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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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624TH MEETING

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

+ + + + +

OPEN SESSION

+ + + + +

THURSDAY

MAY 7, 2015

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ROCKVILLE, MARYLAND

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The Advisory Committee met at the Nuclear
 Regulatory Commission, Two White Flint North, Room
 T2B1, 11545 Rockville Pike, at 8:30 a.m., John W.
 Stetkar, Chairman, presiding.

COMMITTEE MEMBERS:

- JOHN W. STETKAR, Chairman
- DENNIS C. BLEY, Vice Chairman
- MICHAEL CORRADINI, Member-at-Large
- RONALD G. BALLINGER, Member
- SANJOY BANERJEE, Member
- CHARLES H. BROWN, JR. Member

1 DANA A. POWERS, Member
2 HAROLD B. RAY, Member
3 JOY REMPE, Member
4 PETER RICCARDELLA, Member
5 MICHAEL T. RYAN, Member
6 STEPHEN P. SCHULTZ, Member
7 GORDON R. SKILLMAN, Member *

8 DESIGNATED FEDERAL OFFICIAL:

9 WEIDONG WANG

10 ALSO PRESENT:

11 GREG BROADBENT, Entergy
12 BRYAN FORD, Entergy
13 CHRISTOPHER JACKSON, NRC
14 MEENA KHANNA, NRC
15 RICKY LIDDELL, Entergy
16 BRUCE LIN, NRC
17 JOSE MARCH-LEUBA, ORNL
18 JAMES NADEAU, Entergy
19 JERRY PURCIARELLO, NRC
20 BRIAN THOMAS, NRC
21 ALAN WANG, NRC
22 GEORGE WILSON, NRC

23
24 *Present via telephone
25

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

(8:34 a.m.)

CHAIR STETKAR: The meeting will now come to order. This is the first day of the 624th meeting of the Advisory Committee on Reactor Safeguards. Here at today's meeting the committee will discuss the following -- Grand Gulf MELLLA+ License Amendment; Regulatory Guide 1.27; Ultimate Heat Sink for Nuclear Power Plants, Revision 3; and preparation of ACRS reports.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. Mr. Weidong Wang is the designated federal official for the initial portion of this meeting.

We've received no written comments or requests to make oral statements from members of the public regarding today's sessions. There will be a phone bridge line and to preclude interruption of the meeting the phone will be placed in a listen-in mode during the presentations and committee discussion.

A transcript of portions of the meeting is being kept, and it is requested that speakers use one of the microphones, identify themselves and speak with sufficient clarity and volume so that they can be

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1 readily heard. I'll remind everyone in the room to
2 please check and silence all of your little beepy
3 devices.

4 A couple of other items of note for
5 everyone sitting at the tables, we've made changes to
6 our microphone system here. So if you look at the
7 base of your little microphone there's a thing that
8 says Push. You can now turn them off and turn them
9 on. I'd request that everybody keep your mic off
10 unless you're speaking because the rustling of the
11 papers, these mics are so sensitive that they pick up
12 and disrupt people on the bridge line that can't
13 really hear us. So just touch the Push, the little
14 light will come on, talk, turn it off when you're not
15 talking.

16 We've got that. Remember, Dick Skillman
17 is theoretically on a separate bridge line that should
18 be open. Dick, are you out there?

19 MEMBER SKILLMAN: Good morning, John. I'm
20 here. Yes, sir.

21 CHAIR STETKAR: Excellent. And I hope
22 you're doing well. For those members who don't know,
23 Dick was afflicted with shingles a couple of weeks ago
24 and is hopefully on the mend. You doing okay?

25 MEMBER SKILLMAN: I am on the mend. Thank

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1 you.

2 CHAIR STETKAR: Excellent.

3 MEMBER SKILLMAN: All who haven't had
4 shingles shots I urge you to consider. This is
5 something that none of us wishes to go through. And
6 as Dennis Bley wrote, the pain is really formidable.
7 So best to all. Thank you.

8 CHAIR STETKAR: Glad to hear you're on the
9 mend and hope you get there.

10 MEMBER SKILLMAN: Thank you, John.

11 CHAIR STETKAR: With that unless any of
12 the members have anything else, the first item on the
13 agenda is the Grand Gulf MELLLA+, and Dr. Joy Rempe
14 will lead us through that session. Joy?

15 MEMBER REMPE: Thank you, Mr. Chairman.
16 On March 17th, our Power Upgrades Subcommittee reviewed
17 the Grand Gulf Nuclear Station Unit 1 operating
18 license amendment request to allow operation in the
19 expanded Maximum Extended Load Line Limit Analysis
20 Plus, or MELLLA+ domain.

21 At the end of our meeting, our
22 subcommittee recommended that this LAR be presented to
23 the full committee. This LAR for operation in the
24 MELLLA+ domain is the second to be reviewed by us.
25 The first was the Monticello Nuclear Generating Plant.

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1 And you shall hear today, several features
2 of Grand Gulf which differ from Monticello are of
3 particular importance with respect to MELLLA+
4 operation. Today we're going to hear presentations
5 from the NRC staff and representatives from the
6 licensee, Entergy Operations Incorporated, and part of
7 the presentations will be closed in order to discuss
8 information that's proprietary to the licensee and its
9 contractors.

10 And I believe we're going to start today
11 by hearing is it from George, or-- okay, yes, Wilson
12 from the staff.

13 MR. WILSON: Good morning. I'm George
14 Wilson, deputy director of the Division of Operating
15 Reactor Licensing. I want to thank you for this
16 opportunity to brief the committee on the MELLLA+
17 amendment for Grand Gulf.

18 The staff and the licensee last met with
19 the ACRS subcommittee on this review on March 17th.
20 The NRCS staff has determined that the operation in
21 the MELLLA+ domain at the Grand Gulf Nuclear Station
22 provides additional operational flexibility while not
23 compromising the safety of the plant.

24 At this point I'd like to turn the meeting
25 over to Meena Khanna, the branch chief for Plant

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1 Licensing 4-2 which includes Grand Gulf. Meena?

2 MS. KHANNA: Thank you, George. Good
3 morning. As George indicated, my name is Meena
4 Khanna. I am a branch chief in the Division of
5 Operating Reactor Licensing. Today we will be talking
6 to you about the review of the Grand Gulf MELLLLA+.

7 The Entergy license amendment request
8 dated September 25th, 2013 proposes a revision to the
9 Grand Gulf Nuclear Station technical specifications to
10 allow plant operation from the currently licensed
11 maximum extended load line limit analysis, MELLLLA,
12 domain to plant operation in the expanded MELLLLA+
13 domain under the previously approved extended power
14 uprate conditions of 4408 megawatts-rated core thermal
15 power.

16 An EPU was approved by license amendment
17 number 191 dated July 8, 2012 for Grand Gulf that
18 increased the power level from 3898 megawatts-thermal
19 to 4408 megawatts-thermal. When operating in the
20 MELLLLA+ domain, the operating power is maintained
21 constant but the recirculation core flow is allowed to
22 operate under a wider window than under the MELLLLA
23 conditions.

24 For Grand Gulf, the MELLLLA+ flow window is
25 between 80 percent and 105 percent flow. This

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1 operating flexibility reduces the need for frequent
2 control rod motion. I'd like to note that this is the
3 NRC staff's second review of the request for
4 implementation of the MELLLA+ domain, Monticello being
5 the first. In both cases the licensees used the GEH
6 approved MELLLA+ licensing topical report NEDC-33006,
7 Revision 3, which is General Electric Boiling Water
8 Reactor Maximum Extended Load Line Limit Analysis Plus
9 for its submittal.

10 A portion of the NRC staff's presentation
11 today will include a comparison of the significant
12 differences between the Monticello and Grand Gulf
13 MELLLA+ license amendment reviews. As first indicated
14 previously, we did have an NRC subcommittee review
15 meeting in March, and through that meeting there were
16 several questions that were raised by the
17 subcommittee. We have responded to all of these
18 questions.

19 Again I will reiterate that the staff has
20 determined the operation in the MELLLA+ domain at the
21 Grand Gulf Nuclear Station does provide additional
22 operational flexibility while not compromising plant
23 safety. In addition, I would like to note that we
24 currently have two additional MELLLA+ applications in-
25 house for Nine Mile Point and Peachbottom. Both of

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1 these applications are currently under staff review,
2 and the ACRS meetings, subcommittee and full
3 committee, will be scheduled in the near term. We
4 thank you for your time.

5 At this point I would like to turn the
6 meeting over to Bryan Ford of Entergy for their
7 presentation of the MELLLA+ license amendment
8 application for Grand Gulf. Thank you.

9 MEMBER REMPE: While we're switching
10 speakers, Dick, is there a way to turn your phone on
11 mute? Because we're getting a lot of background
12 noise, I think, from your phone.

13 MEMBER SKILLMAN: I will go ahead and do
14 it right now.

15 MEMBER REMPE: Thank you. Sorry to
16 request it, but it'll help.

17 MR. FORD: Well, good morning everybody.
18 My name is Bryan Ford. I'm the senior manager of
19 Regulatory Assurance for Entergy. Thank you very much
20 for taking the time to look at our MELLLA+ submittal
21 today. It's going to provide some good flexibility
22 for the plant going forward.

23 So today with me I have Greg Broadbent,
24 the supervisor of Fleet Nuclear Safety Analysis; Jim
25 Nadeau, the Grand Gulf Regulatory Assurance manager;

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1 and Ricky Liddell, the supervisor at Grand Gulf
2 Operations Training for Entergy.

3 Today what we're going to discuss is a
4 brief overview of the plant and the benefits that
5 we're getting out of the MELLLA+ analysis. We're
6 going to talk a little bit about the safety analysis
7 methods.

8 We're going to show a short video on the
9 prime area operator action associated with the
10 analysis. We're also going to discuss the ATWS-I
11 analysis that was performed to support the amendment,
12 and we're going to talk about the license condition
13 associated with it. With that I want to turn it over
14 to Jim Nadeau.

15 MR. NADEAU: Thanks, Bryan, and thank you
16 to the committee for hearing us. Again I'm Jim
17 Nadeau. I'm the Regulatory Assurance manager at Grand
18 Gulf and I'm going to give a brief overview of Grand
19 Gulf and MELLLA, why we want it.

20 Grand Gulf was initially licensed in 1984,
21 became commercially operational in July 1st, 1985. We
22 are a GE BWR 6 with a Mark III containment. We were
23 originally licensed in 1984 to 3833 megawatts-thermal,
24 and we're currently operating license limited at 4408
25 megawatts-thermal.

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1 The MELLLA+ offers us improved operational
2 flexibility in this extended region of 4408 megawatts-
3 thermal. It gives us reduced reactivity
4 manipulations, reduced operator challenges and reduced
5 enrichments. Next slide.

6 The graph in front of you shows the
7 current power-flow map. That's the white area inside
8 the black line. The MELLLA+ region is the blue region
9 that we're requesting and this gives us additional
10 flexibility to operate reactor flows to change reactor
11 reactivity.

12 As Meena was talking earlier, we've gone
13 through the licensing. We've had 80 limitations and
14 conditions that were in the licensing documents.
15 We've met all 80. And we've had two audits by the NRC
16 staff. One at GE Hitachi in April 2014, and also one
17 at the Grand Gulf facility in the simulator to show
18 that we could meet our operate time-critical operator
19 actions. In both cases the audits were successful.

20 MEMBER BANERJEE: Ask you a question. I
21 missed this in the subcommittee meeting, but --

22 CHAIR STETKAR: Sanjoy, it's one thing to
23 turn the mic on, another thing to be sort of close to
24 it.

25 MEMBER BANERJEE: All these things that I

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1 have to learn towards the end of my career. But
2 whatever. Your limiting transient for your ATWS, if
3 I remember, was the turbine trip, right, without
4 bypass?

5 MR. NADEAU: Without bypass.

6 MEMBER BANERJEE: Now if I should ask this
7 in the closed session just say so, but that's fine.
8 Whereas, the things that challenge the DSSCD mostly
9 are the two RPT trip in terms of stability, and if I
10 remember with Monticello that was the same thing. Why
11 is that the case?

