it can all
19 change, but that is the minimum water level.
20 CHAIRMAN BANERJEE: Well LB-LOCA anyway,
21 that's a conservative --
22 MR. HALE: Right.
23 MEMBER SIEBER: The discharge is not
24 conservative with respect to NPSH. This is the top
25 estimate.

1 DR. WALLIS: That's the top, right.
2 (Simultaneous speaking.)
3 CHAIRMAN BANERJEE: But they don't need
4 any of those for NPSH. The level is above the --
5 MEMBER SIEBER: Well yes, you make it
6 before you --
7 CHAIRMAN BANERJEE: Yes, way above.
8 MEMBER SIEBER: You get there --
9 DR. WALLIS: This is what lets the water
10 temperature --
11 CHAIRMAN BANERJEE: Sorry?
12 DR. WALLIS: That's what lets -- this is
13 what lets the water temperature get to 250.
14 CHAIRMAN BANERJEE: Yes. But then it's
15 just simply water at saturation.
16 DR. WALLIS: Whatever it is, yes, whatever --
17 MR. HALE: In the -- that was pressure and
18 --
19 CHAIRMAN BANERJEE: What is that little
20 bump, the current MINSI, what does that -- why is it
21 going down and up there?
22 MR. HALE: I maybe --
23 DR. WALLIS: Someone's turned off the core
24 spray --
25 CHAIRMAN BANERJEE: Something is happening

there. Did you turn off the spray?

MR. HANNEMAN: This is Harv Hanneman from NextEra Point Beach. Previously we didn't put containment spray on, during the recirculation phase, so when you finish the injection phase, the spray is turned off and it's not restarted again so you -- it'll bump there and the current analysis, because of AST, we put containment spray on recirculation after the injection phase, so if that helps keep -- the spray into the containment helps keep the temperature down.

MEMBER SIEBER: Keep the pressure down, yes.

CHAIRMAN BANERJEE: Okay.

MR. HALE: And then -- and that's pressure and the temperature curves look like this. This is the 24-hour curve. This is containment temperature versus time.

CHAIRMAN BANERJEE: And again your recirc is coming on where, roughly here?

MR. HALE: Right here.

CHAIRMAN BANERJEE: Right above --

MR. HALE: Well no, that's where containment spray -- but again, depending on how many pumps are operating, it can be as soon as 20 minutes

1 or it can be as long as an hour or longer.

2 So hours 3600, so you know, this would be

3 right there, in here, yes in this region.

4 CHAIRMAN BANERJEE: So that's why you set

5 the temperature, if it's in equilibrium with the

6 pressure, would be 250.

7 MR. HALE: Right.

8 CHAIRMAN BANERJEE: But if it is

9 atmospheric, it would be 212.

10 MR. HALE: Exactly, exactly. Okay.

11 DR. WALLIS: It's a partial pressure,

12 that's why it's -- so is there is an issue here or is

13 it just we are being informed about the --

14 CHAIRMAN BANERJEE: No, we just wanted to

15 see what the pressures were when your recirc came on.

16 DR. WALLIS: Are we going to get all this

17 stuff given to us when we leave?

18 CHAIRMAN BANERJEE: I think the most

19 significant curve was the one that they showed us

20 where the water level --

21 DR. WALLIS: The level, yes, that's right.

22 MR. HALE: Now we had gotten a copy of the

23 power ascension test plan, but unless you have

24 magnifying glasses, it's very hard to read.

25 MEMBER SIEBER: I have one.

1 MR. HALE: I did ask Zeyna to print it
2 out, but once we looked at it, we thought it was just
3 too small to see. I mean we can hand it out if you
4 would like to see it but --
5 DR. WALLIS: Is it a graph or is this
6 words?
7 MR. HALE: This is at each power level
8 okay, we describe each power level and what we intend
9 to accomplish at each power level, and the checks and
10 tests --
11 DR. WALLIS: I think one thing that would
12 be useful would simply be power versus time as a plot,
13 you know, this is the first week and the second week
14 and so on.
15 CHAIRMAN BANERJEE: But you have got that
16 --
17 MS. ABDULLAHI: Can you put it on here and
18 then just magnify it?
19 MR. HALE: I may be able to do that.
20 MS. ABDULLAHI: Just magnify it. I can
21 give you the small one if you want.
22 (Simultaneous speaking.) MS.
23 ABDULLAHI: I am trying to do that but it was just --
24 MR. HALE: But I think that's a closed
25 session, so --

1 DR. WALLIS: And then the closed session.

2 MR. HALE: Yes, that's the last question

3 we have.

4 CHAIRMAN BANERJEE: So let's look at the

5 handout. Can you give us the handout?

6 MS. ABDULLAHI: The small one?

7 CHAIRMAN BANERJEE: Yes, just for our

8 records.

9 MEMBER SHACK: We'll take a look at it.

10 CHAIRMAN BANERJEE: And you have it

11 electronically, right?

12 MS. ABDULLAHI: I have it electronically.

13 (Simultaneous speaking.)

14 MR. HALE: Let me try to put it on my

15 flash drive here.

16 CHAIRMAN BANERJEE: I guess --

17 MEMBER SIEBER: This is a competence test.

18 CHAIRMAN BANERJEE: This is to see if you

19 are --

20 MEMBER SIEBER: Computer illiterate.

21 DR. BONACA: Are we going to review the

22 dispositioning of open items?

23 MEMBER SHACK: Sanjoy, what are we going

24 to do about the open items? Are they all going to be

25 addressed at the full committee? Presumably --

1 CHAIRMAN BANERJEE: We'll ask the staff
2 that question, of course, because also, you know, this
3 how we are going to handle this, needs to be
4 clarified, because they are looking at amendments and
5 things like that.
6 MEMBER SIEBER: As many as we can mark off
7 here, the better off we will be.
8 CHAIRMAN BANERJEE: The boron issue is no
9 longer an open item, at least if I -- the last version
10 of the SCR that we saw.
11 DR. BONACA: But we haven't seen --
12 CHAIRMAN BANERJEE: Well, it's on the CD
13 that Zeyna didn't send you.
14 DR. BONACA: That's right.
15 CHAIRMAN BANERJEE: Really, make sure you
16 get it.
17 MEMBER SIEBER: She sent enough stuff.
18 CHAIRMAN BANERJEE: Except she sent to me
19 the wrong CD, with the open item. Just take an action
20 on our part to make sure Mario gets the latest version
21 of the --
22 DR. BONACA: I got two copies of the first
23 --
24 CHAIRMAN BANERJEE: You got two copies of
25 the -- okay if you can't manage it, it's okay.

1 MR. HALE: Let's take a look.

2 MEMBER SIEBER: He's actually trying to

3 wipe out the G drive.

4 CHAIRMAN BANERJEE: Oh well, that's pretty

5 good.

6 MR. HALE: Let's see if I can shrink it

7 here.

8 MEMBER SHACK: Shrinking is not the

9 problem.

10 CHAIRMAN BANERJEE: Bill knows this.

11 DR. BONACA: I can see it. Close enough.

12 CHAIRMAN BANERJEE: The left -- if you go

13 to down and you'll see a negative, yes, and a

14 positive.

15 MR. HALE: Oh, there we go.

16 CHAIRMAN BANERJEE: You want to make it

17 any smaller?

18 MR. HALE: Let's just -- we can kind of

19 walk through it. If you look up above, at the top,

20 you'll see -- we start from the defueled condition,

21 pre-shutdown, that's pre-shutdown, but defueled.

22 Then we move into mode five and six. We

23 list the various testing that will be performed at

24 each stage, like over here in mode five and six. It's

25 the main feedwater isolation valve initial setup.

1 You'll see the work order tasks that are referenced
2 there.
3 Identified there, you see that there are
4 certain aspects of certain things that need to be
5 complete before you enter mode four. You see those as
6 mode four constraints here.
7 Moving on, you are looking at your mode
8 four testing and you will see -- in here you will see
9 not only the safety-related testing that you are
10 required to perform, but also, some turbine
11 supervisory EHC system, things of that sort.
12 Moving on to, you'll see here a safety
13 committee approval required for mode two and then you
14 will see low power physics testing here as we move
15 into actual start power ascension.
16 So you monitor rotating equipment, data
17 collection, low power physics testing of course.
18 Moving on through the power ascension, you
19 will see there's a --
20 DR. WALLIS: Do you have the timing here
21 somewhere?
22 MR. HALE: Mike, can you speak to some of
23 the
24 times that are currently planned for some of these
25 plateaus?

1 MR. MILLEN: Yes, Mike Millen, NextEra.
2 The -- part of the outage schedule, the schedule is
3 not totally finalized, but we -- most of those -- the
4 power -- actual hold points such as I mentioned
5 earlier at 30 percent power and 50 percent power,
6 those are also chemistry holds.
7 So it will be dependent upon chemistry and
8 reactor engineering completing flux maps of the core.
9 When we get into the actual power ascension activities
10 at the 85 percent power point and above, to the new
11 EPU limit that I mentioned are at three percent
12 increments as you can see there, those have -- will be
13 dual power escalation within our fuel conditioning
14 limits which will be less than three percent per hour
15 from 50 to 80, less than two percent from 80 to 90,
16 less than one percent from 90
17 to 100.
18 And there's scheduled time set for
19 approximately four hours for data collection, four
20 hours to analyze the data and then to prepare, resolve
21 any issues and go through the approval process they
22 had initially scheduled 24 hours.
23 so if you put that all together, just from
24 85 percent to 100 percent would be you know, a week or
25 a little over a week.

1 DR. WALLIS: So it's a clear --

2 (Simultaneous speaking.)

3 DR. WALLIS: -- between each three

4 percent.

5 MR. MILLEN: That's correct. That's the

6 current schedule. We are --

7 DR. WALLIS: When you said a week, I sort

8 of thought it was a week between the three percent.

9 It's actually a week for the whole thing.

10 MR. HALE: Yes, approximately.

11 DR. WALLIS: We earlier said a week, early

12 this morning, or someone said.

13 MR. MILLEN: Yes. And we are working on

14 that schedule. We are trying to revise that 24 --

15 CHAIRMAN BANERJEE: Do you have a

16 preliminary schedule, because this is very useful and

17 I can read it so it's fine.

18 DR. WALLIS: It is very easy to read.

19 What's the problem?

20 CHAIRMAN BANERJEE: Yes, it's no problem.

21 It's --

22 MS. ABDULLAHI: I guess I'm the only one

23 blind.

24 CHAIRMAN BANERJEE: But we do need -- it

25 would be nice to have if you have, you don't need it,

1 a timeline on this, because at the moment --

2 MEMBER SIEBER: You have to add them up,

3 yes.

4 DR. WALLIS: Well, what really matters is

5 the actual upgrade part, isn't it? I mean the rest of

6 it is preliminary, as you work up to current power.

7 That's not really very exciting.

8 CHAIRMAN BANERJEE: It's really 85 percent

9 on.

10 DR. WALLIS: That's sort of a day and a

11 half, two days per three percent.

12 MEMBER SIEBER: Right.

13 DR. WALLIS: So, assuming everything goes

14 well.

15 MR. HALE: That's correct.

16 CHAIRMAN BANERJEE: Well, also it's just

17 your estimate because clearly if things don't go well

18 you just back off and --

19 MEMBER SIEBER: That would be the

20 question.