12 MR. NADEAU: Greg, is this a closed
13 session?

14 MR. BROADBENT: Yes, that's something we
15 can discuss in the closed session. We'll have a GE up
16 here and we can talk the details.

17 MEMBER BANERJEE: Yes, I sort of missed
18 that until I started to look at your things in more
19 detail.

20 MR. BROADBENT: Yes, I'm not sure if we
21 went into a whole lot of detail on that particular
22 subject area, but --

23 MEMBER BANERJEE: Yes. Okay.

24 MR. NADEAU: Okay, now I'd like to turn it
25 over to Greg Broadbent.

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1 MEMBER SCHULTZ: One question. You
2 mentioned you have 80 limitations. I thought there
3 were also conditions associated with the application
4 of MELLLA+. Are there no longer conditions associated
5 with the application?

6 MR. NADEAU: There are license conditions
7 associated with the application which we're
8 incorporating through our license. We'll be talking
9 about that later in the presentation --

10 MEMBER SCHULTZ: That's fine. Thank you.

11 MR. NADEAU: -- directly related to time-
12 critical actions.

13 MEMBER SCHULTZ: Understood. Thank you.

14 MR. BROADBENT: And I'm Greg Broadbent,
15 the Entergy Nuclear Analysis supervisor in corporate.
16 With regard to the MELLLA+ analysis, we followed the
17 guidelines and the standard GE MELLLA+ topical report,
18 33006.

19 The most challenging, the most different
20 analysis associated with MELLLA+ is the ATWS analysis,
21 and that's because in MELLLA+ you're operating a
22 higher rod line. We presented this in some more
23 detail for the subcommittee. But when the recirc
24 pumps trip you end up at a higher ATWS post-trip power
25 level and that causes things to happen faster. PCT

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1 increases faster. The pool heats up faster and
2 necessitates the need for quicker operator actions.
3 And we have a 90-second operator action time to reduce
4 reactor water level.

5 SLC is assumed in the analysis to happen
6 at 300 seconds, and then to cool the suppression pool
7 we put RHR and suppression pool cooling in 11 minutes.
8 Now we recognize that the 90 seconds is a relatively
9 fast operator action time, and I think we've got a
10 video that Ricky will present that will go in a little
11 bit more detail.

12 MR. LIDDELL: Good morning. I'm Ricky
13 Liddell. I will be walking us through the video this
14 morning, showing that we do in fact meet the 90-second
15 time-critical action for determining feed flow to the
16 vessel to reduce level. We did do a benchmark at the
17 Monticello plant, and basically our operator response
18 is similar to theirs. They were able to meet the 90-
19 second time-critical action as were we. And so I'll
20 cue up the video now.

21 MEMBER REMPE: Before you do that I have
22 a question about the last bullet.

23 MR. LIDDELL: Sure.

24 MEMBER REMPE: The video, my understanding
25 was the operators were given some training and they

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1 knew that that transient was going to occur.

2 MR. LIDDELL: That's correct.

3 MEMBER REMPE: And will the training be
4 the same way or are you going -- there's one thing to
5 be told to do something and then you execute that
6 action, and then there's another thing to be sitting
7 in the control room and have an accident or a
8 transient to occur. And how do you account for that
9 in certain --

10 MR. LIDDELL: Our training in the staff,
11 me and two of my instructors put that video together
12 in a couple of hours. We looked at our EPs and how we
13 would need to implement the actions to meet the 90
14 seconds. And essentially what we're doing is we're
15 doing the same actions that we already do for an ATWS
16 response. We're just eliminating the three-part
17 communication between the CRS and the operators.

18 Now we were able to put that together
19 pretty quickly with a minimum of training. We're
20 going to give a minimum of two cycles of training to
21 our operators, so they're going to have to cue off of
22 an update from the at-the-controls operator that we're
23 in a high power ATWS and they will know what actions
24 to take based on that.

25 VICE CHAIR BLEY: Ricky, I don't remember

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1 from the subcommittee meeting, I don't recall anyone
2 talk about that for this activity you suspended the
3 three-way communication that you just said.

4 MR. LIDDELL: What we're doing is --

5 VICE CHAIR BLEY: I mean that gets you
6 done faster but it might get something else done.

7 MR. LIDDELL: Yes, we have several
8 actions, time-critical actions that we do already in
9 response to a reactor scram or a turbine trip. So
10 immediate operator actions have to be performed by
11 memory. They're not required to have a supervisor
12 direct and the operator is expected to recognize the
13 three conditions for those --

14 VICE CHAIR BLEY: Do they have a post-
15 activity communication requirement?

16 MR. LIDDELL: Yes. Since the standard
17 heat reports that I did immediate actions one, two and
18 three, that's correct.

19 MEMBER BROWN: Does the simulation
20 actually show the trigger or what alerts the operator?

21 (Simultaneous speaking.)

22 MR. LIDDELL: And I'll explain what the
23 cues are.

24 MEMBER SKILLMAN: Ricky, this is Dick
25 Skillman. Can you hear me, please?

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1 MR. LIDDELL: Yes.

2 MEMBER SKILLMAN: Sir, what I want to ask
3 you is a reinforcement of Dr. Rempe's question. What
4 I heard you just say is that there are other events
5 for which you have immediate operator actions, your
6 TCOAs, time-critical operator actions, and that your
7 operator's performance for those events coupled with
8 what you witnessed in the ATWS give you confidence
9 that the TCOAs will be accomplished in the required
10 time period. In other words, you're building not only
11 on the ATWS event but on other similar events that
12 cause the operators to take immediate manual actions.
13 Is that what you intend to communicate?

14 MR. LIDDELL: Yes, sir. If we're in an
15 ATWS and let's say we had other off-normal events that
16 had immediate actions, the ATWS and entry into our
17 EP2A would be the overriding priority, and it already
18 is. We respond to other immediate actions already as
19 secondary to our ATWS EP directions.

20 MR. FORD: And this is Bryan Ford. A
21 little bit more clarification. During our training,
22 one of our license conditions is to document the
23 amount of time it takes for our different shifts to
24 perform this action and to provide a report to the
25 staff that shows that we were able to meet it for the

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1 applicable shifts.

2 MEMBER SKILLMAN: Thank you. Are there
3 other immediate time-critical actions for other
4 transients or events that are just as stringent
5 required compliance as ATWS?

6 MR. LIDDELL: No. But we do have other
7 immediate actions that we take for such as a jerking
8 control rod, the operator's supposed to immediately
9 drive that control rod fully in. So the trip of a
10 control rod drive pump, the operator immediately
11 recognizes that and starts the second, the standby
12 pump.

13 So those are the kind of critical, not
14 time-critical but I would say time-sensitive actions
15 that we do have in place.

16 MEMBER SKILLMAN: And what is the track
17 record for operator response? Spontaneous operator
18 response not rehearsed to those types of events?

19 MR. LIDDELL: I can give you an example.
20 Recognition of THI, thermal hydraulic instability, we
21 have some scenarios last cycle with that. And I think
22 the longest for an operator to recognize that and take
23 an action was about ten seconds based on the
24 availability of the indications. So for the ones that
25 we train on as immediate operator actions we have not

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1 seen any specific weaknesses in the operator response.

2 VICE CHAIR BLEY: Ricky, that was a real
3 isolated event, right, or was it a simulator?

4 MR. LIDDELL: No, ours was in the
5 simulator. There was --

6 (Simultaneous speaking.)

7 MR. LIDDELL: But it was not ours.

8 VICE CHAIR BLEY: Okay.

9 MEMBER SKILLMAN: Ricky, thank you.

10 MR. LIDDELL: Sure. I'm going to go ahead
11 and expand this. What I'll do first is just discuss
12 the locations on the panels where there will be
13 actions that'll be taken initially. This is the --
14 and I apologize for the ones that are on conference
15 call, but I'm looking at the full core display.

16 We have our at-the-controls operator
17 seated in the controls area, and he will receive a
18 couple of alarms indicating a scram and we'll respond
19 to those with the immediate operator actions for a
20 scram. Once he recognizes that we have a ATWS
21 condition then he will provide an additional update
22 for that which will be the cue for he and the second
23 operator and also the CRS to enter the EP2A which is
24 our ATWS emergency procedure. So we have --

25 VICE CHAIR BLEY: Just for everybody here,

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1 for you guys, the CRS is the SRO.

2 MR. LIDDELL: That is correct. Control
3 room supervisor. And what, his desk is off-camera but
4 for EPs and off-normal events he would move down to
5 the control room operator's desk and so he'll come
6 into view which will be me. All right.

7 MEMBER BROWN: Before you -- where are the
8 alarms indicated where this operator is going to
9 respond to?

10 MR. LIDDELL: Okay. What we're going to
11 get is I've got to get reactor scram alarms right here
12 on the indicators next to the full core display. And
13 what he has to do is to test, verify that all rods are
14 in. In this case there will be no rods inserted as a
15 result of the scram signal.

16 So we'll remain in 100 percent ATWS
17 condition until we will get a recirc pump trip that
18 will occur on pressure because of the turbine trip.
19 Even though we have bypass we'll still have high
20 reactor pressure, enough that we will get an automatic
21 actuation of the recirc pump trip and alternate rod
22 insertion.

23 Now there will be some additional alarms
24 that you can see over here on this left side of the
25 680 panel. So those will be an indication that ARI-

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1 RPT, alternate rod insertion-recirc pump trip has
2 actuated. Now what that means for us is the operator
3 action to downshift the recirc pumps and to initiate
4 ARI-RPT will not be required. We do expect the
5 operator to go ahead and go through those just to
6 verify that all those signals are received. So you
7 will see him initiate those actions, but we can tell
8 by the alarms that they've actually already occurred.

9 MEMBER BROWN: So it's the absence of the
10 rods, you've got a scram but no rods go to the bottom.

11 MR. LIDDELL: That's right.

12 (Simultaneous speaking.)

13 MEMBER BROWN: There's some other, it's
14 the turbine trip that comes along with it?

15 MR. LIDDELL: If I get indications of a
16 turbine trip, you know, have indications of a scram --

17 MEMBER BROWN: I'm just trying to --

18 (Simultaneous speaking.)

19 MEMBER BROWN: -- the two or three things
20 he's going to cue on that he has to see to say okay.

21 MR. LIDDELL: The APRM that you've got
22 four channels of average power range monitors on that
23 section of the panel and they will, even after the
24 recirc pump trip they will still be indicating about
25 40 percent.

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1 MEMBER BROWN: Okay.

2 MR. LIDDELL: So you'll hear him give an
3 update, 40 percent ATWS. That 40 percent is the 40
4 percent for thermal power that we still have after the
5 recirc pump trips. Because that's the initial plant
6 response that's going to drive power down otherwise we
7 would still have 100 percent. But that pressure spike
8 is going to initiate automatic response.

9 MEMBER BROWN: Okay, thank you.

10 MR. LIDDELL: Now also on this section of
11 the panel to the left of the at-the-controls operator
12 are the feedwater controls. This control room
13 operator will actually respond to control feedwater.
14 The at-the-controls operator after verifying that we
15 are in an ATWS and taking initial actions to verify
16 that the recirc pumps are downshifted and tripping one
17 feed pump, now we trip one feed pump because the
18 feedwater control system is going to ramp injection
19 back as far as it can.

20 But the feed pump speed with both feed
21 pumps still in service are really going to feed more
22 than we need in this situation, so tripping one
23 feedwater pump will reduce feedwater injection and
24 allow us to maintain the level.

25 Now our initial actions are really just to

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1 stabilize level. I will give, or the CRS will give an
2 order to terminate and prevent feedwater injection,
3 and that includes not only just reducing the injection
4 to zero but isolating the flow paths so that if
5 reactor pressure were to drop we wouldn't get an
6 inadvertent feedwater injection. So that order of
7 terminate and prevent encompasses all actions to
8 terminate feed flow and also isolate the flow paths to
9 prevent the injection.

10 CHAIR STETKAR: Ricky, just education
11 because I come out of the PWR world and I sort of know
12 how boilers work, but as you get out of the initial
13 transient how are they instructed to control level
14 after that? What do they do?

15 MR. LIDDELL: The EPs, EP2A will drive
16 that. What they'll do is CRS will give out a lowered
17 level band. In this case the initial level band is
18 going to be minus 70 inches wide range to minus 130
19 inches wide range. We'll line up the feedwater in a,
20 we'll call a start-up lineup.