21 MR. MILLEN: Yes, that's correct.

22 CHAIRMAN BANERJEE: Okay, so, let me sort

23 of -- if you stay there, we'll just ask the staff. You

24 have looked through this plan for the power ascension

25 and things like that, and one the things that they are

1 not doing are any of these large transient tests, so
2 can you just give us your sort of rationale for going
3 forward with it without the large transient tests?
4 MR. PETTIS: Is this on?
5 CHAIRMAN BANERJEE: I think it's on.
6 MR. PETTIS: This is Bob Pettis of the
7 staff, the division of engineering. Just as a little
8 background, our group is chartered with looking at the
9 power ascension test program in concert with some of
10 the other technical branches.
11 So since this particular application
12 primarily used the LOFTRAN simulations and analyses as
13 a justification for not performing some of the large
14 transient tests, we have asked some of our technical
15 folks from the reactor systems branch to take a look
16 at that basis, since they are the code experts.
17 And also on the secondary side, balance--
18 of-plant, we had the balance-of-plant branch take a
19 look at that, and I believe we have some tech staff
20 that can speak to that.
21 But as far as the question as to why not
22 perform large transient testing, the review of the
23 power uprate falls under two basic acceptance
24 criteria, one of which is Appendix D of part 50 and
25 also the Standard Review Plan, 14.1, which addresses

1 review criteria that the staff will take a look at in
2 every EPU application.
3 Some of what is in the SRP, which is
4 primarily in section 3, discusses criteria and
5 justifications for licensees, in the event they do not
6 plan on reperforming some or all of the original
7 start-up testing.
8 The thing that we have to keep in mind
9 with EPUs is that this is not a new plant license.
10 This is a license amendment. They already have an
11 operating license, and the original start-up testing
12 was done back in the `70s or so under Reg Guide 168 to
13 assure that the plant safety systems would perform as
14 designed.
15 So here it is 25, 30 years later. The
16 plants in general, in addition to Point Beach, have
17 gone through certain operating transients, usually
18 defined and designed for under chapter 15.
19 Many were after trips from full power,
20 some of which were manually induced and some were
21 based on anticipated operational occurrences. That
22 usually provides a large volume of technical data that
23 a licensee or an applicant can then use and perform
24 some analytical evaluation extended through the EPU
25 range, and pretty much come to the conclusion that if

1 all things are equal, there is really no need to
2 perform certain of the original start-up tests.
3 We have -- well the staff has reviewed
4 probably, I'm going to take a guess and say at least
5 20, 25 EPUs since the 2000 time frame, more on the BWR
6 side of the house than on the PWR side.
7 So for each one of these that is
8 performed, the industry gains much more experience
9 with respect to how transients interact with the plant
10 at EPU power, LERs are written and the database of
11 historical performance just becomes a little better.
12 With respect to the boilers, they have a
13 history all of their own. With respect to the PWRs,
14 for the most part the justifications that we have
15 seen, and Point Beach is specific, usually follows the
16 normal exception to performing the large transient
17 testing that we show in section three of the SRP.
18 We give the licensees credit if in fact
19 they can demonstrate in their license application
20 industry performance, plant-specific information, even
21 though most of the plant-specific information is not -
22 - did not occur at EPU power levels, they would then
23 go back and look at their analyses, like in the case
24 of Point Beach, they would look at LOFTRAN, and see
25 how that tracks and predicts, such that they may not

1 have to re-perform a large transient test.

2 The arguments in the past have been some

3 of these events are going to take place at EPU power

4 eventually. There are normal operating occurrences,

5 but really it's a little -- it may be a little too

6 much to use up a silver bullet so to speak at 120

7 percent of original license thermal power and just

8 trip the plant.

9 The arguments made are really what do we

10 gain from this and do we have any other basis for

11 saying that the plant SSCs will still perform as

12 design. That is pretty much the general argument.

13 In the case of Point Beach, one of the

14 RAIs that we had written for additional information

15 actually came back, from what I remember there was a

16 copy of the Ginna test report, which I thought was --

17 I don't know if this thing is working.

18 CHAIRMAN BANERJEE: It is.

19 MR. PETTIS: Is it? Okay. Which I thought

20 was pretty interesting because this was the first time

21 that at least I had seen a start-up test report at EPU

22 conditions for a recently approved EPU.

23 We approved -- I think we approved Ginna,

24 that was about a 16.8 percent EPU, which was

25 extremely, extremely large, especially on the PWR

1 side.

2 And we approved that 2005, 2006 time

3 frame. The start-up test report I think was dated

4 January 31st, 2007 and it was a good insight into how

5 does one of these post-EPU plants behave on start-up.

6

7 And the report came back and to summarize

8 the report, it basically was all systems operated as

9 designed and there were really no issues.

10 So on Point Beach, if you take a sister

11 plant -- although Ginna is not exactly, doesn't

12 exactly align itself with Point Beach -- but if you

13 look at Ginna, you look at Kenauwee, you look at some

14 of the other PWRs, you can pretty much make an

15 argument, if it's done technically robust enough, and

16 cite the SRP guidance in addition to the review

17 standard for EPUs, that there may not be a need to

18 repeat some of these larger transient tests.

19 Now, in the case of Ginna, they did

20 perform some large transient tests at full power, and

21 I think if my memory serves me correct, they may have

22 done that based on the extent of their balance-of-

23 plant modifications.

24 But aside from that, I don't believe the

25 staff has, in the case of PWRs in the past, has

1 required -- we have not required that a licensee, even
2 after their justification, perform one of these large
3 transient tests.
4 In the case of Point Beach, the reliance
5 or the basis for not doing it, was primarily a LOFTRAN
6 basis and I can't speak, I am not a technical LOFTRAN
7 person, but I believe reactor systems branch did a
8 very thorough job in challenging the licensee with
9 respect to modeling techniques.
10 Just because the program is NRC-approved
11 and it's been around in the industry for 30 years or
12 so, that doesn't necessarily mean that it was modeled
13 properly to account for some of these events.
14 And again, I can have reactor systems
15 folks talk to you based on that. So after a healthy
16 exchange back and forth between the staff and the
17 licensee, it was concluded that the basis for them not
18 doing these tests was adequate and provides reasonable
19 assurance that the safety systems will operate as
20 designed.
21 Now, that's not to say that every plant
22 shouldn't do these tests, but I think there's a cost
23 benefit and maybe even a risk of benefit in looking at
24 what information can really be gained that we don't
25 already know, either from actual plant performance,

1 from industry performance or from computer code
2 correlation simulation, and that's pretty much the
3 base argument for --
4 CHAIRMAN BANERJEE: Did you require any
5 large transient tests of Ginn?
6 MR. PETTIS: No. I don't believe we did.
7 CHAIRMAN BANERJEE: They just did it?
8 MR. PETTIS: They did it on their own, and
9 actually we have some EPUs in house right now on the
10 PWR side that have actually volunteered in their
11 application so to speak, to perform certain large
12 transient tests, simply because they want to make
13 sure, because they have changed the plant
14 significantly and there is -- the extent of the mods
15 require them to re-benchmark, re-validate their own
16 assumptions to make sure that everything is going to
17 be --
18 CHAIRMAN BANERJEE: So in this case, the
19 changes are not as extensive as Ginna?
20 MR. PETTIS: From what I remember of Point
21 Beach, no.
22 DR. BONACA: When the whole secondary
23 feedwater system is modified. I'm not sure that you
24 need an interim test to deal with that. I'm not
25 arguing that. But there is a significant modification

1 of the plant and it would be easy to understand how
2 that could affect the need for an interim test.
3 CHAIRMAN BANERJEE: We don't disagree with
4 your conclusion, we are just trying to understand the
5 --
6 MR. PETTIS: Well, I think we have
7 representatives from the tech branch both on the
8 balance-of-plant side and also on the reactor system
9 side.
10 So if it's a LOFTRAN-based type question,
11 we can easily address that, and on the balance-of-
12 plant side, I think there would be some good
13 information that would come out of that.
14 Sometimes on the balance-of-plant side,
15 they do recommend certain tests based on the extent of
16 modification but they are not large transient tests.
17 They may be more system, functional performance tests.
18 There's been -- I think personally I have
19 probably looked at every EPU that we have had on our
20 side of the staff and there may have been one boiler
21 back a long time ago that we recommended that they do
22 certain testing and then through some license
23 exception, that was pretty much removed.
24 So I think right now the industry just has
25 a lot of information and from application to

1 application, everyone cites pretty much the previous
2 information.
3 We are finding plants at EPU operating
4 conditions today that have had reactor trip events and
5 have sent in LERs, have all documented the fact that,
6 I mean, the buzzword is all systems respond as
7 designed. So one has to assume that they correlate
8 well with their analyses and the cost benefit of doing
9 some of these tests kind of outweighs really the input
10 that you are putting into it.
11 DR. WALLIS: But the ACRS has been over
12 this before and you said the same kind of arguments
13 were made, and the ACRS agreed with the staff, said --
14 MR. PETTIS: Yes. That was when we first -
15 -
16 (Simultaneous speaking.)
17 DR. WALLIS: -- were not necessary.
18 CHAIRMAN BANERJEE: Well, Ginna is the
19 only one which --
20 DR. WALLIS: Right, which is really --
21 CHAIRMAN BANERJEE: I think in recent
22 times it was as large a EPU as --
23 DR. WALLIS: But they chose to do it.
24 MR. PETTIS: We have some other benchmarks
25 here and because of the Vermont Yankee EPU --

1 CHAIRMAN BANERJEE: The boiler.

2 MR. PETTIS: Exactly. But we did testify

3 up in Brattleboro --

4 CHAIRMAN BANERJEE: I was there.

5 MR. PETTIS: the staff, I was there.

6 CHAIRMAN BANERJEE: Oh you were on the --

7 there was an ACRS --

8 MR. PETTIS: No, this was ASLB. It was

9 myself, and Zeyna and a few other people on the hot

10 seat but basically the contention was Vermont Yankee

11 should do these tests and we gave our arguments and

12 the staff concluded that they did not, and the bottom

13 line was they did not have to do them.

14 But again, I guess it boils down to these

15 are license amendment requests, they are not brand-new

16 facilities, not that we couldn't require them to do

17 it, but we have an SRP that was written that gives

18 some options and gives some staff guidance for a

19 plausible argument as to why we are not going to do

20 it.

21 And it's been borne out by plant operating

22 history, so it's kind of dovetailed together pretty

23 well.

24 DR. WALLIS: The history of boilers was

25 that GE originally recommended the tests.

1 MR. PETTIS: Right, these tests all came
2 and the GE ELTR topical report --
3 DR. WALLIS: That's right.
4 MR. PETTIS: which was the two volumes
5 long, they had a requirement for generator load reject
6 at greater than 15 percent power, excuse me, 15
7 percent EPU.
8 DR. WALLIS: That's what started the whole
9 debate, as I remember.
10 MR. PETTIS: Well, we came before ACRS
11 with the CPPU topical report for constant pressure
12 power uprate, in addition to rehashing this issue for
13 the boilers for probably 10 or 12 plants, and we have
14 visited this before so --
15 But again we look at each application
16 because when the staff approve the -- again this is on
17 the boiler side -- but when the staff approved the GE
18 topical report for constant pressure power uprate,
19 which was also approved by ACRS, we did not give a
20 blanket exemption for every EPU application such that
21 they didn't have to perform large transient testing.
22 So the staff's conclusion was each
23 application would have to be looked at on its own, and
24 we'll take it from there.
25 CHAIRMAN BANERJEE: Okay. I think that's

1 fine. What you are really saying is that this
2 application falls within the universe of what you have
3 looked at previously and the experience we have and
4 that that's the real rationale, supported by LOFTRAN
5 calculations.
6 MR. PETTIS: Right, supported by really
7 balance-of-plant review of the modifications and
8 reactor systems branch review of the applicability of
9 LOFTRAN in this case to the log transient tests.
10 CHAIRMAN BANERJEE: Okay, are there any
11 issues with regard to LOFTRAN or anything that needs
12 to be resolved or you are happy?
13 Okay. Thank you very much.
14 MEMBER SHACK: We have got a better
15 benchmark for LOFTRAN now since Ginna did the 30
16 percent trip.
17 CHAIRMAN BANERJEE: Yes. But you don't
18 need to see that, do you? Okay. Then I am assuming it
19 worked out fine, yes, 30 percent trip. Okay, so let's
20 proceed -- thanks -- I think we move away now from
21 this -- this is very good information.
22 MR. HALE: Okay. Very good.
23 CHAIRMAN BANERJEE: We are happy with it.
24 MR. MILLEN: This is Mike Millen from
25 NextEra. I just received a bit of updated information

1 I guess I would like to share regarding the schedule
2 you had asked about. It's a few hours over 11 days for
3 breaker closure to 85 percent power and then it was
4 closer to two days on each plateau.
5 It's just over, a couple of hours over 11
6 days to get from 85 percent power to the new 100
7 percent power.
8 CHAIRMAN BANERJEE: So just so I get this
9 down, 85 to 100 percent, your current schedule is
10 another approximately 11 days.
11 MR. MILLEN: Eleven days, that is correct.
12 CHAIRMAN BANERJEE: Okay, thanks. That's
13 useful. Okay. So --
14 MR. HALE: I think we've addressed all the
15 --
16 CHAIRMAN BANERJEE: We have covered almost
17 everything.
18 MR. HALE: except the closed --
19 CHAIRMAN BANERJEE: Yes. The only thing is
20 that there are certain open items left, maybe we need
21 to talk to the staff.
22 MS. ABDULLAHI: Yes, they have an answer
23 to the steam generator flow-induced vibration. They
24 would like to address that.
25 CHAIRMAN BANERJEE: Okay.

1 MS. ABDULLAHI: If they have to go through
2 the numbers, like Bill said they might have to do some
3 --
4 CHAIRMAN BANERJEE: Is that better than
5 after the closed session or --
6 MS. ABDULLAHI: It depends if you ask the
7 question of the numbers or not, but they will explain
8 I suppose.
9 CHAIRMAN BANERJEE: Well, as we are still
10 in open session, we will ask you to bear with us for a
11 minute. We don't want your person to be waiting on the
12 phone for too long.
13 MR. HALE: Well, he's available right now.
14 CHAIRMAN BANERJEE: All right. So what we
15 are going to do is ask for your forbearance --
16 MR. HALE: Okay.
17 CHAIRMAN BANERJEE: and talk to the staff.
18 MS. ABDULLAHI: Want to go?
19 CHAIRMAN BANERJEE: Whoever wants to
20 discuss this. So we will come back to you --
21 MR. HALE: Okay.
22 CHAIRMAN BANERJEE: in a minute. This is
23 getting quite chaotic so let's try to keep it here.
24 Okay. Go ahead.
25 MR. TSIRIGOTIS: Earlier I was asked a

1 question about the flow-induced vibration in the tubes
2 --
3 DR. WALLIS: I have 200. That's 236.
4 MR. TSIRIGOTIS: Excuse me, I didn't have
5 all my information with me. But in an RAI, I asked the
6 licensee to discuss the evaluation performed, to
7 address the effects of the flow-induced vibration on
8 the steam generator tubes due to the increased EPU
9 flow.
10 And I also asked him to discuss the basis
11 for the assumptions acceptance criteria methodology
12 that they used to calculate the tube vibrational
13 forces present.
14 And this is what they have offered and so
15 it is why I found it acceptable. First the application
16 showed that the stability ratio was less than one, and
17 then they also showed theat the tube vibration
18 amplitude was less than half the distance between the
19 tubes. And that's why I asked for an RAI.
20 And in there they show how the fluid
21 elastic instability is calculated and they show that
22 the stability ratio is proportional, the density to
23 the one half power times the velocity.
24 Then they continued and they provided the
25 discussion for the turbulence. The turbulence

1 basically is proportional to density velocity squared,
2 but for proximities on the displacements were scaled
3 using the conservative relationships of the square of
4 the product of the density times the velocity square.
5 Once you calculate the displacement you
6 can calculate the bending stresses. The licensee
7 continuing with the RAI response, they showed that the
8 fluid elastic instability ratio is less than one and
9 they showed that the amplitude -- the vibration
10 amplitude, when they considered the tubes out of
11 phase, was less than half the distance between the
12 tubes. Numbers are proprietary and I can't discuss
13 them right now.
14 And they stated that based on the factors
15 that they derived, densities and velocities and EPU
16 conditions and the scale factors, the original flow-
17 induced vibration results were modified for the
18 effects of the EPU.
19 These values for fluid elastic instability
20 turbulence and tube wear were compared to the design
21 basis allowable values that they had, and so to
22 determine acceptability for the EPU.
23 The fatigue usage associated with general
24 flow-induced vibration resulting from the most
25 limiting operator condition for the EUP was also

1 calculated.

2 So they have an original analysis, and the

3 limiting tube had a maximum flow-induced vibration of

4 a given stress which stress is way below the endurance

5 limit of the material.

6 For the EPU, that stress went up, but

7 still remained well below the endurance limit which is

8 --

9 CHAIRMAN BANERJEE: So it went up in the

10 fourth power of the velocity, right? It went up at the

11 fourth power of the velocity?

12 MR. TSIRIGOTIS: It went up -- the stress

13 went up. But --

14 CHAIRMAN BANERJEE: Tell me, did they

15 provide evidence that the methodology that they were

16 using was within the validation sort of --

17 MR. TSIRIGOTIS: I have compared the

18 equation by showing the OM part three, which shows the

19 calculation for the stresses. And the --

20 CHAIRMAN BANERJEE: Well, the stresses are

21 okay, but it's the vibration is the issue, right?

22 MR. TSIRIGOTIS: Pardon?

23 CHAIRMAN BANERJEE: I'm asking about the

24 vibration amplitudes and the vibration excitation.

25 MR. TSIRIGOTIS: Right, the vibration

1 amplitude.

2 CHAIRMAN BANERJEE: So, so --

3 MR. TSIRIGOTIS: due to turbulence.

4 CHAIRMAN BANERJEE: Well, whether

5 turbulence or vortex streaks, I don't know.

6 MR. TSIRIGOTIS: Vortex shedding.

7 CHAIRMAN BANERJEE: Yes, vortex shedding,

8 or if there is any form of vortex shedding, two-phase

9 flow. The mechanism is not clearly understood I think,

10 but is it within the experience base, these velocities

11 that they are seeing?

12 MR. TSIRIGOTIS: I didn't see numbers for

13 the velocity.

14 CHAIRMAN BANERJEE: Yes, so the question

15 was more, I'm sure that all of us agree that

16 Westinghouse has probably since this is an economic

17 issue, been very careful with codes and things like

18 this.

19 The question is whether this is within the

20 experience base in terms of velocities that they used

21 this and validated the quotes for, and probably that

22 is the issue we will --

23 MR. TSIRIGOTIS: What velocities exist or

24 are predicted at the tube region --

25 CHAIRMAN BANERJEE: Yes.

1 MR. TSIRIGOTIS: I don't know because I
2 didn't ask for that number.
3 CHAIRMAN BANERJEE: Yes. But that is I
4 think a concern.
5 MR. TSIRIGOTIS: I understand what you are
6 saying.
7 CHAIRMAN BANERJEE: I'm sure that they are
8 going to be quite careful about this because this is a
9 sort of economic thing.
10 MR. TSIRIGOTIS: Well, obviously these are
11 the numbers that they used in their evaluations and
12 they are telling me that the results are within the
13 acceptance criteria of one for the elastic instability
14 ratio and the distance is less -- it's actually --
15 CHAIRMAN BANERJEE: Yes, fair enough, I
16 mean, what they have responded to your RAI -
17 MR. TSIRIGOTIS: Right.
18 CHAIRMAN BANERJEE: and they have given
19 you reasons, satisfaction.
20 MR. TSIRIGOTIS: Yes, and for that reason
21 I accepted it.
22 CHAIRMAN BANERJEE: Yes. Okay. So I think
23 we -- that part of the question is done, so we will go
24 back and ask Westinghouse not -- a somewhat different
25 question as to whether the validation part is within

1 that.

2 Now I don't think these are uniquely high

3 velocities or anything, so we should be within that

4 and that will be just fine.

5 MR. TSIRIGOTIS: But you also asked for

6 the U-bend region and --

7 CHAIRMAN BANERJEE: Yes, what is the

8 velocity there?

9 MR. TSIRIGOTIS: Past, right --

10 CHAIRMAN BANERJEE: Yes.

11 MR. TSIRIGOTIS: Now that their 88.02

12 bulletin discusses this type of conditions, you know.

13 That bulletin is titled, "Rapidly propagating fatigue

14 cracks in steam generator tubes."

15 I also asked the licensee to discuss the

16 applicability of the NRC bulletin 88.02 for their

17 steam generators, and they responded back, stating

18 that this bulletin is not really applicable to Point

19 Base unites one and two replacement steam generators,

20 because the tube support plates are fabricated of

21 stainless steel.

22 One of the prerequisites for high-cycle

23 U-bend fatigue is the formation of a dented tube

24 support condition in the upper plate. So this support

25 condition is a result of a build-up of corrosion

1 products associated with drilled holes in carbon steel
2 tube support plates.
3 This is the broach stainless steel support
4 plate in the replacement -- the replaced steam
5 generators, is designed to inhibit the introduction of
6 corrosion products, the support condition necessary
7 for the development of high-cycle fatigue.
8 As a result, high-cycle fatigue associated
9 with unsupported inner roll tubes in the Point Beach
10 units one and two steam generators. That was the
11 licensee's response.
12 Basically, the replaced steam generators -
13 -
14 CHAIRMAN BANERJEE: Yes, they have broach
15 plates, clearly, yes.
16 MR. TSIRIGOTIS: Right, they have the
17 broach stainless steel plates, the support plate. So.
18 I didn't have all this information with me earlier.
19 That's why I went back to get it.
20 CHAIRMAN BANERJEE: Okay. Thank you. I
21 think that's useful.
22 MR. TSIRIGOTIS: That's the question I
23 asked.
24 CHAIRMAN BANERJEE: Yes.
25 MEMBER SIEBER: Do you have more support

1 pipes in the new steam generators than in the old? Did
2 they change the number? Did they change the numbers of
3 support plates?
4 MR. TSIRIGOTIS: I don't know.
5 MEMBER SIEBER: Do you folks know? Okay.
6 CHAIRMAN BANERJEE: Well --
7 MEMBER SIEBER: I don't know either.
8 CHAIRMAN BANERJEE: We can address this. We
9 have somebody from Westinghouse on the phone.
10 MEMBER SIEBER: Okay.
11 CHAIRMAN BANERJEE: So I think as far as
12 the discussion is concerned, we understand why you
13 accepted this. That was the question. So it's clear
14 that you asked RAIs, you got an answer that was
15 satisfactory.
16 So if -- we will ask them some other
17 questions like -- what we are interested in.
18 MR. TSIRIGOTIS: And then we'll follow up
19 with that because -- I am interested myself to see
20 what the actual velocities were.
21 CHAIRMAN BANERJEE: Yes.
22 MR. TSIRIGOTIS: With the current power
23 situation.
24 CHAIRMAN BANERJEE: Right. Okay. Thank you
25 very much. Now we will want to come back to the staff.

1 Should we do this at the -- after we talk to
2 Westinghouse now and -- because we would like to
3 review the open items or whatever is left, with the
4 staff, before we close the meeting.
5 It depends on what your schedules are
6 like. Would you rather do it now or after the closed
7 session?
8 MR. BELTZ: Let's do it after the closed
9 session.
10 CHAIRMAN BANERJEE: Okay. Are there any
11 open items? We have closed everything, including the
12 boron thing which we just -- we got shortly before,
13 right?
14 MR. BELTZ: This is Terry Beltz, NRR. I
15 believe we have covered most of the open items.
16 CHAIRMAN BANERJEE: Everything is done,
17 right?
18 MR. BELTZ: For the staff. For the staff.
19 CHAIRMAN BANERJEE: Okay. All right.
20 MEMBER SIEBER: Right.
21 CHAIRMAN BANERJEE: Okay. So then we will
22 go ahead.
23 MR. HALE: Okay. Brett Kellerman from
24 Westinghouse has some additional information regarding
25 the --

1 CHAIRMAN BANERJEE: Great.

2 MR. HALE: The lower plenum.

3 CHAIRMAN BANERJEE: Volume mixing coming

4 back again?

5 MR. KELLERMAN: This is just -- I went and

6 calculated the number that -- the boil uprate that Dr.

7 Wallis was looking for. I want to make a quick

8 correction.

9 The RHR flow to the upper plenum is

10 reduced to 500 gpm at approximately an hour, not at 20

11 minutes. At 20 minutes, the rate is like 1,500 gallons

12 per minute.