21 CHAIR STETKAR: Okay, but they do restore
22 feedwater flow?

23 MR. LIDDELL: Correct.

24 CHAIR STETKAR: Okay.

25 MR. LIDDELL: And you'll see that action.

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1 That'll be one of the first things that he does is to
2 terminate feedwater and then line up in the start-up
3 level lineup.

4 A few other actions that are going to
5 occur, if you look over to the right side this is our
6 601 panel which has our SRVs, standby liquid control.
7 The SRVs, we want to make sure that they don't
8 inadvertently initiate on a low level.

9 So one of the first actions in our ATWS
10 response is to inhibit ADS, so you'll hear that order
11 given. Inhibit alternate depressurization system.
12 And that's done with just two switches, keylock
13 switches, so that's one of the first actions that'll
14 be taken.

15 Also high pressure core spray, since it
16 will initiate on a level 2 which we will receive a
17 level 2 when we start lowering, we want to override
18 high pressure core spray before we start lowering
19 level to the point of initiating high pressure core
20 spray.

21 So the initial actions that you'll see
22 will be the at-the-controls operator will respond to
23 the scram, take the mode switch to shutdown, recognize
24 that the rods are still out and we're at approximately
25 40 percent based on APRM indications. He'll give an

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1 update and then once he gets the update the other
2 operator then knows that he needs to go inhibit ADS
3 and override high pressure core spray.

4 The at-the-controls operator will also
5 trip a feed pump, and at that point the control room
6 operator will come back over and take over feedwater
7 and then he will maintain feedwater through the rest
8 of the event.

9 MEMBER SCHULTZ: Inhibiting the ADS is
10 time-critical?

11 MR. LIDDELL: It is not. It's not a time-
12 critical action specifically, but it's one that we do
13 in parallel with the others. Our EP initial actions
14 are ordered such that before you terminate and prevent
15 feedwater injection you take those other actions, so
16 they'll be doing those first.

17 And those are some of the actions that if
18 we don't get those done immediately we can't get to
19 the step to terminate and prevent feedwater. So it is
20 important that they do those as immediate actions
21 without having to wait for the CRS to give that
22 command.

23 MEMBER SCHULTZ: Thank you.

24 MR. LIDDELL: All right, so I'm going to
25 start the video. And I'm not getting, I don't see a

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1 timeline.

2 MR. FORD: You'll have to make it a little
3 smaller.

4 MR. LIDDELL: All right, yes, this will
5 work. So what I'm going to do is I'm going to go
6 ahead and run the video one time through and it'll
7 take just a couple of minutes. And then I'll go back
8 and I'll freeze it at certain points, anybody wants me
9 to stop at a certain point. But I think it would be
10 good to run through it one time without stopping just
11 to give you an idea of the actions and the time frame
12 that they tell you.

13 (Video played.)

14 MR. LIDDELL: (Narrating) The reactor
15 scram alarms are coming in, and also -- now the at-
16 the-controls operator, he's verifying that the recirc
17 pumps have tripped. The other operator has overridden
18 high pressure core spray and inhibited ADS. He's
19 coming around to take over feedwater now.

20 He's now reducing injection. That's where
21 we'd get our high pressure core spray initiation if it
22 hadn't already been overridden. Okay, I'll stop it
23 there.

24 (Video stopped.)

25 VICE CHAIR BLEY: When you run it again

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1 would you stop at the point they do the things they
2 need to do in 90 seconds?

3 MR. LIDDELL: Absolutely.

4 VICE CHAIR BLEY: Yes, thanks.

5 MR. LIDDELL: So on our timeline right now
6 we're two minutes and 55 seconds from the start of the
7 video. The scram came in at about ten seconds, so
8 we're about two minutes and 45 seconds in. Our
9 standby liquid control which that's a 300-second
10 activity so that has been completed. And the 90-
11 second for the terminate and prevent. So this time I
12 will freeze it.

13 (Video played)

14 MR. LIDDELL: (Narrating) Now he just
15 tripped a feed pump which is going to help with our
16 level.

17 MR. MARCH-LEUBA: Can you freeze it there?
18 Can you freeze it?

19 (Video stopped.)

20 MR. LIDDELL: Sure.

21 MR. MARCH-LEUBA: Yes, this is Jose March-
22 Leuba. Can you point out the line, the alarms where
23 they identify the scram happen?

24 MR. LIDDELL: Yes. All right, let me back
25 up. Okay, so at this point we've got a couple of red

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1 alarms here. There's also going to be one that comes
2 in here. What's happening is we're going to get some
3 multiple scram signals. We're going to get, initially
4 you just get the reactor scram and based on that alone
5 his immediate action is to verify that the rods are
6 inserted, which they're not, take the mode switch to
7 shutdown which actually gives two additional signals
8 for shutdown and they don't cause the rods to insert
9 either.

10 So at that point the recirc pumps have
11 tripped on high pressure and he's going to look and
12 recognize that we're at a 40 percent power.

13 MR. MARCH-LEUBA: So this is Jose again.
14 Before operator got off the chair he already knew the
15 scram was supposed to happen because he saw those red
16 lights, correct?

17 MR. LIDDELL: That's correct.

18 MR. MARCH-LEUBA: And now he's looking
19 probably at the APRM display to see where the power
20 is?

21 MR. LIDDELL: That's correct.

22 MR. MARCH-LEUBA: Can you point where the
23 control rod insertion will show up?

24 MR. LIDDELL: Yes. This section here is
25 just a graphical display of the core. All this red

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1 should be all green. You should have full-in
2 indication green lights on all of these rods. So just
3 based on a glance, you know, we all can see that this
4 is red and not green. So that's your first.

5 MR. MARCH-LEUBA: What initiated the scram
6 in this case?

7 MR. LIDDELL: The turbine trip initiated
8 the scram on high pressure. That's going to be the
9 first one you're going to get. You're also going to
10 get an APRM flux scram, then he's going to get, due to
11 the level at, pretty soon you'll get a level scram
12 signal.

13 So there's multiple scram signals that are
14 coming in, but initially the pressure because you've
15 basically got 100 percent power you've only got 30
16 percent capacity on your bypass valves, so you're
17 going to be lifting SRVs over here but that happens
18 after your scram signal.

19 CHAIR STETKAR: This is the turbine trip
20 with bypass as opposed --

21 MR. LIDDELL: Turbine trip with bypass.

22 MR. LIDDELL: We ran them both. The
23 response of the crews is the same but --

24 CHAIR STETKAR: The timing, you know, the
25 level response will be a little different.

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1 MEMBER BANERJEE: This is 100 percent
2 power, is it?

3 MR. LIDDELL: Initially we're at 100
4 percent power. With the scram signal until the recirc
5 pumps trip on high pressure we're still at 100
6 percent. But as soon as the recirc pumps trip then
7 you're going to have boiling in the core and --

8 MEMBER BANERJEE: Does it make any
9 difference if you're at 80 percent flow or something
10 or what's the flow again? Full flow, full power.

11 MR. LIDDELL: I think that this one
12 over --

13 MR. BROADBENT: Yes, this was from the
14 MELLLA+ region so this is the highest rod line that we
15 can get to.

16 MR. MARCH-LEUBA: This is Jose again. You
17 guys know too much and are making it a little
18 complicated. Ultimately the point from the human
19 factor point of view, which is the one we're really
20 more concerned about, before operator got off the
21 chair he'd already seen that the scram signal had
22 happened and the rods had not gone in. So even before
23 he got off the chair, two or three seconds, he knew
24 that he was in an ATWS.

25 MEMBER BANERJEE: Yes.

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1 MR. MARCH-LEUBA: It was going through his
2 mind what do I have to do next.

3 MEMBER BANERJEE: Yes, I'm just trying to
4 establish the initiating conditions.

5 MR. MARCH-LEUBA: Yes, that's important.
6 But from the human factor point of view it's not that
7 complicated.

8 (Simultaneous speaking.)

9 MEMBER BANERJEE: Eighty percent flow?

10 MR. BROADBENT: Eighty percent.

11 MEMBER BANERJEE: Eighty percent flow,
12 that's been established and it's a turbine trip.

13 VICE CHAIR BLEY: I'm sorry. Jose, from
14 a thermal hydraulics point of view you're right. The
15 guy in the control room, the complication is what
16 makes his job.

17 MR. MARCH-LEUBA: Correct. He's to
18 oversee --

19 VICE CHAIR BLEY: This all matters.

20 MR. MARCH-LEUBA: He needs to go through
21 everything.

22 VICE CHAIR BLEY: I have just a quick
23 question, Ricky, on what you guys do. I noticed this
24 and I noticed nobody looking at it, or maybe you were
25 looking at it. The guy said, I'm going to do an

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1 update, and the other two guys hold their hands up.
2 So at the CRS if he didn't see the other hand go up
3 would say, wait a minute.

4 MR. LIDDELL: Yes. You're fixing to get
5 some information -- that's right.

6 VICE CHAIR BLEY: I saw two hands going
7 up. I was, oh that's weird.

8 MR. LIDDELL: Okay. No, the hands going
9 up is something that we've adopted just to make sure
10 that whoever's giving the update knows that
11 everybody's listening.

12 VICE CHAIR BLEY: But his back's turned.
13 But go ahead. Every time.

14 (Video played.)

15 MR. LIDDELL: (Narrating) All right, so
16 just a couple of seconds. The mode switch is in
17 shutdown. We're just going to give you a redundant
18 scram signal but it's not going to make a difference.

19 (Video stopped.)

20 MEMBER BANERJEE: Okay, so at this point,
21 31 seconds, we've taken the two actions to inhibit
22 ADS, override high pressure core spray. He has gone
23 through the actions to ensure that ARI-RPT has been
24 initiated. It did auto-initiate based on this red
25 alarm and tripped one feed pump.

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1 MEMBER BALLINGER: The board is still red
2 though, right?

3 MR. LIDDELL: That's correct.

4 (Video played.)

5 (Video stopped.)

6 MR. LIDDELL: Now what this operator's
7 doing right now, he hasn't been given an order to
8 terminate and prevent feedwater, so but what he is
9 doing is lining up the feedwater system so that he can
10 maintain in a band. And what he's going to have to do
11 is he's going to reduce the pump speed so that he
12 stops injection and he's going to isolate that flow
13 path.

14 And he's going to have to walk around to
15 this other panel and line up the start-up level
16 control flow path, so you'll see at one point he's
17 walking away from the panel. That's part of his
18 action that he has to do to complete the terminate and
19 prevent process. So don't think -- you know, he's
20 going to where he needs to be to complete that action.

21 But the key point here is once he has
22 terminated injection that action is complete. To be
23 able to prevent a subsequent injection he has some
24 other actions, but as far as the initial action to
25 terminate feed flow that will be complete, and I'll

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1 show you when that happens.

2 VICE CHAIR BLEY: What's he carrying
3 around? Is that a little check sheet for immediate
4 actions or something?

5 MR. LIDDELL: That's correct.

6 MR. FORD: So he's just about to take the
7 action, is the 90-second action.

8 MR. LIDDELL: That's correct.

9 (Video played.)

10 (Video stopped.)

11 MR. LIDDELL: Okay, now he was already
12 reducing feed flow, and I'll show at what point.

13 (Video played.)

14 MR. LIDDELL: (Narrating) All right, so
15 he's reducing injection right there.

16 (Video stopped.)

17 MR. LIDDELL: He's done at that point,
18 okay. He initiated the action. It took about, you
19 know, five or so seconds. So right now we're at, we
20 had seven seconds, so nine and three, you know, we're
21 at about 85 seconds for him to complete the action,
22 but he had already reduced the injection flow several
23 seconds before that.

24 VICE CHAIR BLEY: And that's the 90-second
25 action.

1 MR. NADEAU: The 90-second action is to
2 initiate.

3 MR. LIDDELL: That's right.

4 MALE PARTICIPANT: Initiate what?

5 CHAIR STETKAR: Initiate, well, I mean,
6 you know, you can call initiate tripping the first
7 feed pump. But is it --

8 MR. LIDDELL: That's true, but there's
9 several things that are happening to reduce injection
10 rate. But when he finally has all injection
11 terminated, which he has right here, it's about 85
12 seconds.