13 So at one hour the boiloff just due to

14 decay heat is 236 gallons per minute, thereabouts,

15 which is about 32 pounds per second.

16 DR. WALLIS: And the pressure is what?

17 MR. KELLERMAN: 14.7 psi.

18 DR. WALLIS: So it's all atmospheric?

19 MR. KELLERMAN: Right, it's all

20 atmospheric.

21 CHAIRMAN BANERJEE: So about half the --

22 DR. WALLIS: You are putting in twice as

23 much water as you need to boil off --

24 MR. KELLERMAN: Right.

25 DR. WALLIS: which has to go somewhere.

1 MR. KELLERMAN: Right, it short-circuits
2 to the hot leg.
3 CHAIRMAN BANERJEE: That's the assumption.
4 MR. KELLERMAN: That's the analysis.
5 (Simultaneous speaking.)
6 CHAIRMAN BANERJEE: But I think that's
7 fine. So we should close the session now, right? Could
8 we just check that everybody who shouldn't be here
9 isn't here, and who should be here is? And we will
10 close the transcripts as well?
11 DR. BONACA: I have a couple of questions,
12 before we adjourn, I would like to ask.
13 CHAIRMAN BANERJEE: So, we are going out
14 of open session. And we are going into closed session
15 and the transcripts are closed now.
16 (Whereupon, the above-entitled matter went off
17 the record at 3:52 p.m. and back on the record at 4:24
18 p.m.)
19 DR. WALLIS: So we are going to go out of
20 closed session and we are going to go into open
21 session. That's the easier -- okay, so the transcripts
22 will now be open.
23 MR. ROMANKO: Okay.
24 CHAIRMAN BANERJEE: And all the remarks
25 and everything made will reflect that. We won't refer

1 to anything --

2 DR. WALLIS: So we are on the record now?

3 What we say will be written down?

4 CHAIRMAN BANERJEE: Yes.

5 MEMBER SIEBER: We are on a different

6 record.

7 CHAIRMAN BANERJEE: We are on a different

8 record.

9 MEMBER SHACK: We're always on the record.

10 CHAIRMAN BANERJEE: We're always on the

11 record.

12 MEMBER SHACK: Some records are more open

13 than others.

14 DR. WALLIS: We're not always on the

15 record. Sometimes we dismiss the -- and we have a

16 Committee discussion.

17 CHAIRMAN BANERJEE: Yes. No, I think we

18 remain on the record because we are simply going to

19 give our feedback for the --

20 MEMBER SIEBER: You have to be on the

21 record to close it.

22 CHAIRMAN BANERJEE: Yes. Yes. We have to

23 be on the record.

24 MR. DOMINICIS: Excuse me, we can ask Kim

25 to -- has Kim hung up?

1 CHAIRMAN BANERJEE: Yes.

2 MR. ROMANKO: Okay. I'll hang up.

3 CHAIRMAN BANERJEE: Kim we are done with

4 you. Thank you very much.

5 MR. ROMANKO: You are welcome. Bye.

6 CHAIRMAN BANERJEE: Okay. Bye-bye.

7 MEMBER SIEBER: Bye. Have a nice weekend.

8 CHAIRMAN BANERJEE: Okay. So we can just -

9 - the great advantage of an open session is everybody

10 in a closed session can be there for the open session.

11 It doesn't really matter.

12 MEMBER SIEBER: Right.

13 CHAIRMAN BANERJEE: Okay. So now I think

14 we are coming to the end. Ivan, if you want to now get

15 back on, that would be good, so that we can get this

16 feedback.

17 So what we are going to do now is just get

18 some comments.

19 MR. HALE: I can't turn it on. No, I can't

20 turn it on.

21 DR. WALLIS: He can't turn him on.

22 CHAIRMAN BANERJEE: I think Theron can do

23 this now.

24 DR. BONACA: I have a couple of questions

25 I would like --

1 CHAIRMAN BANERJEE: Yes, yes. Of course.

2 DR. BONACA: I had them in mind and I did

3 not ask another phase, in a way. Should I ask now?

4 CHAIRMAN BANERJEE: Yes please, go ahead.

5 DR. BONACA: The first question I had was

6 when we were looking at the load reject analysis, we

7 were saying peak pressure of 2748 and a half, about

8 one and a half psi, are those numbers calculated

9 numbers, or are they inferred numbers?

10 MR. HALE: Those are calculated numbers.

11 CHAIRMAN BANERJEE: I'm sorry about this.

12 DR. BONACA: Because I mean, at times the

13 --

14 DR. MALDONADO: Hello?

15 CHAIRMAN BANERJEE: Hi, is that Ivan?

16 DR. MALDONADO: Yes. This is Ivan.

17 CHAIRMAN BANERJEE: Okay Ivan, you are

18 back on, we are coming -- we have come out of closed

19 session and we are going to have a brief discussion

20 and then close the meeting but we would like to get

21 some feedback eventually back for the full committee

22 meeting.

23 But right now, Mario is just catching up

24 with a specific question, so Mario, go ahead.

25 DR. BONACA: At times, analysts, in

1 certain approaches they use, they tend to calculate
2 the number that is bounding, high enough that they can
3 claim the whole domain is 50.
4 Once it is approved, any change that goes
5 to be a lower number doesn't even need -- I mean it
6 can be done under 50, 59.
7 And I was wondering, you know, when I see
8 a number so close to the limit, but you are saying
9 that was calculated.
10 MR. HALE: That was a calculated number,
11 yes it was.
12 DR. BONACA: The other question I have was
13 regarding the assemblies. This fuel has longer rods
14 than the regular fuel assembly, and did you have pilot
15 assemblies? You did.
16 MR. HALE: Is Jay still here? Let Jay
17 answer that question.
18 DR. BONACA: Okay.
19 MR. KABADI: Yes, this is Jay Kabadi from
20 NextEra. The fuel rod length does not change. The fuel
21 rod length remains the same. So the geometry doesn't
22 change, just the actual blanket length increases so
23 the other rod gets slightly lower.
24 So both the fuel rod length remains
25 unchanged.

1 DR. BONACA: The distance from the rod to
2 the nozzle is the same?
3 MR. KABADI: Yes. The total rod length
4 does not change, out of the total, which is 143.05,
5 the actual blanket length slightly increases.
6 DR. BONACA: But your effective fuel
7 heights is higher, lower?
8 MR. KABADI: No. That does not change.
9 CHAIRMAN BANERJEE: You've got your
10 questions answered?
11 DR. BONACA: Yes.
12 CHAIRMAN BANERJEE: Okay. I think what we
13 will do is we will take -- we will wait for Bill, but
14 you can go ahead Graham, and give your views on what
15 we should --
16 DR. WALLIS: What we should do?
17 CHAIRMAN BANERJEE: we should do, and --
18 DR. WALLIS: Well, I thought Point Beach
19 responded very well to the questions we had. The area
20 where I think the analysis is unrealistic, and maybe
21 this is because of something the staff has insisted
22 upon, has to do with this boron dilution, when you
23 have an upper plenum injection, that the phenomena are
24 different from what they are in the traditional one,
25 of which there are experiments and so on.

1 So I will write up some thoughts about the
2 boron dilution problem. When you have got long-term
3 cooling, do you precipitate boron, is the question,
4 right?
5 Otherwise I am pretty happy about
6 everything, even the steam generators. It's remarkable
7 how almost everything has been covered appropriately
8 and well.
9 CHAIRMAN BANERJEE: Okay.
10 DR. WALLIS: So that's it.
11 CHAIRMAN BANERJEE: So, if you had your
12 thoughts sort of that they would follow for a full
13 committee meeting --
14 DR. WALLIS: I will write something up on
15 the boron precipitation thing.
16 CHAIRMAN BANERJEE: Yes.
17 DR. WALLIS: The problem I have is that I
18 only have partial information so have to sort of say I
19 think this is probably what happens, but I don't have
20 all the properties and the things, because they
21 haven't been given to me.
22 I have enough to give you some
23 information, and I think the mixing with the upper
24 plenum is going to be more important than the mixing
25 with the lower plenum, when you have this stuff

1 churning around in the upper plenum, comes down
2 through the core, goes up through the core, carries
3 boron with it.
4 It's unrealistic to sort of assume that it
5 comes in and goes out and doesn't do anything.
6 CHAIRMAN BANERJEE: But their analysis of
7 record is that this be one which does not credit, so
8 in a way --
9 DR. WALLIS: I understand that.
10 CHAIRMAN BANERJEE: what goes out of --
11 what credits mixing in the lower plenum.
12 DR. WALLIS: I'm not interested in the --
13 CHAIRMAN BANERJEE: I know that you don't
14 agree with the --
15 DR. WALLIS: -- unrealistic assumptions of
16 record. I would be interested in what really happens.
17 CHAIRMAN BANERJEE: So what do you want
18 them to do? Redo the analysis?
19 DR. WALLIS: I don't try to tell the staff
20 what I want them to do. I just say this is what I
21 think happens.
22 CHAIRMAN BANERJEE: Okay.
23 DR. WALLIS: And if they want to ignore
24 it, they can ignore it. Yes.
25 MR. HALE: If I could ask, is it

1 appropriate?

2 CHAIRMAN BANERJEE: Yes, go ahead.

3 MR. HALE: Do you agree that our analysis

4 is conservative, based on the assumptions that we

5 made?

6 DR. WALLIS: I don't like the behavior of

7 the -- the way that you credited the lower plenum. I

8 think that's a very incomplete analysis so far. And

9 this number of a half comes from an experiment which

10 was for a completely different situation.

11 But I think, you know, your velocities are

12 rather small going in and out of the lower plenum, it'

13 not clear that they penetrate very far, to produce

14 much mixing.

15 So you have to rely on some kind of an

16 argument about heat transfer and natural convention

17 and stuff, and how much of that is then mixed up into

18 the core, because it's a pretty dead region down

19 there, but I think the core is really going around and

20 injecting stuff into the upper plenum and bringing

21 stuff in from the upper plenum.

22 That's where the mixing is. It's not

23 injecting stuff into the lower plenum and creating

24 mixes. But I have had enough, sort of enough of them.

25 I will say more in a letter.

1 CCC yes.

2 DR. WALLIS: I realize I am very pleased
3 with what I heard. I think they are in pretty good
4 shape and it's -- the only thing you may want to do
5 is, if you are any doubt, is to say you should inspect
6 the steam generator tubes more often, just because we
7 are not quite sure.

8 MEMBER SIEBER: Right, that's where I am
9 coming down on the --

10 CHAIRMAN BANERJEE: Can you -- do you have
11 any views on the LEFM? They are part of the power
12 ascension --

13 DR. WALLIS: That's a different issue.
14 That's been approved by the staff. It's been accepted
15 by --

16 CHAIRMAN BANERJEE: Then you calibrate
17 them on the way up, I noticed, for several times,
18 right?

19 MR. HALE: Right.

20 CHAIRMAN BANERJEE: On your power
21 ascension --

22 DR. WALLIS: And do the usual thing that
23 is done with them.

24 MR. HALE: And we have confirmed that the
25 LEFM device is not real sensitive to changes in flow.

1 It's much more sensitive to changes in piping
2 configuration.
3 DR. WALLIS: I don't think it's a Point
4 Beach issue, and if the committee wants to revisit the
5 accuracy of the LEFM, that's a generic sort of issue.
6 But Point Beach is not an exception in that it's doing
7 something very different from what other plants do.
8
9 CHAIRMAN BANERJEE: It's only a question
10 of calibration.
11 DR. WALLIS: And what we have -- well if
12 they calibrate as well as other plants do, which I
13 think they are going to do, then they should be
14 treated the same way as the other plants.
15 MEMBER SIEBER: But you've already had the
16 leading edge from your proof right?
17 MR. HALE: That is correct.
18 MEMBER SIEBER: That was a separate
19 amendment.
20 MR. HALE: That's right.
21 CHAIRMAN BANERJEE: But at a different
22 flow rate.
23 MEMBER SIEBER: You can question it, but
24 it's not hard to just --
25 CHAIRMAN BANERJEE: It is, but they do

have verification of LEFM calibration at 85 percent and at 97 --

MEMBER SIEBER: For their start-up procedure.

CHAIRMAN BANERJEE: Yes. They're going to do it.

DR. WALLIS: It's within the range of previous calibrations. And the start-up again looks like what we have done with other plants, the slow --

CHAIRMAN BANERJEE: Well your feedwater flow rates are within their -- the velocities of the feedwater are within the range of other plants, isn't it?

MR. HALE: Right, exactly.

DR. WALLIS: And also, within the calibration range of the flow meter I understand.

MR. HALE: Yes, that's correct.

CHAIRMAN BANERJEE: Within the calibration.

MR. HALE: Yes, we have confirmed it.

CHAIRMAN BANERJEE: Okay.

DR. WALLIS: So this looks no more complicated, perhaps less complicated, than uprates that we have been happy with previously.

MEMBER SHACK: That have been accepted.

1 CHAIRMAN BANERJEE: Happy may be an
2 extreme word, but --
3 MEMBER SHACK: We're never happy. That's
4 why we are grumpy old men.
5 DR. WALLIS: But we are never concerned
6 either, are we, we are somewhere in-between?
7 MEMBER SIEBER: Old guys can be on this
8 committee.
9 CHAIRMAN BANERJEE: All right, Jack, your
10 turn.
11 MEMBER SIEBER: I guess overall, I didn't
12 see too many flaws but there are some things I don't
13 understand fully, and I asked for a simplified
14 schematic type flow diagram for the boron
15 concentration problem. I think that would be helpful
16 for me.
17 And I was wondering, in PWRs, a lot of
18 PWRs, there was at one time a problem called baffle
19 jetting where because of the pressure differential
20 across the baffle, it would vibrate fuel rods and the
21 fix to that was to reverse the flow.
22 And that may have some impact on this
23 boron concentration problem and the question is, did
24 Point Beach fix the baffle jetting problem by drilling
25 holes?

1 MR. HANNEMAN: This is Harv Hanneman from
2 NextEra Point Beach. Yes, we did an -- what they call
3 an upflow conversion, where we drilled the holes and
4 so now they --
5 MEMBER SIEBER: It reduces the pressure
6 drop across the --
7 MR. HANNEMAN: -- flow up outside of the
8 baffle plates goes up the core as well, and that
9 reduces the DP and we also pin the gaps to try to
10 reduce the baffle jetting.
11 We have not experienced any such baffle
12 jetting fuel damage since --
13 MEMBER SIEBER: Well, that's really not
14 the issue because that's a pretty good fix. You reduce
15 the pressure drop, the peak flow is reduced and the
16 fuel doesn't vibrate as much.
17 The question in my mind, is I don't
18 remember exactly how all those different plates are
19 arranged in there, but that may have some influence on
20 the boron concentration problem.
21 DR. WALLIS: It changes the mixing, is
22 that --
23 MEMBER SIEBER: Yes, and so when we get
24 the sketches to what is a flow pass where we are, it
25 would be good to show the baffle flow pass also.

1 CHAIRMAN BANERJEE: Do you have any
2 questions or issues about the electricals?
3 MEMBER SIEBER: No.
4 CHAIRMAN BANERJEE: Okay. The PRA?
5 MEMBER SIEBER: It all seemed pretty
6 straightforward, human factors, training, the start-up
7 program all seemed pretty good to me.
8 CHAIRMAN BANERJEE: What about --
9 MEMBER SIEBER: The steam generator
10 performance has been pretty good so far.
11 CHAIRMAN BANERJEE: What about the times
12 available for various operator actions?
13 MEMBER SIEBER: I think it would help me
14 if I saw a list of how many things operators have to
15 do outside the control room. It is probably very few
16 or maybe not even any of them.
17 MR. HALE: In fact, post-accident, we
18 eliminated those --
19 CHAIRMAN BANERJEE: Right. You have none,
20 right?
21 MEMBER SIEBER: And that would help me
22 judge as to whether you have time or not in order to
23 perform an operation in a -- I think some of those
24 times, almost all those times are too long.
25 They are in the range of hours and even a

1 pretty slow operator could do that without making a
2 mistake, he has that much time, if it's in the control
3 room. But if you are running a minimum shift
4 complement and you have things outside the control
5 room you have to do, to me that starts to become a
6 problem.
7 And so if you tell us anything in your
8 emergency procedures that requires operators to
9 perform operations at some local panel or go off-
10 manual and operate a valve, I would be --
11 CHAIRMAN BANERJEE: I guess when you come
12 to the full committee, which would be --
13 MEMBER SIEBER: Right. You could make a
14 statement that says we don't have any operations
15 outside the control room and so our -- we can handle
16 everything with a minimum shift.
17 But once you send somebody out to do
18 something, that person can't do anything else until
19 they are done.
20 CHAIRMAN BANERJEE: Also, probably because there
21 are people who are going to be interested in human
22 factors, the history of this, you might just make a
23 list of the critical operator actions and how the EPU
24 impacts the time, showing still that you have
25 sufficient time or whatever, because that's the

1 message you've got -- that would be helpful to guide
2 the discussion. Okay, go ahead.
3 MEMBER SHACK: I'm sort of like Graham. I
4 think they have done a pretty good job. I think the
5 changes in the aux feedwater system and reducing the
6 dependency on the service water, we will probably end
7 up with a safer plant than we have.
8 CHAIRMAN BANERJEE: And the compressed
9 air.
10 MEMBER SIEBER: Yes, I think so, and PRA
11 shifts.
12 MEMBER SHACK: 9706, we have managed steam
13 generators, they are going to have a lot more problems
14 than these steam generators do so I am not really
15 concerned about problems with the steam generators.
16 CHAIRMAN BANERJEE: Okay, and any other
17 materials or --
18 MEMBER SHACK: Well, I think they are
19 going to have the standard problems, you know, slight
20 difference in the facts stuff, but I don't see
21 anything there that will be -- that will be managed
22 again by the FAC program.
23 CHAIRMAN BANERJEE: Okay.
24 MEMBER SHACK: I don't expect big
25 surprises there but you know, certainly there will be

1 things to look for.

2 CHAIRMAN BANERJEE: Mario.

3 DR. BONACA: Yes, as I -- I agree with the

4 issue of the feedwater system improvements. I mean I

5 think that they have made such improvements that the

6 plant is certainly safer than it used to be. There is

7 no doubt in my mind.

8 The only complication I see is that, you

9 know, if I think of a large transient that one could

10 consider would be load reject. You have an auxiliary

11 built into the system and isolation in place which are

12 new. They are different from what they used to be

13 before, and I really have to go back and think about

14 it.

15 I mean, I am not saying that I would

16 recommend at this stage that you do that, but I think

17 there should be some consideration of it, because of

18 the complexity of the changes and the response to load

19 rejection.

20 I think that you know I can see the logic

21 of not having tests if you don't have to do it, and I

22 have also supported that. But in this case, I think we

23 have to reflect on the transient are going to go back

24 and see what -- how a sequence of events would go.

25 CHAIRMAN BANERJEE: Now with Ginna, were

1 the changes as extensive, do you recall?

2 DR. BONACA: No.

3 CHAIRMAN BANERJEE: They were not. Okay.

4 DR. BONACA: At Ginna, I think the changes

5 implemented before --

6 MEMBER SHACK: A long time ago, yes.

7 DR. BONACA: a long time ago, like

8 Fitzpatrick, the same.

9 CHAIRMAN BANERJEE: Okay, so I think you

10 should take at least -- address that issue at some

11 point.

12 DR. BONACA: Yes, because I mean, there

13 was made lots of comparisons to other plants, but

14 other plants did not have this change, these

15 modifications. And if I understand it, I mean, you

16 have feedwater isolation coming into play, automatic

17 start of new feedwater pumps and feeding somewhere

18 else. I don't know the schematics exactly, but they

19 are not feeding in the same location as the old pumps.

20 And --

21 CHAIRMAN BANERJEE: So you will put that

22 in your report, Mario, and we will follow up on that

23 in the full committee meeting. So that will certainly

24 come as part of the consultants' report and we will

25 deal with it, whichever way it is, right? Yes.

1 MS. ABBOTT: Hi, Liz Abbott, EPU licensing
2 director. One of the things that we think about with
3 large transient testing of course is the fact that we
4 would be intentionally invoking a challenge, both on
5 the plant and on the operators to do that.
6 So operational philosophy-wise, you know,
7 it's very contrary to do that under current
8 operational practices. So what we do more extensively
9 now is we look at individual component testing, and I
10 think you heard about some of the power ascension
11 testing that is going to be done and steam generator
12 level deviations and things like that, which will help
13 us have online, in progress as power increases and
14 flow rates increase, validation that our control
15 systems and so forth are working as expected compared
16 against projected values.
17 But I think maybe what we didn't emphasize
18 a lot is additionally the work that we do in pre-op
19 and start-up testing on those major secondary site
20 systems.
21 You know that certainly is something where
22 we can take a control system before a system is
23 actually in service, and put in a false signal so to
24 speak, watch it responds for the full spectrum of the
25 event, without having to cycle the entire plant, you

1 know, live and in action so to speak, and be able to
2 simulate those types of conditions in advance, so that
3 when we do do actual in-plant evolutions, we are
4 really checking that the performance matched what was
5 there originally.
6 And that's really the structure of a lot
7 of our basis, is to do as much testing as early as
8 possible. They may be pieced together with overlaps,
9 you know, but that's the way we do it.
10 Same thing with engineered safeguards
11 testing that is done every single cycle. We don't
12 actually go in on a live plan and create something
13 that would cause a safety injection. But we test that
14 in a condition that is a more manageable condition
15 without challenging the plan.
16 DR. BONACA: You may want to present a
17 plan to the full committee where you are pointing out
18 those observations and I think they have merit and
19 that in fact you may win the day.
20 But that's the focus of what you should be
21 discussing rather than you know, it's a similar plan
22 to plant X or Y, because in this particular case they
23 are not really the same things.
24 I mean the changes are significant and one
25 concern that we have for example in delivery of cold

1 water to the steam generator and you may have a fourth
2 level coming down, there have been instabilities in
3 certain plants because of delivery of aux feedwater,
4 and that is something that you would see during a load
5 rejection.
6 Or, I agree, in more limited testing, that
7 will give you still some answer to this, but the
8 behavior.
9 MS. ABBOTT: Yes. Exactly. And another
10 example is we actually are installing a full flow aux
11 feedwater test line, just so that we can test at full
12 flow conditions without having to put cold water in
13 the steam generators, while the plant is operating and
14 the reactivity impacts of that.
15 So these are things that were thought
16 about.
17 DR. BONACA: I understand but you know one
18 day it is going to happen, and you will rather have it
19 happening during a controlled situation where you are
20 planning for it, than having it surprising the
21 operators.
22 And again I am not pre-judging. I am only
23 saying that I will give it some thought in my
24 comments.
25 CHAIRMAN BANERJEE: I think that is

1 valuable feedback for you to take back. Ivan do you
2 have some questions or comments?
3 DR. MALDONADO: Yes, just a few. First I
4 want to thank all of you for enabling me to
5 participate from afar, and I apologize that I had to
6 be out this morning. I was giving a test to 50
7 University of Tennessee students who were eagerly
8 taking reactor physics.
9 So yes, I am probably on the young side.
10 This is my first subcommittee meeting and so I am
11 looking forward to being groomed into a grumpy old
12 man, like some of the others perhaps.
13 But anyway, some of the thoughts I have --
14 I expressed some of this previously, but I think while
15 I was thinking about this today, I can put this into a
16 different context.
17 When I first looked at the core design
18 results, I noticed of course that there was a lower F
19 delta H and an improved axial offset performance and I
20 thought well, wait a minute, you are bringing in more
21 power, why is that happening?
22 And then it became obvious that you do
23 that by increasing the number of bundles, the number
24 of fresh bundles that you bring in in your fresh
25 batch.