13 CHAIR STETKAR: So is the time window to
14 get injection flow to, I'll use the term "zero," or is
15 it the time to get injection flow less than normal
16 injection, to start getting injection flow less than
17 normal?

18 MR. LIDDELL: It is to reduce, we're --

19 CHAIR STETKAR: What I'm trying to
20 understand is he very quickly trips the first feed
21 pump. That drops it probably to 70 percent, roughly.

22 VICE CHAIR BLEY: And is that the 90-
23 second time window or is it to get it to zero?

24 MR. LIDDELL: No.

25 CHAIR STETKAR: Or actually to get level

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1 down to --

2 MR. NADEAU: Is not to get it zero. Very
3 quickly at about 20 seconds when he trips the first
4 feed pump that is not, we have not completed
5 initiation of reducing flow.

6 (Simultaneous speaking.)

7 MR. NADEAU: About 60 seconds.

8 MEMBER REMPE: So this is the time you
9 report to the NRC for your condition.

10 (Video played.)

11 (Video stopped.)

12 MR. LIDDELL: So he is reducing feed flow
13 at this point and this is, you know, 78 seconds. So
14 approximately at 71 seconds he's taken the action
15 that --

16 VICE CHAIR BLEY: So that's the 90 seconds
17 then is when you actually start running it back.

18 MR. NADEAU: That's right.

19 VICE CHAIR BLEY: Okay. That's what we
20 didn't quite understand. And for this case that's 70
21 seconds.

22 (Video played.)

23 VICE CHAIR BLEY: This case is pretty
24 clean.

25 (Video stopped.)

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1 MR. NADEAU: Are there any more questions
2 on the video?

3 CHAIR STETKAR: Charlie. Push the button,
4 Charlie, when you're going to talk.

5 MEMBER BROWN: Oh that's right. Can I ask
6 the question again since he didn't hear me? I don't
7 think I needed that but --

8 CHAIR STETKAR: Well, it's the recorder
9 because the mics only go to the recorder.

10 MR. LIDDELL: So to answer your question,
11 one of the things that we do early on is we'll call
12 for three attachments to be installed which will
13 bypass the interlocks that prevent us from inserting
14 control rods. They'll bypass interlocks that prevent
15 us from resetting the scram and allow us to take
16 actions to start inserting rods.

17 But at this point there's really nothing
18 we can do to insert rods until those attachments are
19 in. The scram signal's already there. We can't
20 manually drive rods because, you know.

21 MR. BROADBENT: Right. The analysis
22 assumption is that you never get rods in. It gets
23 shut down with the SLC.

24 MEMBER BROWN: Okay.

25 MR. BROADBENT: And you saw when he

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1 initiated SLCs.

2 MEMBER BROWN: That was my question. It's
3 a later action manually taken to finally insert, pull
4 up, whatever the term is. I'm a PWR guy --

5 (Simultaneous speaking.)

6 CHAIR STETKAR: Before -- I don't have any
7 questions on the simulation, but, you know, reducing
8 feedwater flows is a pretty standard ATWS response on
9 all boilers. What, now there's a magic 90-second time
10 window, and I wasn't here in the subcommittee meeting.
11 I'm not a boiler, thermal hydraulics, core neutronics,
12 anything guy. What was, did you have a nominal time
13 window in the past to reduce feedwater flow?

14 MR. LIDDELL: Typically two to three
15 minutes.

16 CHAIR STETKAR: Two to three minutes,
17 okay.

18 MR. LIDDELL: And the reason it took
19 longer, you're doing all the same actions but you're
20 three-parting just about every action and they're all
21 being done in sequence versus parallel.

22 VICE CHAIR BLEY: So that's the main
23 difference is getting rid of the three-way
24 communication.

25 MR. LIDDELL: That's right. And allowing

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1 a couple of actions to be done in parallel versus
2 sequentially.

3 CHAIR STETKAR: Okay, thank you.

4 MR. BROADBENT: Okay. And continuing on
5 with the presentation, there were a few requests from
6 the subcommittee. One on operator action times, one
7 associated with the TRACG Tmin and the underlying
8 bases and references and all, and another one
9 associated with PCT margin.

10 The staff, the NRC staff answered the
11 first one. We'll let them discuss that in their
12 presentation. The second one, we did provide a
13 response. We listened to references, and if you want
14 to get into the details with that we can do it in the
15 closed session.

16 And then the third one was with regard to
17 PCT margin. And talking about PCT margin, we, you
18 know, the ATWS-I and the ATWS analysis, their best
19 estimate analyses, we do apply some conservative
20 values in some of these sensitive inputs in the
21 analysis. In three cases, in three areas, for
22 example, we assume a minimum core flow of 80 percent
23 which is the lower band of our window. We don't
24 actually design the core all the way down that far, we
25 actually only design the core to 85 percent.

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1 So we used a nominal value and some of the
2 sensitivity evaluations of 85 percent. Same thing
3 with rod peaking. The license basis analysis assumed
4 that we're at 95 percent of the LHGR limit. We design
5 with ten percent margins, so we use the actual margins
6 for LHGR. Also there's a feedwater temperature
7 transient that occurs in an ATWS, and we assumed a
8 bounding or a faster drop than expected. So we, in
9 our sensitivity evaluations we used a more realistic
10 value for that.

11 MEMBER BANERJEE: So just before we go on
12 because this is interesting. Clearly when you look at
13 this you have to get some uncertainties because this
14 is a best estimate calculation.

15 MR. BROADBENT: That's right.

16 MEMBER BANERJEE: And so you have to put
17 some distributions and bounds on these parameters
18 which because you're sampling. So do you do the
19 sampling of this to look at your uncertainties?

20 MR. BROADBENT: I think that was part of
21 the RAI response where we described an evaluation that
22 had been performed. For the actual analysis we give
23 GE numbers and then they generate a PCT trend.

24 MEMBER BANERJEE: Well, they do a single
25 calculation.

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1 MR. BROADBENT: Right, right.

2 MEMBER BANERJEE: And you were appealing
3 to another calculation done for a different situation,
4 right?

5 MR. BROADBENT: That's right. We could
6 talk about that in the closed session.

7 MEMBER BANERJEE: So we need to go into
8 that in some detail which you did.

9 MR. BROADBENT: Okay. Just some results
10 associated with this. We have a graph in the closed
11 session with actual numbers on the y-axis, but this is
12 still a good comparison, where the red line is the
13 license analysis and you could see we have
14 oscillations early due to the conservative assumptions
15 that we applied.

16 The green and the blue is where we use the
17 nominal assumptions, and with the blue we still assume
18 the 90-second operator response time, and you can see
19 that we barely saw any oscillations. And with the
20 green we assumed 120-second operator response time,
21 and there were some oscillations but it was bounded by
22 the license basis case.

23 MEMBER BANERJEE: So what's the difference
24 between the red and the green and the blue?

25 MR. BROADBENT: The red is the base case.

1 That's our license basis analysis. That's the case GE
2 ran and the PCT trend that we saw. That's the case
3 that's in our MELLLA+ safety analysis report.

4 MEMBER BANERJEE: Right. So what is the
5 difference? What changed between these?

6 MR. BROADBENT: Well, it was these three
7 things. We assumed, instead of 80 percent we assumed
8 85 percent core flow.

9 MEMBER BANERJEE: Oh, okay. But what are
10 you going to be allowed to operate in?

11 MR. BROADBENT: We're allowed to operate
12 at 80 percent. We can --

13 MEMBER BANERJEE: That's the case that's
14 important, right?

15 MR. BROADBENT: Right.

16 MEMBER BANERJEE: You may want to do
17 something else, but yes.

18 MR. BROADBENT: And we're just trying to
19 show the sensitivity of that.

20 MEMBER BANERJEE: Can you go back to that
21 slide please? The previous one. So if you ran the
22 base case you're well into oscillations at 90 seconds.

23 MR. BROADBENT: Yes.

24 MEMBER BANERJEE: Okay.

25 MR. BROADBENT: And that's when we start

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1 to level everything.

2 MEMBER BANERJEE: But you stop the actions
3 no matter whether you're in oscillations or not.

4 MR. BROADBENT: That's right.

5 MEMBER BANERJEE: Right.

6 MR. BROADBENT: Right, they're
7 procedurally driven.

8 MEMBER BANERJEE: Yes, they're
9 procedurally driven.

10 MEMBER BALLINGER: Now we can go into
11 this, I'm sure, in the closed session, but I'm looking
12 at the time scale. Is it physically possible for fuel
13 temperature, and I don't know what the left hand scale
14 is so --

15 MR. BROADBENT: We've got it in the closed
16 session.

17 MEMBER BALLINGER: Okay. This is a
18 calculation so --

19 MR. BROADBENT: That's right.

20 MEMBER REMPE: So on the prior side you
21 said you removed some of these conservatisms.

22 MR. BROADBENT: Right.

23 MEMBER REMPE: Can you give us a feel in
24 the open session which of the conservatisms you
25 removed had a larger impact? Because as Sanjoy said

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1 you're allowed to operate in 80 percent. Is that the
2 one that really made the difference?

3 MR. BROADBENT: I'm not sure I know the
4 answer to that, which ones were the most important.
5 We can answer that. And Mike, do you have a --

6 MR. COOK: This is Mike Cook from GE
7 Hitachi. Is this mic on?

8 MR. BROADBENT: Yes.

9 MR. COOK: The feedwater temperature
10 response is probably the most important here.

11 MEMBER REMPE: Thank you.

12 MEMBER BANERJEE: And when you mean the
13 bounding faster drop, how much faster, or can you tell
14 us that here?

15 MR. BROADBENT: So maybe we should --

16 MEMBER BANERJEE: Yes, okay. If you can't
17 answer these questions here.

18 MR. BROADBENT: We can discuss them in
19 closed session.

20 MEMBER BANERJEE: We need some numbers.

21 MR. BROADBENT: Significantly faster than
22 what we would expect. And Jim, do you want to talk
23 about license conditions?

24 MR. NADEAU: Thank you. Time-critical
25 operator actions will be incorporated into our license

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1 conditions. It will include the training of the
2 operators, the validation that they can all meet the
3 time-critical actions that we specified earlier, and
4 we will report the results to the NRC prior to
5 operating in the MELLLA region. Next slide.

6 So overall conclusion is Grand Gulf can
7 operate safely in the MELLLA+ region. We're confident
8 of that because we've got a good quality analysis,
9 we've got a good quality training program, and time-
10 critical operator actions will be met.

11 MEMBER SCHULTZ: I thought there was a
12 condition related to single-loop operation. Is that
13 no longer applied in the MELLLA+?

14 MR. NADEAU: No, it's there.

15 MR. FORD: We have a license condition
16 that says we can't operate in single-loop or loss of
17 feedwater or you're removed from service.

18 MEMBER SCHULTZ: Thank you.

19 MEMBER BANERJEE: Is that because, is
20 single-loop, generally single-loop operation is not
21 limiting with regard to stability, if I understand the
22 situations. So maybe I should ask the staff. Why is,
23 I mean generally it's the two RPT pump trip that gives
24 you the limiting conditions for stability.

25 MR. MARCH-LEUBA: That is correct. That

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1 will give you the worst transient. However, in the
2 MELLLA+ domain one unit's in a such high home
3 (phonetic) line, going into single-loop gets you in
4 the bottom of that MELLLA+ and we don't really want to
5 them to operate there. So it would be very difficult
6 for them to operate in MELLLA+ and single-loop.

7 MEMBER BANERJEE: Agreed, agreed. Yes,
8 sure.

9 MR. MARCH-LEUBA: So indeed it becomes
10 pretty handy, because the last incident that happened
11 last month was because single-loop operation. So it
12 was good foresight. And they don't need it and I
13 don't think the staff would ever release that
14 requirement for it.

15 MEMBER BANERJEE: And I guess they run
16 both transients and see, but usually it's the two RPT
17 which is limited --

18 MR. MARCH-LEUBA: Well, the RPT uses half
19 the flow. So yes, absolutely.

20 MEMBER BANERJEE: Right.

21 MEMBER REMPE: We're running a little bit
22 behind so I think we need to switch to the staff's
23 open presentation.

24 CHAIR STETKAR: I just wanted to ask one
25 more question. Ricky, do you have a rough estimate of

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1 how many unplanned scrams you've had at Grand Gulf in
2 the last five years?