1 And so that's all good and so that made me
2 think well what about the future, you know, will there
3 be a restriction of that type put on to maintain a
4 large number of bundles, to maintain the F delta H as
5 low as it shows, because as you always know, there's
6 going to be bids for fuel every reload, and the
7 utility usually will try to fight to have less bundles
8 while the vendor may push for more. I have been in
9 that game before, so it just gave that thought to
10 mind.
11 The other thought was that if you maintain
12 a larger number of bundles in your batches, does that
13 have any implication on potentially changing the
14 source term of discharged bundles as a function of
15 time?
16 That's slightly off my knowledge base, but
17 I was wondering if there was anything that related to
18 future operation of the plant, where you were managing
19 more discharge bundles. That's just kind of an open-
20 ended question for someone out there.
21 And the other question I had was I know
22 that the analysis was done on the basis of 14 by 14
23 fuel, and it seems to -- I don't really know how long
24 that will remain and what would be the implications on
25 bringing new fuel types, which oftentimes are more

1 efficient and then you might run with less bundles and
2 so on and so forth.
3 And so I don't expect answers to these
4 questions but I just thought these are some of the
5 thoughts that came to my mind when I --
6 MR. KABADI: This is Jay Kabadi, NextEra.
7 As far as the source term for accident analysis, those
8 have been done conservatively actually using F delta H
9 even higher than 1.68.
10 So source term-wise, from the accident
11 analysis point of view, that should not be any
12 problem, and again, our goal, when we do the core
13 designs, is first look at the fuel performance,
14 although as you mentioned, there may be some thought
15 about reducing the number of assemblies, whether --
16 actually our primary focus when we do that is maintain
17 the fuel performance within the industry experience
18 at the same time ensuring that we don't get any fuel
19 failures.
20 So that's a good point taken and we will
21 always consider that, but our current strategy does
22 not rely on optimizing from the fuel assembly's point
23 of view, but from the fuel performance and the code
24 design limits point of view.
25 MEMBER SIEBER: Well yes, the limit on

1 your maximum enrichment would sort of put you in a
2 certain level of numbers of assemblies for a given
3 amount of VAPH. It's going to come out the same
4 regardless.
5 DR. MALDONADO: Now Jay, the 14 by 14
6 fuel, just for my own information, why is that the
7 preferred fuel type that you use?
8 MR. KABADI: I think that 14 by 14, that
9 cannot be changed, that's a part of the design. That's
10 the assembly -- those fit into the vessel.
11 DR. MALDONADO: Oh okay. Okay. I got you.
12 Yes, I have no further comments.
13 CHAIRMAN BANERJEE: Okay. Thanks, Ivan. So
14 anything that I should know from the staff other than
15 what you have already presented?
16 MR. BELTZ: No, this is Terry Beltz from
17 NRR. No. I guess the NRC staff appreciates the
18 opportunity to give their presentations before the
19 ACRS. It's been the first time for me. It's been an
20 experience.
21 But as far as the staff goes, no, we don't
22 have any -- I don't have any more questions from our
23 side.
24 CHAIRMAN BANERJEE: Okay. So what I'll
25 just do is sum up for the full committee meeting,

1 which will be I don't remember the date.

2 MR. BELTZ: It's March 10th.

3 CHAIRMAN BANERJEE: March 10th. And I

4 think we are in for 2-1/2 hours or something in the

5 afternoon, aren't we? Yes. It's the afternoon Zeyna,

6 right?

7 MS. ABDULLAHI: Yes.

8 CHAIRMAN BANERJEE: We've scheduled it and

9 so everything has to be of course very compressed, and

10 what I think we should do -- I think the scope of what

11 was covered is pretty good, but obviously we won't

12 have the time to go into everything in the same

13 detail, so there are things probably which you should

14 sort of go into in a little bit more detail than

15 others.

16 And one of those issues probably -- other

17 than giving of course an overview, there have to be an

18 overview of the safety analysis, overview of the

19 materials issues, clearly a source, the radiological

20 things -- so all the things that are here essentially

21 need to be covered, but much shorter and --

22 MEMBER SIEBER: Talk faster.

23 CHAIRMAN BANERJEE: Don't talk faster.

24 Talk slower. But I would say that you should focus on

25 the issues which came up more during these meetings.

1 One would be clearly the boron issues, because there
2 was some controversy about how that is done.
3 The second point I think would probably be
4 that you should talk about the effect of the increased
5 velocities briefly, and the steam generators and other
6 things because that will be of interest.
7 I think the point about all the mods you
8 have made to the feedwater system and things, they are
9 very important and should be discussed, you know, the
10 implications of that.
11 And certainly you have also done fairly
12 substantial modifications on your electrical systems
13 and so those should be briefly discussed, and human
14 factors, because there will be some interest in that,
15 in operation -- you know, operating times, what the
16 impact of the EPU is on operator actions and things
17 like that.
18 MEMBER SIEBER: I would at least list, say
19 that you have reduced the overall plant risk.
20 CHAIRMAN BANERJEE: Yes, and also of
21 course, I said you have to basically go over the whole
22 thing, because here is nothing -- there is nothing
23 that you shouldn't talk about. It's a question of what
24 you spend more time on.
25 MR. HALE: Level of detail.

1 CHAIRMAN BANERJEE: Level of detail, yes.
2 DR. WALLIS: Have a summary slide of some
3 sort.
4 CHAIRMAN BANERJEE: And the other thing is
5 of course is this HELB briefly at least, to mention
6 that. And well, Zeyna is saying the alternate source -
7 - I mean the radiological consequences and things like
8 that.
9 But was there any issue that came out of
10 that? I don't remember, so.
11 MS. ABDULLAHI: And even the electrical --
12 CHAIRMAN BANERJEE: So those are more like
13 you have to just go over the coverage of all these
14 things, but the emphasis should probably be on the
15 things which elicited more discussion here.
16 And we will have the benefit of course of
17 Graham's report and Mario's report at the time and
18 Ivan's report. But Mario clearly feels that you need
19 to at least talk about the load rejection thing, and
20 Graham feels you probably need to talk about the
21 boron.
22 So that gives you an idea. And I think the
23 staff will come in and say basically that everything
24 is okay, you know, and you have been over it, but go
25 over it in some systematic way as you did --

1 DR. WALLIS: You have to have some kind of
2 a list of how you meet the regulations --
3 CHAIRMAN BANERJEE: Yes, they are going to
4 do that.
5 DR. WALLIS: like PCT and all that stuff
6 and have a summary table or something.
7 CHAIRMAN BANERJEE: I think that both
8 NextEra with Westinghouse and the staff made very good
9 presentations but you have two days and you will have
10 2-1/2 hours, so that's the difference.
11 And we will keep it moving.
12 MS. ABDULLAHI: And it has to be 50
13 percent, right?
14 CHAIRMAN BANERJEE: Sorry?
15 MS. ABDULLAHI: Fifty percent of the time
16 is for comments and discussion.
17 CHAIRMAN BANERJEE: Yes, so --
18 MEMBER SIEBER: So you have got an hour.
19 CHAIRMAN BANERJEE: No, you have more than
20 an hour. Count on an hour and a half talk time.
21 DR. WALLIS: It will go very quickly.
22 CHAIRMAN BANERJEE: Yes. Okay. And this
23 is, I think, I don't see any major issues so it is not
24 going to hang up. Okay? Is that enough guidance or do
25 we need to do anymore? Anything I have missed? Mario?

1 Okay.

2 So do you have any comments? Thank you

3 very much otherwise. We really appreciate your taking

4 the time, and we appreciate the staff as well taking

5 the time and coming, and all of you made very good

6 presentations. Thank you.

7 With that we will adjourn, okay?

8 (Whereupon, the above-entitled matter

9 adjourned at 4:59 p.m.)

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Agenda

- EPU Overview
  - Background…… Larry Meyer
  - Modifications and Unique Features…… Steve Hale
- Fuel and Core…… Jay Kabadi
- Safety Analyses…… Jay Kabadi
  Steve Hale
- **Probabilistic Safety Assessment……. Anil Julka**
- Electrical …… Steve Hale
- Human Performance & Ops Training
  & Emergency Operating Procedures……. Mike Millen
- Power Ascension and Testing…….. Mike Millen
- Acronyms

NEXTera ENERGY POINT BEACH

Models were updated accordingly to reflect the EPU conditions

- **Updated Full-Power Internal Events Models**
  - Logic models changed to reflect physical changes planned for EPU
  - Accident sequence changed to reflect new support system requirements
  - Human Reliability Analysis (HRA) updated to include EPU-related timing changes
- **External Events**
  - Assessed qualitatively
- **Shutdown Risk**
  - Assessed qualitatively

NEXTera ENERGY POINT BEACH

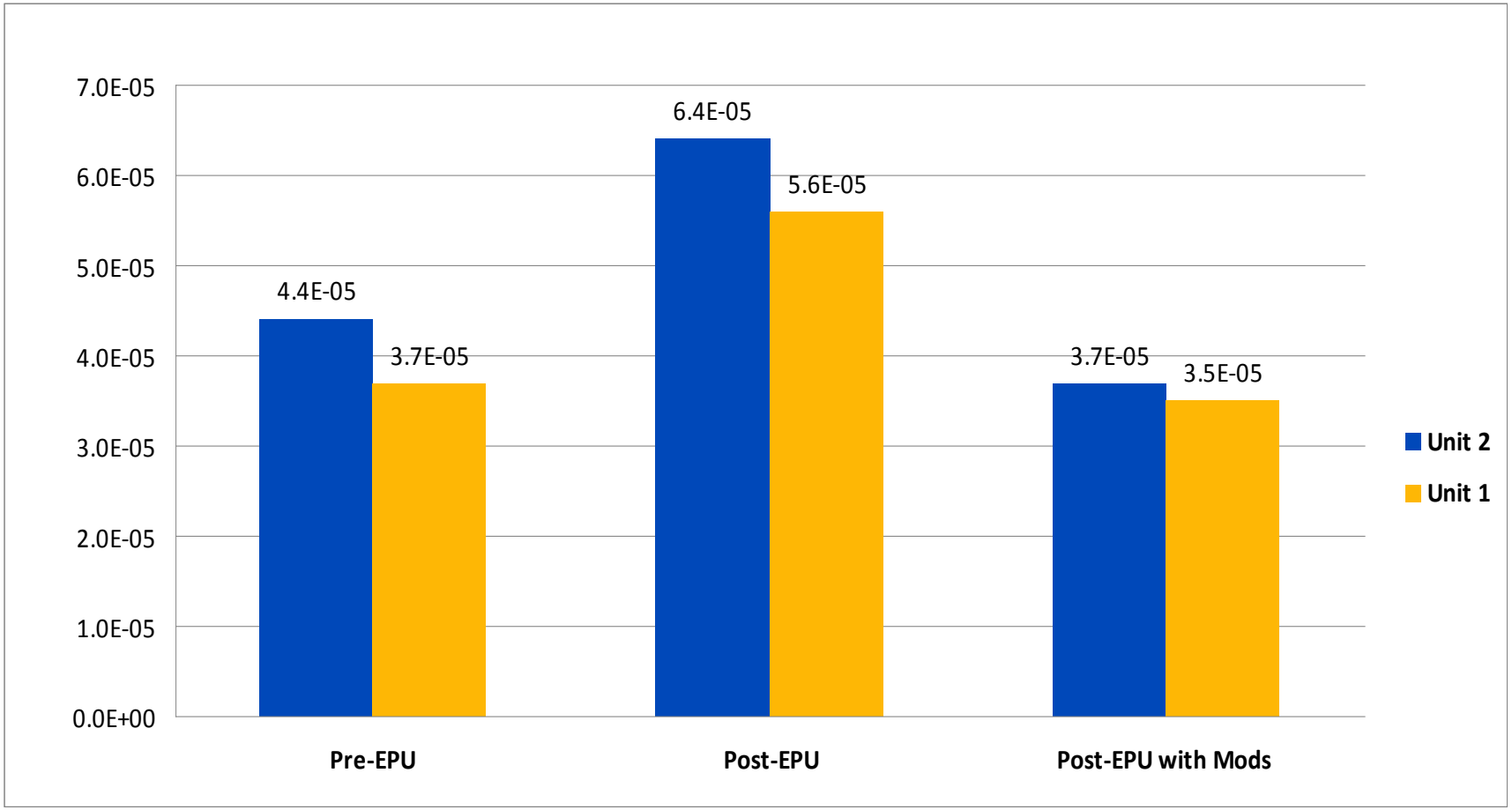
Overall the changes due to EPU resulted in a reduction to plant risks

- **Plant modifications were incorporated into the models**
- **Plant changes that resulted in a risk reduction**
  - AFW system changes
    - -- Increase backup air supply for AFW mini-recirculation valves
    - -- Auto switchover of AFW suction
    - -- Eliminated manual alignment of shared motor-driven AFW pumps
  - Provide self-cooled air compressor
  - Feedwater/Condensate system changes
  - Procedure change to improve reliability of RCS depressurization

NEXTera ENERGY POINT BEACH

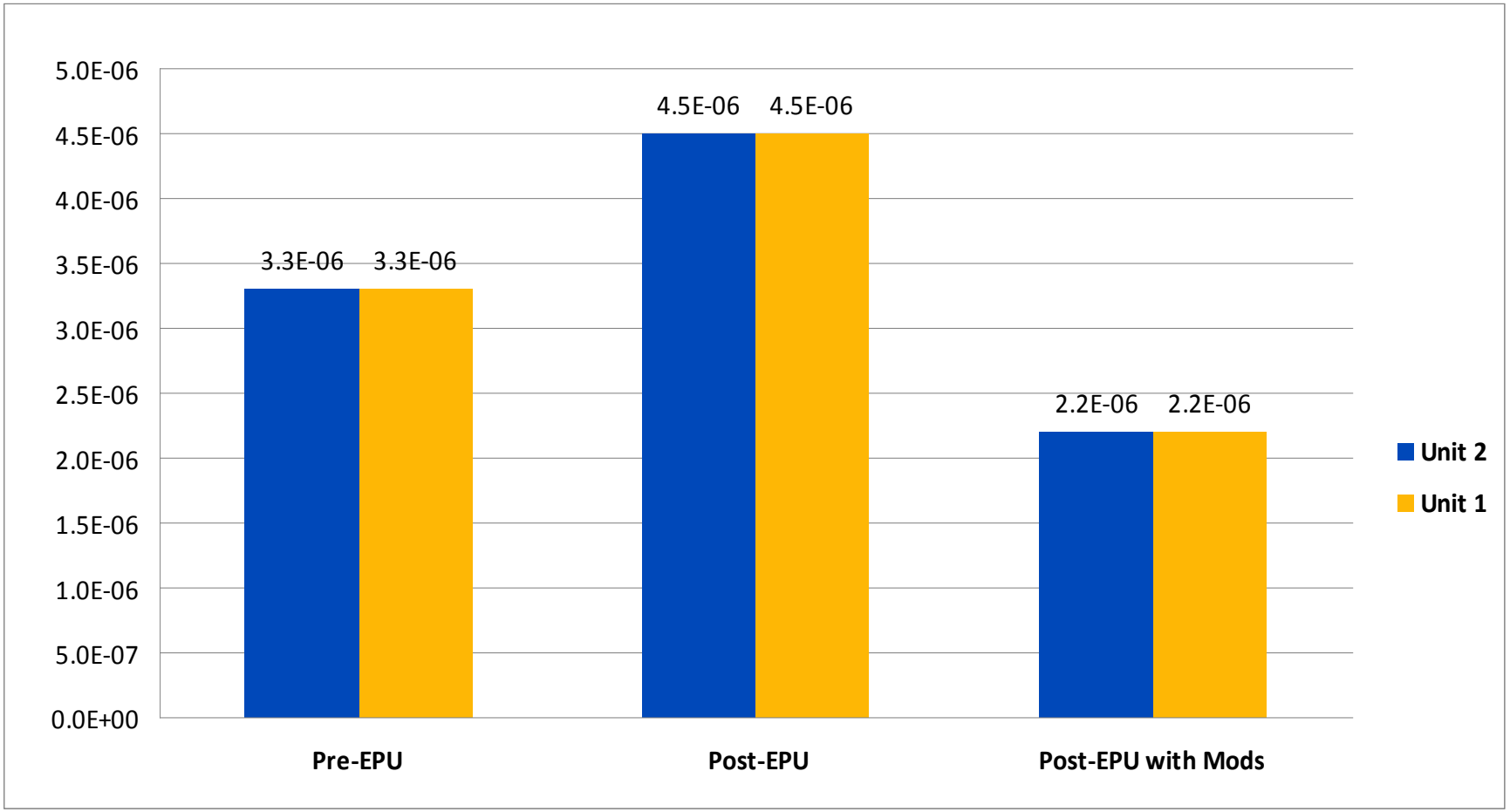
With the installed plant modifications, the Core Damage Frequency (CDF) decreases below the present value

EPU Impact on CDF



With the installed plant modifications, the Large Early Release Frequency (LERF) decreases below the present value

EPU Impact on LERF



Overall Risk is reduced following EPU

- **Overall Risk Is Reduced Following EPU**
  - Reduction in CDF
  - Significant reduction in LERF
  - Reduced dependence on Service Water
  - Improved Auxiliary Feedwater system design
  - Eliminated several of the risk significant operator actions

Agenda

- **EPU Overview**
  - Background…… **Larry Meyer**
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NEXTera ENERGY POINT BEACH

Safety improvements include changes to improve the reliability of the Emergency Diesel Generators

- **Emergency Diesel Generators**
  - Capacity of the Emergency Diesel Generators (EDGs) is acceptable under EPU conditions
  - Addition of the new AFW pump motors and automatic start of control room emergency fans were evaluated
  - Time delay added to the motor-driven AFW pump start to improve EDG transient loading
  - Diesel generator load changes being made to reduce load to below 2000-hour rating
  - Proposed EPU Tech Spec Surveillance includes 24 Hour Endurance Test of each EDG every 18 months

Safety improvements ensure electrical distribution system reliability

- **New Main Generator output breakers**
- **4160V AC Distribution System**
  - Meet 4160V AC distribution equipment design ratings
  - Loss of voltage (LOV) relay time delay changes
    - -- Improves ability to maintain off-site power during transmission grid voltage transients
  - Protective relay settings impacted by EPU are revised to ensure protection and coordination
- **480V AC Distribution System**
  - Meet 480 V AC distribution equipment design ratings
- **Safety Related 120 V AC System**
  - Equipment ratings bound EPU operating conditions
- **Safety Related 125 V DC System**
  - Equipment ratings bound EPU operating conditions
  - Capability and capacity sufficient to supply EPU load changes

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Environmental qualification of electrical equipment is maintained

- **Environmental Qualification**
  - Effects of EPU on the Environmental Qualification of electrical equipment evaluated
  - Equipment not qualified for EPU conditions are re-qualified or replaced

NEXTera ENERGY POINT BEACH

Actions will be implemented to ensure grid stability

- Impact of EPU evaluated by American Transmission Company (ATC), the grid system operator
- Actions needed by NextEra, Dominion and ATC identified and underway

NEXTera ENERGY POINT BEACH

Agenda

- **EPU Overview**
  - Background…… **Larry Meyer**
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  Steve Hale
- **Probabilistic Safety Assessment…… Anil Julka**
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- **Power Ascension and Testing…….. Mike Millen**
- **Acronyms**

There has been significant Operations involvement and participation on the project

- **Resources**
  - Operations lead assigned full time to the EPU project in 2008
  - Additional licensed Senior Reactor Operators (SROs), Reactor Operators (ROs), and plant operators, and previously licensed SROs assigned in support roles
  - Operations provides input to modifications, licensing, testing, work orders, tagging, procedures, margin reviews
- **Human Factors**
  - Design guidelines followed for optimization of human factors for new controls
  - New motor-driven AFW controls located on control boards near Steam Generator indicators matching location of turbine-driven pump controls
  - Plant equipment locations considered for ease of access

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There has been significant Operations involvement and participation on the project (continued)

- **Implementation**
  - Senior Operations personnel assigned as Startup Test Directors
  - Test organization reports to the Startup Test Directors
  - Startup Test Director works with Shift Manager, Operating crew, relief crew, and test organization to perform post-maintenance and power ascension testing

Simulator upgrades and procedure changes are being implemented to support the EPU

- **Simulator Modifications**
  - Unit 2 simulator modified prior to power uprate for AFW, AST and EPU modifications
  - Facilitated Emergency Operating Procedures (EOP) validations and Operator training
  - Unit 1 simulator to be modified prior to fall 2011 outage
- **Procedure Changes**
  - Emergency Operating Procedures (EOPs)
  - Emergency Contingency Action Procedures (ECA's)
  - Critical Safety Function Procedures (CSPs)
  - Abnormal Operating Procedures (AOPs)
  - Normal Operating Procedures (OPs)
  - Procedures were validated in simulator

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On-going training since 2009 has been conducted to ensure the operators and other plant personnel are prepared for EPU

- **Training**
  - Operations classroom training in 2009, 2010 and 2011
  - Simulator training performed in first training cycle of 2011
  - Additional classroom and simulator training, and equipment walkdowns scheduled during outage
  - Just in Time Training will be performed for Operations and Test Engineers prior to startup testing
  - Maintenance and Technical training ongoing since 2009
  - Program training materials being updated

NEXTera ENERGY POINT BEACH

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Point Beach Units 1 and 2 Extended Power Uprate ACRS Subcommittee Meeting

Risk Evaluation

February 25, 2011

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RISK REVIEW OF NON-RISK-INFORMED SUBMITTALS

"SPECIAL CIRCUMSTANCES"

- ISSUES THAT COULD REBUT PRESUMPTION OF ADEQUATE PROTECTION
  - Situation was not identified or addressed in development of regulations and could be important enough to warrant a new regulation if encountered on a widespread basis
  - The reviewer has knowledge that the risk impact is not reflected by the licensing basis analysis and has reason to believe that the risk increase would warrant denial if the request were evaluated as a risk-informed application.

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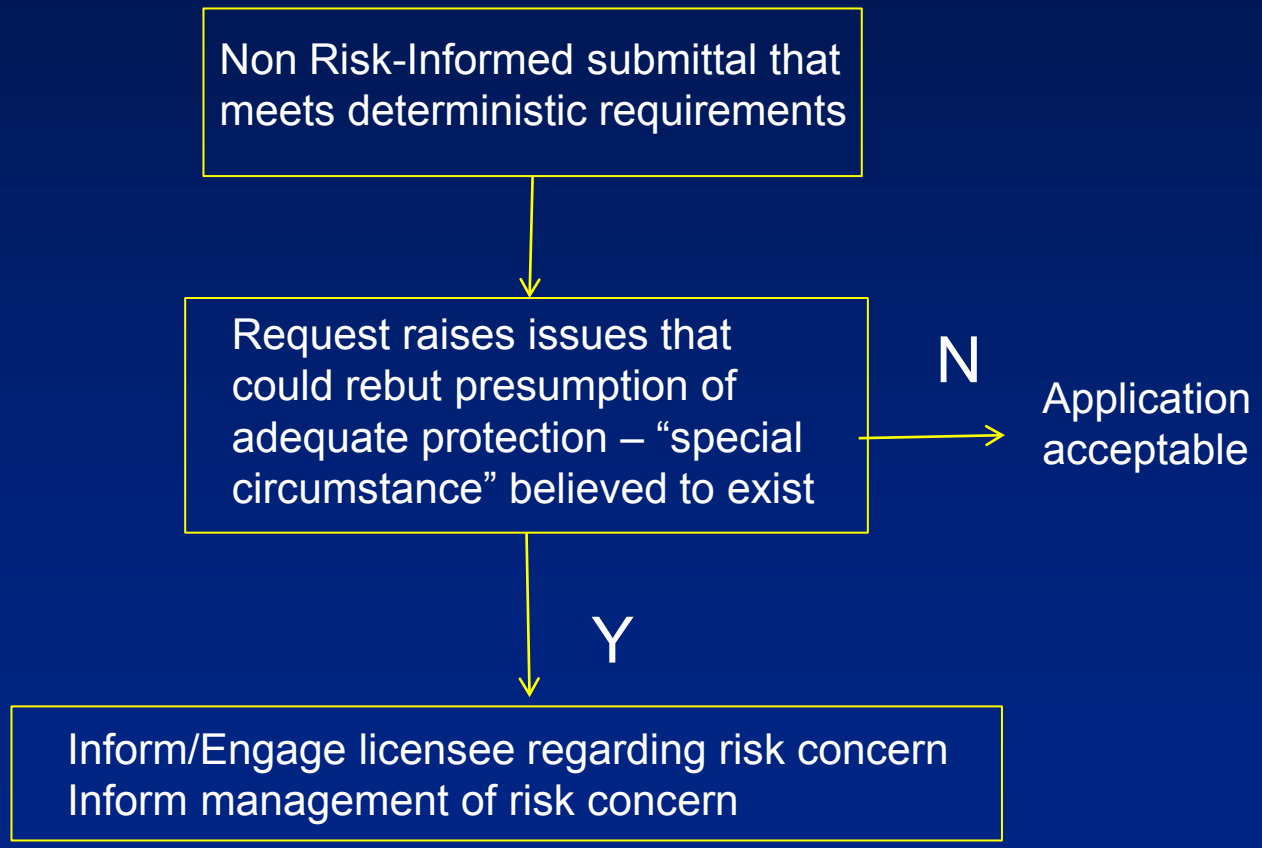
PROCESS FOR CONSIDERING RISK IN LICENSE APPLICATION REVIEWS