3 MR. LIDDELL: We've had two this cycle.
4 We had five, I believe, the previous cycle.

5 CHAIR STETKAR: So you get a couple issues
6 though per cycle?

7 MR. LIDDELL: Yes.

8 CHAIR STETKAR: Thanks. That helps.

9 MEMBER REMPE: Can we move to the staff?
10 And thank you.

11 MR. A. WANG: Good morning. My name is
12 Alan Wang. I'm the project manager for Grand Gulf
13 Nuclear Station. I had two slides most of which has
14 already been gone over, so I'll just go to the second
15 slide.

16 So basically as discussed we do have two
17 license conditions as part of the approval for the
18 amendment. One is on the single-loop operation and
19 the other one is on the operator training
20 requirements.

21 There are three amendments tied to this
22 submittal. Of the three, the most important is the
23 effective fluence in the MELLLA+ operation. That is
24 still staff review. We expect to finish that in June
25 and we expect to finish the MELLLA+ amendment in June

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1 also, by the end of June. The other two are the
2 Safety Limit MCPR which had been increased for a
3 MELLLA+ operation. That safety evaluation is
4 completed.

5 MEMBER BANERJEE: Is that because there
6 was some uncertainty in the power distribution, or
7 what was that increase?

8 MR. JACKSON: Well, I think that the
9 applicant would be better off answering that. But the
10 Safety Limit MCPR is sort of cycle dependent,
11 depending on how you load the core or how you design
12 the cycle. So that MELLLA+ needs to come in 18 months
13 in advance, so it's not unexpected that we'd get the
14 Safety Limit MCPR. That amendment's been approved.
15 It's finished. We're just making sure the SER is in
16 line exactly with this one so that there's no --

17 MEMBER BANERJEE: So it's just a penalty
18 of some sort.

19 MR. JACKSON: Yes.

20 MEMBER BANERJEE: It's 0.02 or something,
21 what is it?

22 MR. JACKSON: We were fined the penalty.
23 I have it on my desk, 0.02, because their power
24 density is greater than 42. So I have that. But that
25 wasn't unexpected given that we get those six months

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1 before the end of the cycle relatively routinely, so.

2 MR. A. WANG: And then the last amendment
3 is they will be adding the DSSCD to their COLA as one
4 of the references that allow them to use DSSCD in
5 future refueling outages and won't require staff
6 review for approval.

7 MEMBER BANERJEE: They're not already
8 using DSSCD?

9 MR. A. WANG: No, the MELLLA+ will approve
10 the use of DSSCD for the Grand Gulf Station, but the
11 amendment will add it to the COLA so for future
12 outages they can use the methodology without coming
13 back in for staff --

14 MR. JACKSON: DSSCD was updated to use
15 TRACG-04, so they have that in GSTAR and it's
16 available to them if they want to use the more recent
17 approved version. And that's what they're looking
18 for --

19 MEMBER BANERJEE: They will want E1a, or
20 what do they, how were they operating the thing
21 before? Were they in option 3 or --

22 MR. JACKSON: Yes.

23 MEMBER BANERJEE: They were in option 3.

24 MR. JACKSON: They were using DSSCD
25 before. They can use that with their current tech

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1 specs or with their currently approved because the
2 prior version of DSSCD is a GSTAR which is in their
3 tech specs. But the later version that incorporates
4 TRACG-04 is not, so they want to incorporate that.
5 That review's been done. That of course applies.
6 There's no technical review associated with that. But
7 the technical review has been done and associated with
8 this MELLLA+ application. So DSSCD is a good thing
9 for TRACG-04, the latest version's a good thing.

10 MEMBER BANERJEE: I'm just trying to
11 understand, when they went up to EPU level didn't they
12 start DSSCD at that point?

13 MR. JACKSON: I don't think so. I think
14 they --

15 MEMBER BANERJEE: They stayed in option 3?

16 MR. JACKSON: Yes. Can you confirm that
17 though?

18 MR. BROADBENT: Yes, this is Greg
19 Broadbent with Entergy. We were Ela until EPU, and
20 then for EPU we went to option 3. And then for this,
21 for MELLLA+ we're going to DSSCD.

22 MEMBER BANERJEE: Okay, but you haven't
23 actually put the plant under DSSCD yet. Once this is
24 approved you will.

25 MR. JACKSON: Once this is on it's

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1 required.

2 MEMBER BANERJEE: It's not on. Everything
3 is there.

4 MR. A. WANG: The hardware is there, it's
5 just not on.

6 MEMBER REMPE: On the first one about the
7 fluence, during our subcommittee meeting I was left
8 with the impression that it was a sure bet that you
9 would have the amendment approved and that doesn't
10 sound so sure now. What would be the ramification?
11 Will you hold off on approving the MELLLA+ until it is
12 -- so could I rephrase what you're saying. We will
13 not if, it'll be both will be approved in June or both
14 will be approved whenever they both can be approved?

15 MR. A. WANG: You're right. The fluence
16 has to be approved first and then MELLLA+. But we're
17 expecting to approve the fluence in June and then the
18 MELLLA+ will follow.

19 MEMBER REMPE: Thank you for clarifying.

20 MR. A. WANG: And actually that's all we
21 had for the open for the staff.

22 MEMBER REMPE: So at this point we need to
23 stop and open the mics if there's anyone that has a
24 question from the public and allow anyone in the room
25 to come up with comments. And comments from the

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1 public, not questions. I should be more careful how
2 I word that. I assume since nobody's going to the mic
3 there's no one in the room that has any comments?

4 MR. W. WANG: The public line is open now.

5 MEMBER REMPE: Okay. Is there anyone out
6 on the line from the public that would just speak so
7 we know you're there?

8 MR. LEWIS: My name is Marvin Lewis.

9 MEMBER REMPE: Okay, thank you. Are there
10 any comments from the public at this time?

11 (No response.)

12 MEMBER REMPE: And with that I think we'll
13 close the public lines and we'll go into closed
14 session. And I'd like for the staff or the licensee
15 to confirm that only those who are supposed to be here
16 are here.

17 (Whereupon, the above-entitled matter went
18 off the record at 9:44 a.m. and resumed at 11:00 a.m.)

19 CHAIR STETKAR: We are back in session,
20 and this is an open session so we have the bridge
21 line. I'm assured that we have a bridge line open to
22 the public. And the topic of this session is Reg
23 Guide 1.27, and Harold Ray will lead us through this
24 session. So Harold, it's yours.

25 MEMBER RAY: I had it right here in front

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1 of me ready to do that and failed.

2 CHAIR STETKAR: Operator training.

3 MEMBER RAY: Training again, yes. I'm
4 glad that we have coaching when we need it. Anyway,
5 Regulatory Guide 1.27, Ultimate Heat Sink for Nuclear
6 Power Plants, is being revised for reasons which will
7 be described by the staff during our presentation.

8 The pending revision, Revision 3, was
9 reviewed by the Regulatory Policy and Practices
10 Subcommittee on March 4th. At that time the staff had
11 resolved public comments and these were summarized as
12 part of the staff presentation.

13 Today the staff will also summarize their
14 resolution of comments and questions from members
15 received during the subcommittee meeting. Because
16 we've spent a good deal of time these days on a couple
17 of items that are not included in the Reg Guide
18 revision, I would like to mention these before the
19 staff begins.

20 The first item not included is guidance
21 which would apply to review of passive reactor
22 designs. Because passive designs have unique
23 attributes which have thus far been reviewed on a case
24 by case basis, to maintain clarity of the detail in
25 the Reg Guide it continues to be limited to active

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1 plants use water as an ultimate heat sink.

2 The second item not included is accidents
3 resulting from beyond design basis events. Currently
4 at a multi-unit site only one unit is assumed to be in
5 an accident condition. Other units can be assumed to
6 have tripped. At the subcommittee meeting the staff
7 indicated that guidance is being developed separately
8 by JLD staff to address simultaneous, multi-unit
9 action conditions due to a beyond design basis
10 external events.

11 That concludes my initial remarks, and I
12 understand that Brian Thomas will start us with some
13 remarks.

14 MR. THOMAS: Yes, good morning. Brian
15 Thomas from the Division of Engineering in the Office
16 of Research. I'll just very briefly before the staff
17 gets going let me just say that indeed we're at the
18 Revision 3 version of the Reg Guide.

19 This is a very old Reg Guide. It was last
20 revised back in 1976. So basically the approach with
21 the update to this Reg Guide has to do with
22 incorporating, you know, the last 40 years of
23 operating experience. The staff is committed to
24 update Reg Guides on a regular basis. Of course the,
25 you know, the Reg Guide update program was embarked

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1 upon in a more focused manner back in 2006, of course
2 when the Commission directed the staff to do so. Of
3 course that was with the expectation of a renaissance.

4 So the Reg Guide update program, I would
5 say it's in full stride now in terms of regular
6 updates and periodic reviews of the Reg Guides. The
7 staff has briefed the ACRS. It's the Regulatory Policy
8 and Practices Subcommittee as Harold said back on
9 March 4th.

10 The comments and the suggestions of the
11 ACRS members are incorporated into the Reg Guide
12 specifically with regard to some of the items such as
13 like to how to address this passive plant, so not
14 addressed in the Reg Guide but we have the appropriate
15 staff here to respond to some of those questions if
16 the committee has further questions.

17 So with that I'll turn it over to the
18 staff to make their presentation. Thank you.

19 MR. LIN: Okay, thank you, Brian, for the
20 introduction. I'm Bruce Lin. I work at Office of
21 Research Division of Engineering. With me up here is
22 Jerry Purciarello with NRR Division of Safety Systems.
23 We appreciate the opportunity to brief the committee
24 on the proposed Revision 3 to Regulatory Guide 1.27.

25 This is an outline of what we plan to

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1 cover today. I'll briefly provide you with an
2 overview of Reg Guide 1.27 and what's covered in the
3 Reg Guide and the purpose of the Reg Guide and the
4 reason for the revision, and also give you a high
5 level summary of the changes that were made in the
6 Revision 3. And then I'll turn it over to Jerry.
7 He's going to talk about more details on the technical
8 changes that were made.

9 And also we're going to briefly touch on
10 the public comments. We don't plan to go into details
11 on the public comments since those were discussed in
12 length at the subcommittee meeting, but we did include
13 some of the significant comments and the staff
14 responds as the backup slides. And then we're going
15 to address like Brian said and Jim and Ray said, we're
16 going to address some of the subcommittee comments in
17 this presentation.

18 Just a little bit of background on what is
19 ultimate heat sink. The ultimate heat sink is the
20 system of structures and components and associated
21 water supply that's credited for functioning as a heat
22 sink to remove reactor decay heats and essential
23 station heat loads after a normal reactor shutdown or
24 a shutdown after an incident. This will include the
25 necessary water retaining structures and the piping

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1 systems that connect the water supply to the essential
2 cooling water intakes.

3 So essentially the UHS performs three
4 principal safety functions. Removal of the residual
5 heat after reactor shutdown, dissipation of the
6 residual heat after an incident such as a loss of
7 coolant incident, and also removal of the maximum
8 expected decay heat from the spent fuel pool.

9 So this slide is just to provide a high
10 level overview of what's in Reg Guide 1.27. Basically
11 Reg Guide 1.27 provides methods and procedures that
12 licensees and applicants can use to establish the
13 ultimate heat sinks. It contains systems design
14 considerations for ultimate heat sinks such as the
15 safety feature you must perform, the heat loads to
16 consider when determining the performance of the
17 ultimate heat sinks, and in the Reg Guide we also
18 include meteorological conditions to consider in the
19 design of ultimate heat sinks.

20 And there's also guidelines on how design
21 against natural phenomenon and site hazards. And
22 also in the revision we added additional guidance with
23 respect to inspection and maintenance in testing of
24 ultimate heat sink systems. And we also added
25 guidance for water chemistry and micro-bio control.