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STAFF RISK ASSESSMENT REVIEW

- Licensee submitted risk information for insights and to ensure no new vulnerabilities are created
  - Internal Events
  - External Events
  - Shutdown Operations
  - PRA Quality

- Staff SEs on IPE and IPEEE

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Overall EPU Risk Calculations

- Overall Results

	Unit 1			Unit 2		
	Base Model	Post-EPU with AFW and Risk Reduction Mods	Change	Base Model	Post-EPU with AFW and Risk Reduction Mods	Change
CDF	3.7E-05	3.5E-05	-2.0E-06	4.4E-05	3.7E-05	-7.0E-06
LERF	3.3E-06	2.2E-06	-1.1E-06	3.3E-06	2.2E-06	-1.1E-06

- License Application Acceptable
  - Meets deterministic requirements
  - No changes identified in management of risks
  - No new vulnerabilities identified
  - Identified issues do not rebut presumption of adequate protection

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Internal Events

- No impact expected for component reliability
- Small and medium LOCA frequency increased due to higher probability of stuck open PORVs and SRVs.
- Secondary line break frequency increased due to accelerated FAC.
- Many HEP values substantially increased by 400 to 1400 percent. For a risk-informed submittal, the staff would have investigated HRA analyses in more detail; however, the updated HEP values are more conservative and therefore does not rebut the presumption of adequate protection.

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Individual Risk Reduction Modifications

Description of individual change licensee commits to make to mitigate risk	Change from the Post-EPU model with the AFW system upgrade			
	Unit 1		Unit 2	
	CDF	LERF	CDF	LERF
Eliminate the reliance on local manual action to gag the motor-driven and turbine driven AFW pump mini-recirculation valves open prior to operation of either unit at EPU conditions. This is a license condition.	-1.1E-05	NONE	-1.1E-05	NONE
A self cooled (i.e., air-cooled) air compressor will be installed to supply IA. The compressor will be independent of service water cooling and aligned for automatic operation. It will be installed prior to operation of either unit at EPU conditions This is a license condition.	-1.5E-05	NONE	-2.2E-05	NONE
Emergency operating procedure (EOP) change made to provide Operations personnel guidance to open the pressurizer spray valve using differential pressure across the valve. This is a regulatory commitment.	-2.0E-06	-2.3E-06	-3.0E-06	-2.3E-06

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External Events

Internal Fire Risk

- Fire induced vulnerability evaluation methodology
- Licensee qualitatively describes decrease in fire risk resulting from EPU and risk reduction modifications.
- Of the operator actions considered in the IPEEE fire analysis, all but two are either guaranteed failure or zero probability. The two events that are evaluated with finite probability are starting an AFW pump and supplying SW to the AFW pump after depletion of CSTs. Since supplying the SW to the AFW pumps will be automated and new Motor-Driven AFW pumps are being installed in a different fire area than the turbine-driven pumps, the overall fire risk is reduced.

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External Events

Seismic Risk

- IPEEE used seismic margins approach
- All relied upon equipment do not produce new vulnerabilities to a seismic event
- Expect negligibly small impact

High winds, Floods, and other External Events

- Expect negligibly small impact

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Shutdown Operations

Expect small increase in shutdown risk

- Requirements of NUMARC 91-06 are implemented to assure risk is assessed and that structures, systems, and components that perform key safety functions are available when needed.

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PRA Quality

Industry peer review performed in June 2001 using NEI-00-02 Jan 2000 guidelines.

All “A” findings and most “B” findings addressed in the PRA. Licensee provided explanations for unaddressed findings in regard to this application.

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QUESTIONS

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ACRS Subcommittee on Power Uprates

NRC Staff Review
Point Beach Units 1 and 2
Extended Power Uprate

February 25, 2011

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Topics for February 25

- Electrical Engineering
- Human Performance
- Operator Training
- Emergency Operating Procedures
- Power Ascension and Testing
- Probabilistic Safety Assessment
- Human Factors Review
- Mechanical and Civil Engineering
- High Energy Line Break Methodology

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Point Beach Units 1 and 2 Extended Power Uprate ACRS Subcommittee Meeting

Electrical Engineering Review

Matthew McConnell
Electrical Engineering Branch
Division of Engineering
Office of Nuclear Reactor Regulation

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Electrical Systems Regulations

- 10 CFR 50.49
  Environmental Qualification
- 10 CFR 50.63
  Station Blackout
- 10 CFR Part 50, Appendix A, GDC-17
  Electrical Power Systems

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Electrical Systems Evaluation

- Existing environmental qualification of electrical equipment remains valid
- Loading on safety equipment remains bounding
- Safe operation under increased electrical output and increased plant load
  - Grid stability study

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Summary

- The Electrical Engineering Branch staff found the following areas acceptable for operation at uprated conditions:
  - Environmental Qualification of Electrical Equipment
  - Offsite Power Systems
  - Onsite Power Systems
  - Station Blackout

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Human Factors Review

Kamishan Martin
Health Physics and Human Performance Branch
Division of Inspection & Regional Support
Office of Nuclear Reactor Regulation

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Human Factors Evaluation

- Changes to EOPs and AOPs will be evaluated through the licensee's verification and validation process and Do not significantly impact operator actions and mitigation strategies
- Operator actions
  - Some eliminated through the use of automation

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Human Factors Evaluation

- Operator actions
  - SGTR current licensing basis analysis requirements
  - Supplemental evaluation of SGTR includes explicit simulation
  - Margin-to-overfill evaluation
  - Performed simulations using operator actions credited in supplement to licensing basis SGTR analysis

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Human Factors Evaluation

- Control Room Controls, Displays, and Alarms
  - Staff is satisfied that the licensee will identify necessary changes to operator interfaces for control room controls, displays, setpoints, and alarms and has an implementation processes in place to support reliable operator performance

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Human Factors Evaluation

- Operator Training Program and the Control Room Simulator
  - The licensee has committed to systematically identify changes and then implement any changes through its established processes for procedure revision, plant modification, and operator training.

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Summary

- Staff concludes that the licensee has (1) appropriately accounted for the effects of the proposed EPU on the available time for operator actions and (2) taken appropriate actions to ensure that operator performance will not be adversely affected by the proposed EPU.

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Mechanical & Civil Engineering Review

Alexander Tsirigotis
Mechanical & Civil Engineering Branch
Division of Engineering
Office of Nuclear Reactor Regulation

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Review Scope

- NRC staff reviewed the impact of the EPU on the structural integrity of the following SSCs:
  - Pressure-retaining components and their supports
  - Reactor pressure vessel and supports
  - Control rod drive mechanisms
  - Steam generators and supports
  - Reactor coolant pumps and supports
  - Pressurizer and supports
  - Reactor pressure vessel internals and core supports
  - Seismic and dynamic qualification of mechanical and electrical equipment.

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Review Results

- EPU increases the steam and feedwater flow rates by approximately 22%
- Piping systems that are mainly affected by the EPU include the following:
  - Main Steam, Condensate, Feedwater, Extraction Steam and Heater Drains.
  - These systems required piping and pipe support modifications and/or equipment replacement to accommodate EPU conditions.
- Structural evaluations of SSCs (including proposed modifications) at EPU conditions employed current plant design basis methodology and acceptance criteria
- Structural evaluations met design basis code allowable values

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Conclusion

- Based on the review of the licensee's evaluations, the staff concluded that reasonable assurance has been provided which finds plant systems, structures, and components important to safety are structurally adequate to perform their intended design functions under EPU conditions.

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High-Energy Line Break Methodology

William (Billy) Jessup
Mechanical & Civil Engineering Branch
Division of Engineering
Office of Nuclear Reactor Regulation

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HELB Methodology Overview

- NRC staff reviewed licensee's methodology and technical justification for proposed HELBs
  - SBPB, SCVB, EMCB branches of NRR involved
- Acceptance criteria based on compliance with PBNP General Design Criterion (GDC) 40:
  - *Adequate protection for those engineered safety features, the failures of which could cause an undue risk to the health and safety of the public, shall be provided against dynamic effects and missiles that might result from plant equipment failures.*
- Current PBNP licensing basis requirements related to HELB are based on the Giambusso Letter criteria (1972)

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Balance-of-Plant Branch (SBPB) Staff Review

- Identification of High Energy Lines
  - High energy Criteria is based on Temperature and Pressure
  - Deleted Sampling system
  - Added five systems or portions of systems
- Jet Impingement Criteria unchanged – EPU has no effect on Pipe Whip and Jet Impingement features
- Protection from flooding resulting from HELB found acceptable

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Mechanical & Civil Engineering Branch (EMCB) Staff Review

- For break postulation, licensee proposed to use stress equations of ASME B&PV Code, Section III, 1977 Edition, with Winter 1978 Addenda, for which PBNP has a formal code reconciliation to the original code of construction
- Licensee's HELB evaluations performed at EPU conditions resulted in new break locations not previously identified
- No whip restraints or barriers removed
- No additional adverse dynamic effects resulting from pipe whip and jet impingement
- NRC staff concluded that reasonable assurance exists with new break postulation criteria

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Containment and Ventilation Branch (SCVB) Staff Review

- HELB analysis for compartments in PAB, containment facade, and turbine building
- NRC approved LOFTRAN code and NRC's RELAP5 code for EPU mass & energy (M&E) release
- GOTHIC for compartment peak pressure & temperature responses
- GOTHIC is accepted by NRC for containment pressure & temperature response analysis given M&E input

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Containment and Ventilation Branch (SCVB) Staff Review

- Staff spot checked several inputs to the GOTHIC code
- Staff RAI on differences on input parameters values from current licensing basis and justification for differences
- Output – compartment peak pressure and temperatures
- Staff accepted GOTHIC HELB analysis for EPU

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Summary

- NRC staff reviewed licensee's methodology and technical justification for proposed HELB methodology
- SBPB reviewed the identification of high energy lines, the criteria for protection from pipe whip and jet impingement, and flooding and found the criteria acceptable
- EMCB reviewed the proposed HELB postulation methodology and has found the proposed criteria adequate
- SCVB reviewed the HELB M&E release analyses and corresponding pressure and temperature responses (using GOTHIC) and found the approach acceptable
- NRC staff concluded that regulatory requirements related to HELB are satisfied and reasonable assurance is provided by the proposed changes to the HELB methodology

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QUESTIONS

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Public Comments

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Committee Guidance Comments

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Adjourn