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1 So why are we updating this Reg Guide? I
2 think it's obvious. The first thing is because it's
3 outdated. The last revision was January 1976. A lot
4 of things have changed and so we want to update the
5 Reg Guide to incorporate lessons learned from
6 operating experience in the last 40 years.

7 And we also want to update the Reg Guide
8 so the guidance is consistent with the more current
9 NRC guidance such as the Standard Review Plan. And we
10 also want to include the changes that were made in the
11 regulations in the last 40 years such as we added the
12 maintenance standards, the maintenance rules.

13 So it's also a commitment from the staff
14 to, like Brian mentioned, to update the Reg Guides on
15 a regular basis to ensure that the guidance is current
16 and accurate.

17 This slide just provides a summary of some
18 of the changes that were made in the Rev 3. In the
19 introduction section we added additional rules and
20 regulations that were applicable to ultimate heat
21 sinks. For example, in the current revision they only
22 list GDC-2 protection against natural phenomenon and
23 GDC-44 cooling systems as applicable regulation. In
24 Rev 3 we added several other GDCs such as GDC-45 for
25 inspection of water cool systems, GDC-5 in the

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1 maintenance rules.

2 In the discussion section we revised and
3 added additional design considerations. Some design
4 considerations in the discussion section are repeated
5 again in the regulatory position section which Jerry's
6 going to talk about.

7 Some of the considerations we added
8 include additional safety features that UHS must
9 perform. We added some guidance with respect to
10 performing transient analysis. I think we clarified
11 some other issue with respect to our critical time
12 periods.

13 And in the regulatory position section we
14 made changes to the four existing regulatory positions
15 primarily to clarify some of the positions that were
16 confusing, and we also added several other additional
17 design considerations based on operating experience.
18 And then we added two new regulatory positions
19 regarding inspections and maintenance of ultimate heat
20 sinks and micro-bio controls.

21 Jerry, do you want to take off from there?

22 MR. PURCIARELLO: Yes. Thanks. In the
23 current Regulatory Guide we have four regulatory
24 positions, and in the new Regulatory Guide we maintain
25 those four positions with some changes and we've

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1 added, as Bruce said we've added two new regulatory
2 positions.

3 The first two regulatory positions we had
4 improvements and clarifications and we have some new
5 guidelines in there. In the third and fourth
6 regulatory position there's no change in content, we
7 just made some minor editorial changes, and then we've
8 added the fifth and sixth regulatory positions for
9 inspection, maintenance and water chemistry and
10 biological control.

11 In Regulatory Position 1 which is on
12 system design considerations, we added some
13 clarifications regarding the transient analysis. We
14 added clarifications regarding whether you have, if
15 you have two cooling towers are more that you have to
16 include the effects of recirculation and interference.

17 And we also added clarification on how to
18 select critical meteorological data when computing
19 basically the real basic criteria for having ultimate
20 heat sink that is the maximum intake water temperature
21 to the plant and also the fact that it has to last for
22 30 days. And then also added system design
23 considerations for fire resistance, about construction
24 materials having to be fire resistant.

25 We added the requirement, the safety

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1 related requirement of being able to remove the heat
2 from the spent fuel pool. And then we've added some
3 criteria regarding the active components. We added
4 guidelines for manual actions if appropriate, but
5 we've said that the active components should be
6 automatically operated.

7 And then we've added some criteria for the
8 inventory. We want our licensees to include boundary
9 leakage because recently a licensee tried to exclude
10 boundary leakage when it was significant leakage and
11 said that the Reg Guide didn't cover that. So now it
12 will. Next slide please.

13 And then Regulatory Position 2 regarding
14 natural phenomena site hazards we made sure that the
15 site hazards were associated with GDC-2. It didn't
16 say GDC-2 before.

17 And then we added clarifications regarding
18 the failure of manmade structures to include, we
19 expounded upon the manmade structures to include
20 reservoirs, dams, upstream and downstream dams, that
21 is, including potential for flow blockage by debris
22 based on industry experience. And then also added
23 features associated with the potential changes in the
24 ocean and river levels or lake levels, and that was
25 based on a public comment that we received. And then

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1 also based on experience we've added criteria for
2 adverse conditions associated with icing and freezing
3 of a water storage facility like the basin of a
4 cooling tower.

5 And then we also added GDC-4 to the
6 criteria for the ultimate heat sink that has to take
7 into account pipe whip, water hammer and any type of
8 dynamic effect. And then also based on industry
9 experience we added the requirements that consider
10 potential clogging of the suction flow paths because
11 that's happened throughout the industry both here in
12 the United States and overseas. Next slide please.

13 Okay, we've added, like I said before
14 we've made some editorial changes to Regulatory
15 Positions 3 and 4, but I won't discuss those because
16 there's no content change to it. But Regulatory
17 Positions 5 regarding inspection, maintenance and
18 performance, this is based on current knowledge and
19 experience. We decided that we had to add this
20 Regulatory Position for maintenance and inspection.

21 I believe there was cases of cooling
22 towers having excessive corrosion. You might recall
23 back in 2006 a non-safety related cooling tower,
24 Vermont Yankee, actually collapsed. It was a wooden
25 cooling tower. Non-safety, it wasn't involved in the

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1 ultimate heat sink but that was a consideration for
2 including this regulatory position for inspection,
3 maintenance and performance testing.

4 And then we've added also the criteria
5 that if the dam or water control structure is within
6 the jurisdiction of the licensee that it should be in
7 the maintenance program, Reg Guide 1.160, the
8 maintenance rule.

9 And then Reg Guide 1.27 we added since the
10 subcommittee, and that's actually for inspection of
11 all water control features or structures whether it's
12 under the jurisdiction of the licensee or not within
13 the jurisdiction of the licensee.

14 MEMBER SCHULTZ: Jerry, is Reg Guide
15 1.127, is that a relatively new Reg Guide? Or if not,
16 is it recently updated?

17 MR. LIN: This Reg Guide is out for public
18 comments. I think it's due currently out for public
19 comments. It was issued January 2015 out for public
20 comment.

21 MEMBER SCHULTZ: Okay, that's the stage
22 it's in. Thank you.

23 MR. LIN: The current version is very old.

24 MR. PURCIARELLO: 1978.

25 MEMBER SCHULTZ: Thank you.

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1 MR. PURCIARELLO: And then we felt the need
2 to add Regulatory Position 6 based on current
3 knowledge and experience and that involves water
4 chemistry and microbiological control. Next slide
5 please.

6 And in the Reg Guide we've, as the slide
7 says the draft Reg Guide was published in 2013. We
8 received comments from the public, ten from NEI, and
9 some from the general public and anonymous also.
10 We've resolved those comments and we put those in Reg
11 Guide 1.27 as appropriate.

12 We had our subcommittee meeting back in
13 March and -- next slide please -- and the subcommittee
14 had some comments that I'm now going to address.

15 The subcommittee took exception to the
16 phrase "reasonably to be expected" because they wanted
17 some more specific criteria just as far as regards to
18 natural phenomena and site hazards.

19 I don't know if you're aware, but back in
20 2012 there was a NUREG published, 2150. Is the
21 committee aware of that? I don't know. But it involved
22 a proposed risk management regulatory framework and it
23 was commissioned by then Chairman Jaczko and chaired
24 by Commissioner Apostolakis. It was again it was a
25 proposed risk management regulatory framework. And

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1 I'm reading from the executive summary here.

2 One of their findings was that the process
3 for establishing the external hazard design bases does
4 not use consistent event frequency or magnitude
5 methods. And the recommendation for that was the NRC
6 should reassess methods used to estimate the frequency
7 and magnitude of external hazards and implement a
8 consistent process that includes both deterministic
9 and PRA methods. Considerations of the risks from
10 beyond design basis events for external hazards should
11 be included in the proposed design enhancement
12 category.

13 So I guess to summarize that, what this
14 study found that we really don't have any specific
15 criteria for putting in some type of, you know,
16 frequency or expected assessment of magnitude methods
17 or frequency of any type of external design hazards.
18 So we can't get more specific than that.

19 So what we suggest using is taking out the
20 reasonably expected phraseology and using what GDC-2
21 uses and use the term "more appropriate combinations"
22 as opposed to reasonably expected. And at this time
23 we can't get any more specific than that. I think the
24 staff or the NRC recognizes that this is an issue and
25 that somehow, you know, I don't know what the

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1 corrective action is and when this will be
2 implemented, but we don't have any way of becoming
3 more specific as far as talking about the magnitude
4 and the frequency of external hazards.

5 MEMBER RAY: You are referring to these
6 other Reg Guides?

7 MR. PURCIARELLO: Yes, and that's been
8 mentioned as far as for seismic and for hurricanes.
9 Yes, that's now in the Reg Guide.

10 CHAIR STETKAR: Jerry, now if this Reg
11 Guide uses the term "appropriate combinations," does
12 that mean the onus on the staff and a particular
13 licensee to justify what is an appropriate combination
14 for their site?

15 MR. PURCIARELLO: I would say yes.

16 CHAIR STETKAR: Okay.

17 MR. PURCIARELLO: I mean hopefully there
18 will be some guidance based on deterministic methods
19 and PRA that will come out sometime in the future that
20 would be more --

21 CHAIR STETKAR: I know in Research, the
22 risk assessment branch is looking at screening
23 criteria in the context of risk assessments. And
24 that's one issue that they're looking at is
25 specifically screening criteria. And again it's

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1 focused in the context of risk assessment, not
2 necessarily something that would fall into this
3 Regulatory Guide.

4 But as you mentioned they are related in
5 sense because there is a frequency and there's a
6 compounding effect, you know, of certain types of
7 hazards. So I just wanted to make sure I understood
8 how appropriate combinations would be considered, you
9 know, among the staff and the licensee if a particular
10 licensee came in and said, well, you know, I want to
11 make a change to something.

12 MR. PURCIARELLO: Well, we used a higher
13 tier document and that is GDC-2. We just used the
14 word of that and you can't get any more specific than
15 that at this time.

16 MR. LIN: I know for specific hazards
17 there are standards that, I'm aware of a flooding.
18 There's an ANS standard that lists appropriate
19 combinations for combined events.

20 CHAIR STETKAR: Core flooding is, flooding
21 a bizarre issue that's being addressed a lot under,
22 external flooding anyway which we're concerned about
23 your being addressed under post-Fukushima initiatives.

24 MR. PURCIARELLO: Next slide please. This
25 slide shows one of the subcommittee's comments

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1 regarding the word "prudent." The word "prudent"
2 didn't seem to have much meaning to it, very
3 subjective. This is in regards to the prudence of
4 inspecting dams and water control structures that are
5 outside the jurisdiction of the licensee or applicant.

6 So as we previously stated on another
7 slide before this, we've added Regulatory Guide 1.27,
8 "Inspection of Water Control Structures Associated
9 with Nuclear Power Plants" to be used. We should have
10 had this before. I guess we became more aware of it
11 trying to answer this subcommittee comment that water
12 control structures, dams included, should be under the
13 guidance of Reg Guide 1.27 for whether the structure
14 is controlled by the licensee or not by the licensee.

15 MEMBER RAY: I think this is a good
16 change. The prudent part was troublesome to me.

17 MEMBER RICCARDELLA: We had some
18 discussion yesterday about the use of the words
19 "should" and "shall" and "may" in documents such as
20 this. Is the "should" appropriate here?

21 MEMBER RAY: I believe so. Another word
22 you might choose is "must," but I don't think that's
23 appropriate for regulatory guidance. "Shall" is
24 equivalent, synonymous with "must," I think. But I
25 think regulatory guidance, "should" is appropriate.

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1 That's my judgment.

2 MR. PURCIARELLO: They're not required to
3 comply with this. If they come up with an alternative
4 that's acceptable to the staff they can deviate from
5 a guideline. They can't deviate from a regulation.

6 CHAIR STETKAR: I'm a little bit, I'm
7 looking at some notes. We had a subcommittee meeting
8 on Reg Guide 1.127 and I don't remember what it was.
9 I guess my notes are from February of 2012. And it
10 seemed to be some fuzziness in that Reg Guide.

11 Now you pointed to that Reg Guide for
12 inspection requirements, so I'm trying to close the
13 loop here. And when we asked in the context of that
14 Reg Guide how would the inspection apply to owners and
15 operators of upstream dams that were not part of the
16 licensee's organization, and then I'm reading
17 responses to well, you know, the NRC inspects some
18 nuclear power plant dams. The licensees inspect some
19 nuclear power plant dams.

20 But the scope of that particular Reg Guide
21 does not include upstream dams whose failures may
22 cause flooding at the site unless those dams are also
23 required for heat sink retention. So it says -- these
24 are my notes. This is not a quote from the Reg Guide
25 itself. From my notes from the staff back in February

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1 2012, it says the NRC and licensees rely on
2 inspections by other state and federal agencies for
3 those dams.

4 The concern obviously is if you have an
5 upstream or downstream dam outside of your control as
6 a licensee what assurance do we have indeed that those
7 dams are being inspected? And it's not clear to me
8 necessarily that pointing from this Reg Guide to
9 1.127, which hasn't been issued yet, but pointing to
10 that solves the necessary concerns. So that's a few
11 because I just want to point to some other guidance.

12 MR. PURCIARELLO: Can I read what this Reg
13 Guide 1.127 says?

14 CHAIR STETKAR: 1.127?

15 MR. PURCIARELLO: Yes.

16 CHAIR STETKAR: Or 1.27?

17 MR. PURCIARELLO: 1.127.

18 CHAIR STETKAR: Okay, good. Thanks.

19 MR. PURCIARELLO: Okay. It says, "This
20 guide applies to water control structures, for
21 example, dams, reservoirs, conveyance facilities
22 specifically built for use in conjunction with the
23 nuclear power plant and whose failure could cause
24 radiological consequences adversely affecting the
25 public health and safety."

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1 So in other words I read that to mean that
2 the dam has to be built in conjunction with the
3 nuclear power plant. No, it just can't be, I don't
4 think a licensee can just, or an applicant can just
5 say I want to use that dam. The dam has got to be
6 built in conjunction with the nuclear power plant.

7 In addition -- I'm reading again. In
8 addition, the structure was built wholly or in part
9 for the purpose of controlling or conveying water for
10 either emergency cooling operation or flood protection
11 of the nuclear power plant.

12 MEMBER RAY: Let me interject something
13 here. When I read what you had done recognizing what
14 Chairman Stetkar just said and recalling that, I
15 thought you were referring to details on inspection
16 and performance monitoring meaning the methodology as
17 opposed to this describes an existing requirement.

18 I'm speaking of 1.127. Trying to say it
19 another way, and I'm going to ask again is this your
20 intent. I thought this was a vehicle for defining how
21 to as opposed to saying, oh by the way this describes
22 what you must do. And that goes back to what Pete
23 said which is that the "should" is what's being
24 created in this Reg Guide or exists in this Reg Guide,
25 not the "should" doesn't come from 1.127 when we're

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1 talking about what you're talking about here. It's
2 just the methodology. Now that was my reading of it.

3 MR. LIN: I think with the intent of the
4 staff with the first sentence basically tell you, you
5 should inspect the water control structures for
6 changes in structure, hydraulic and foundations, and
7 then we refer to the Reg Guide for specific guidance.
8 And also I'm reading from the draft.

9 MEMBER RAY: You're not inspecting by the
10 way, excuse me, you're not inspecting on the basis of
11 verifying the adequacy but you're looking at changes.

12 MR. LIN: Right.

13 MEMBER RAY: Okay.

14 MR. LIN: Also in the draft, changes to
15 Reg Guide 1.127, basically it states that embankments
16 and other appurtenant structures associated with or
17 part of water control structures addressed by this Reg
18 Guide are those typically built to provide and protect
19 ultimate heat sinks. It's in there.

20 So I think it's appropriate to --

21 MEMBER RAY: But again the Reg Guide 1.127
22 we understand is more constrained than would encompass
23 a dam failures which could result in flooding, which
24 is what we're talking about here. It's more
25 constrained. It's talking about things that have been

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1 built to provide for the ultimate heat sink as opposed
2 to things that could fail and result in not the loss
3 of the ultimate heat sink but flooding. That's what
4 Sherman was asking about I thought.

5 CHAIR STETKAR: It's both. I hate all of
6 this pigeonholing of things because people think about
7 flooding as some rise of water level. I think of a
8 dam failure as causing a mountain of water coming down
9 through some valley. That mountain of water will
10 allow level to rise, it also might sweep away things
11 like your intake structure. It also might clog your
12 intake structure with things like, oh, whatever towns
13 were upstream.

14 So I don't want to get into this argument
15 about whether it's a dam failure that causes a flood
16 which triggers certain things or a dam failure that
17 might drain away an ultimate heat sink which would be
18 a downstream dam. I'm concerned about dam failures
19 that may affect the site, the ultimate heat sink and
20 the intake structure being part of that site.

21 MEMBER SCHULTZ: What I've heard, John, is
22 you introduced this by saying we want to check and see
23 that the loop was closed. And what I'm hearing is
24 that the loop is very small and incorporates what has
25 been established as the ultimate heat sink and what

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1 structures were used to do that. It doesn't do what
2 you're describing and that is examine structures that
3 may affect the site and the ultimate heat sink beyond
4 that. And so we just need to recognize that.

5 CHAIR STETKAR: Yes. And I don't know
6 what the context. I mean, you know, 1.27, because it
7 is focused on the ultimate heat sink might not be the
8 vehicle. It might be 1.127. But we just need to make
9 sure that we understand that distinction.

10 MEMBER RAY: Yes, I think that's a good
11 point.

12 MR. LIN: I think Regulatory Position 2
13 restates that ultimate heat sink should be capable of
14 withstanding the failure of reservoirs, dams, and
15 other manmade water retaining structures both upstream
16 and downstream. And we're referring to this Reg Guide
17 for the routine inspection programs.

18 CHAIR STETKAR: The only question is how
19 far upstream does that zone of influence extend?
20 Because in a very narrow interpretation of 1.127 it
21 extends only to the dams that were built for the
22 purpose of that nuclear power plant. It doesn't
23 extend to the other dams that might be withholding,
24 you know, the greater portion of the watershed of, you
25 know, 50,000 square miles or something like that.

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1 MEMBER RAY: Yes. No, I think that's a
2 good point and it's clearly the case that this 1.27
3 isn't attempting to speak to the larger issue that
4 you've described. 1.127 also is constrained by
5 apparently the limits that we've talked about. I
6 think perhaps we have a larger concern that we need to
7 track going forward. I'm not wanting to dismiss it at
8 all.

9 CHAIR STETKAR: We've addressed what would
10 link into some of the post-Fukushima flooding stuff
11 also, so we have that thing.

12 MR. PURCIARELLO: Next slide, please. And
13 then another issue was the issue of the design of
14 active components in the ultimate heat sink and that
15 we say that they should be automatically start or
16 open/close automatically by design.

17 There was some confusion in the last, at
18 the subcommittee meeting on whether when we refer to
19 manual action was it because the automatic features
20 failed or because they weren't designed into the
21 system. And we're saying that if it's an active
22 component it should operate automatically per design
23 and then if it doesn't obviously it has to be operated
24 manually, and that's subject to Reg Guide 1.62 which
25 is on Manual Initiation of Protective Actions and that

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1 the manual actions will be judged by the staff on
2 whether it's allowed in that application for operation
3 of the UHS.

4 CHAIR STETKAR: I think also during the
5 subcommittee meeting we mentioned that in general --
6 previous session I kind of made this point, but it was
7 a closed session so I'll do it again in an open
8 session. That the guidance for evaluating feasibility
9 and associated uncertainties with manual actions has
10 kind of evolved over time.

11 And some of the best guidance in my
12 opinion anyway is NUREG 1852. Now people will say,
13 well that has the word "fire" in the title of it, but
14 it's actually the basic concept of how you look at how
15 much time is available, how much time is required to
16 perform an action.

17 So if you have 60 minutes is available and
18 it takes 59 minutes to perform the action that gives
19 you one minute of margin and then there's uncertainty
20 about that. So you look at the feasibility in the
21 context of time available, time required and
22 uncertainties in both of those parameters and then
23 look at the margins. That concept is not in Reg Guide
24 1.62.

25 We made comments on that when we had our

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1 subcommittee meeting on Reg Guide 1.62 current
2 revision back in, my notes are February, no, it was
3 even December of 2009. That was a couple years after
4 NUREG 1852 was issued.

5 So I think some of the comments we had at
6 the subcommittee meeting is this assessment of the
7 feasibility of these manual actions perhaps ought to
8 be thought of in that context rather than the more
9 deterministic prescriptive context of Reg Guide 1.62.

10 MEMBER RAY: The example, and it's just an
11 example, John, of course here is make-up water, which
12 presumptively not guaranteed but presumptively time
13 isn't an issue. But that's just an example.

14 CHAIR STETKAR: That's just an example and
15 that doesn't change the way you think about it. I
16 mean providing the fact time is an issue because
17 eventually you're going to run out of water and you
18 have a certain make-up rate and a certain, you know,
19 use rate, and who knows, you know, how long. If it's
20 simply pushing a button to start a pump that's one
21 thing. But that doesn't change the concept of the way
22 you think about it. I mean it might be very easy to
23 demonstrate feasibility using that methodology. That
24 doesn't say that you ought not to think about the
25 methodology. And as you said that's only one example.

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1 MEMBER RAY: It is just one example. I
2 guess the premise is as I looked at this anyway, was
3 that the license design rather than this Reg Guide
4 determined what needed to be automatic and what could
5 be manual. And that this wasn't attempting to make
6 that choice. You're pointing out that choice has to
7 be made at some point and it needs to take into
8 consideration --

9 CHAIR STETKAR: I think the observation
10 was that some plants rely on operator, you know,
11 manual operator actions. That it's not a backup to,
12 failure of an automatic function. This clarifies that
13 specific uncertainty. But some plants, you know, do
14 rely on operator actions for, one action is
15 replenishment of, you know, a closed basin from
16 another supply. There could be others. I don't, you
17 know, I'm not familiar with every plant.

18 MR. PURCIARELLO: Let me give an example.
19 How about a safety related cooling tower where the
20 fans have to start right away? Well, in that
21 particular case, if they came in with a design that
22 the operator would manually start those fans we
23 wouldn't approve that. Or if a valve has to open to
24 get water up to the cooling tower that would not be
25 approved unless it's -- so we're saying in the Reg

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1 Guide, and it's a guidance only. It's not saying that
2 they should start automatically.

3 The case of the make-up water obviously,
4 you know, that's a long term effect and we have no
5 problem, you know, if that's going to be done a couple
6 days from after the accident that they have to
7 replenish water. It's supposed to last 30 days. If
8 it doesn't last 30 days then they have to replenish
9 and it's not going to be right away, that would be a
10 manual action that would be, you know, acceptable.
11 And some are context to that. We're saying if
12 something has to start or isolate it should be
13 automatic.

14 CHAIR STETKAR: No, I understand that.
15 What I'm talking about is the principle. You're
16 saying manual. You know, the Reg Guide provides
17 guidance for manual initiation of protective actions,
18 and I'm saying that that Reg Guide is out of date
19 compared to the way that we think about demonstrating
20 feasibility of those actions.

21 MR. PURCIARELLO: Okay, then maybe we
22 should just take that out then. Are you suggesting we
23 should take that, we could take it out.

24 CHAIR STETKAR: Not a role as an
25 individual member of the ACRS to necessarily suggest

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1 the wording, I'm just trying to alert you to the fact
2 that there's kind of an evolving notion of how one
3 demonstrates feasibility of these manual actions. And
4 that Reg Guide 1.62, at least the latest version I
5 have, was a snapshot of that in 2010. And as I said,
6 we had comments on that Reg Guide at that time, but
7 unfortunately they were ignored.

8 MR. PURCIARELLO: We did ask our human
9 factors engineers here, and they said Reg Guide 1.62
10 would be appropriate here.

11 CHAIR STETKAR: Okay. And that's your
12 decision. Thanks.

13 MR. PURCIARELLO: Next slide, please.
14 Then the last issue --

15 CHAIR STETKAR: Jerry, just one thing. Be
16 careful of those papers. Once we have the mics on
17 they're really sensitive.

18 MR. PURCIARELLO: Sorry. The last issue
19 we're going to talk about now is addressing the final
20 subcommittee comment regarding the applicability to
21 passive plants. And the staff concluded that this Reg
22 Guide should apply only to plants with active safety
23 systems for the reasons stated there. That's there,
24 you know, that passive plants are judged on a case by
25 case basis and it doesn't appear to be beneficial to

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1 develop a Regulatory Guide for passive plants at this
2 time. Okay, next slide please.

3 So in conclusion, this Reg Guide has been
4 revised to address current regulations and lessons
5 learned from operating experience. It provides the
6 necessary guidance for a licensee to design an
7 ultimate heat sink. We've reviewed public comments
8 and ACRS comments and we've incorporated comments
9 appropriately, and we believe that Reg Guide 1.27 is
10 now ready for final publication.

11 MEMBER RAY: Are there other questions for
12 staff from members?

13 MEMBER SKILLMAN: Harold, this is Dick.

14 MEMBER RAY: Yes, go ahead, Dick.

15 MEMBER SKILLMAN: Staff, thank you for
16 presentation. We'd just like to suggest on your draft
17 Reg Guide, Rev 3, Page 4, top paragraph described in
18 the last sentence, heat of the spent fuel pool. I
19 know a number of plants in the country actually have
20 pools, plural, and that would be my only comment.

21 MEMBER RAY: Thank you, Dick.

22 MEMBER SKILLMAN: Yes, sir. And Harold
23 you convinced me on the appropriateness of not
24 attempting to combine passive and not passive. So I'm
25 with you. Thank you.

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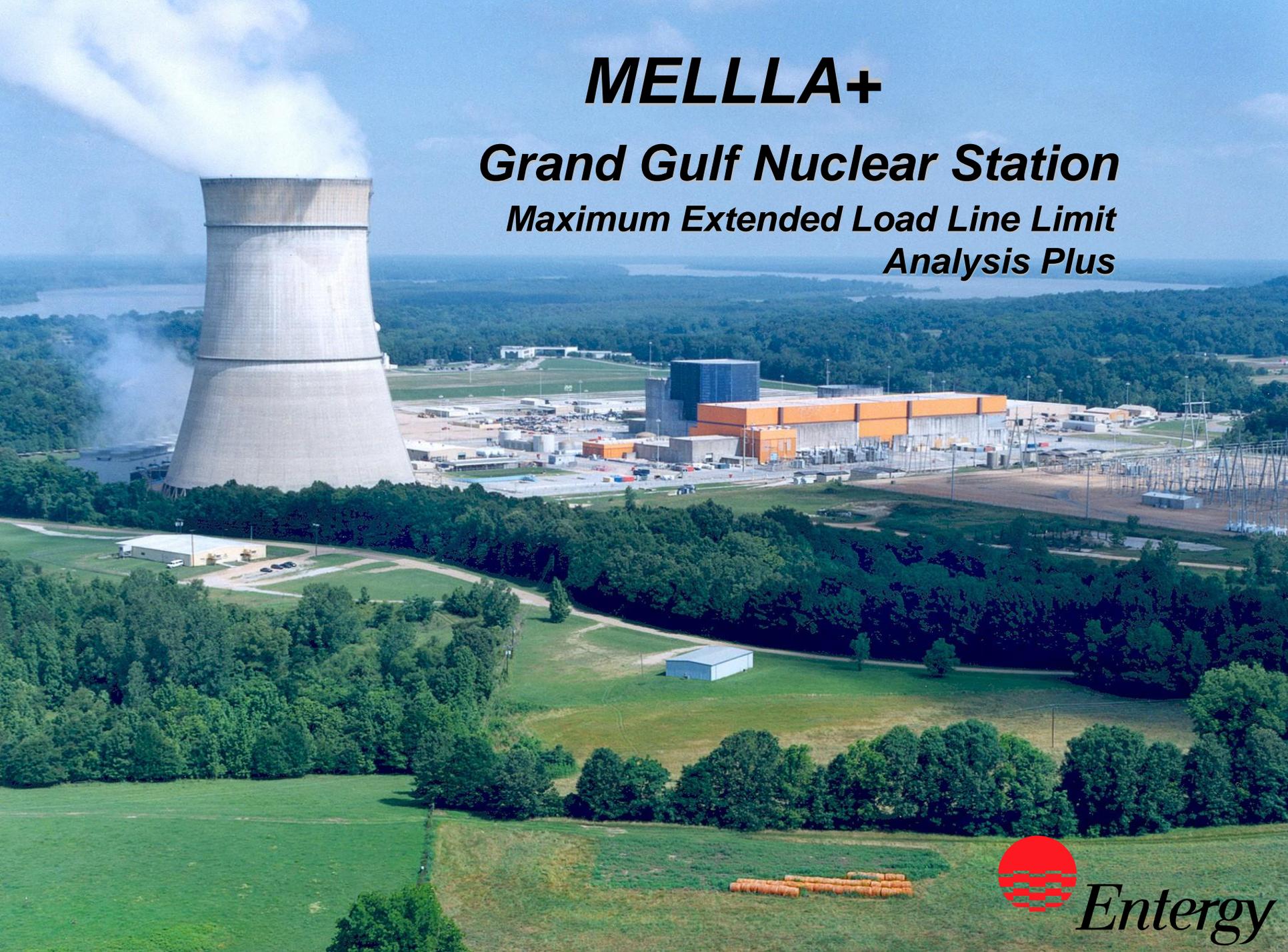
1 MEMBER RAY: Thank you. Anything else?
2 I believe the phone line is now open and so we invite
3 any comments from members of the public who have been
4 listening in. Hearing none, I'll turn it back to you
5 in good time, Mr. Chairman.

6 CHAIR STETKAR: And I am duly impressed
7 and thankful. I'd like to thank the staff and also
8 thanks for taking our comments from the subcommittee
9 at heart. We appreciate that. That's one of the
10 reasons why we have the subcommittee meetings to try
11 to get some of that input. So thank you very much.

12 If nothing else, we are in fact recessed
13 for lunch and we come back to work on our own reports.
14 We don't have anything else on our agenda.

15 For the purposes of anyone who might be on
16 the bridge line, our agenda had one more topic listed
17 today and that was, look for the title because I can't
18 remember anything. Well, it's the update on the
19 Reactor Oversight Process. We had to postpone that
20 because of Member Skillman's illness, and we will
21 reschedule that for a later full committee meeting.
22 So we are now done with our formal presentations and
23 we are recessed for lunch. Come back at 1 o'clock.

24 (Whereupon, the above-entitled matter went
25 off the record at 11:45 a.m.)

An aerial photograph of the Grand Gulf Nuclear Station. A large, grey, hourglass-shaped cooling tower is the central focus, with a thick plume of white steam rising from its top. The tower is surrounded by a dense forest of green trees. In the background, the station's main buildings, including a large orange structure, and various utility equipment are visible. The station is situated near a body of water, likely the Mississippi River, which is visible in the distance under a clear blue sky.

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Grand Gulf Nuclear Station

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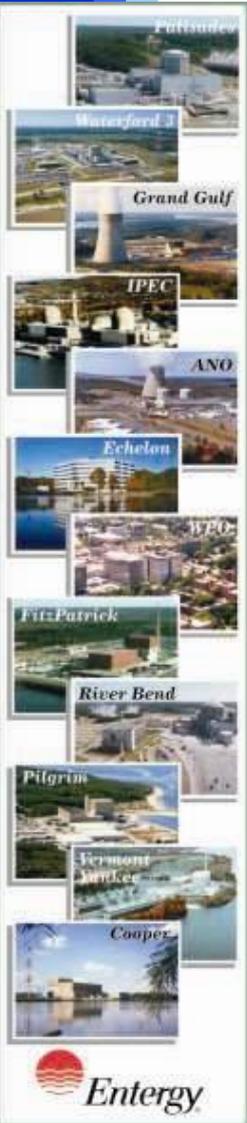
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Advisory Committee on Reactor Safeguards

Grand Gulf Nuclear Station

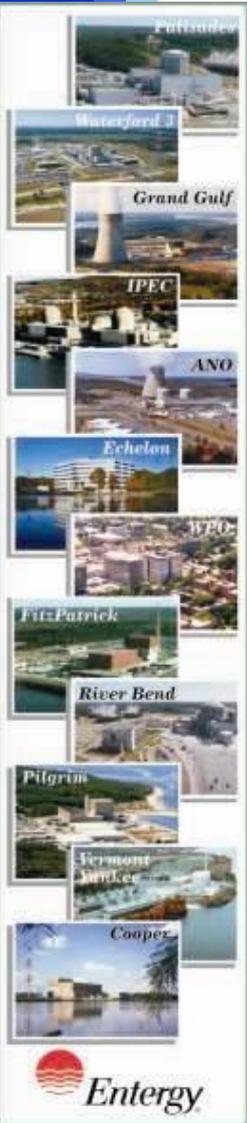
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May 7, 2015



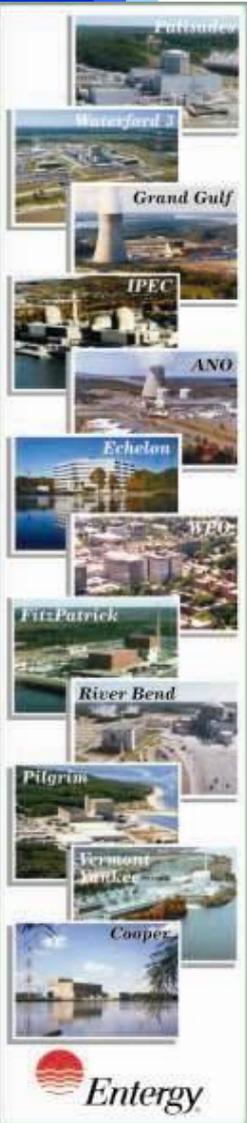
Entergy ACRS Committee Presenters

- **Bryan Ford– Sr. Manager, Fleet Regulatory Assurance Entergy**
- **Greg Broadbent– Supervisor, Fleet Nuclear Analysis Entergy**
- **James Nadeau – Manager, GGNS Regulatory Assurance Entergy**
- **Ricky Liddell – Supervisor, GGNS Operations Training Entergy**



AGENDA

- Overview and Benefits
- Safety Analysis Methods
- Simulator Video
- ATWS-I Analysis
- License Condition



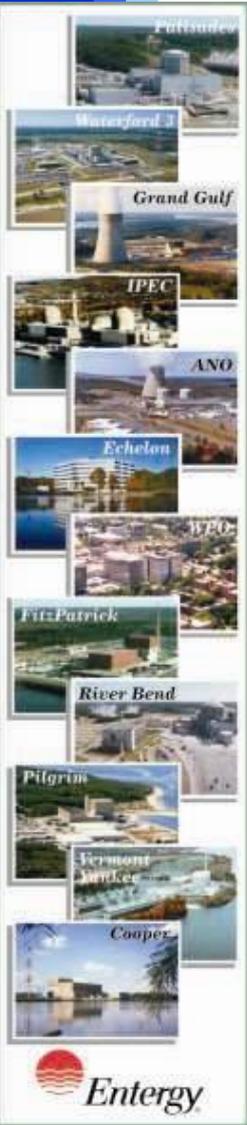
Grand Gulf Nuclear Station Overview

- Operating License Issued November 1, 1984
- Commercial Operation Began July 1, 1985
- GE BWR 6 - Mark III Containment

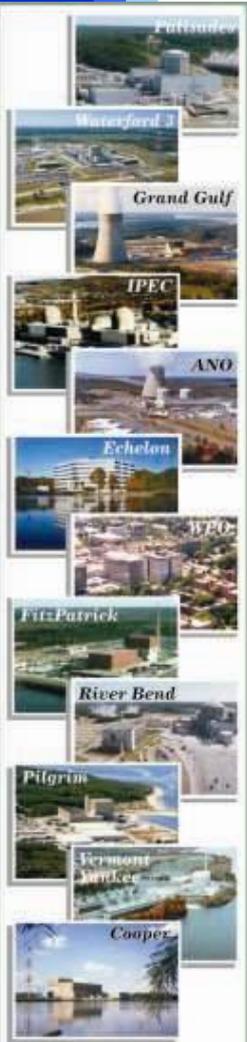
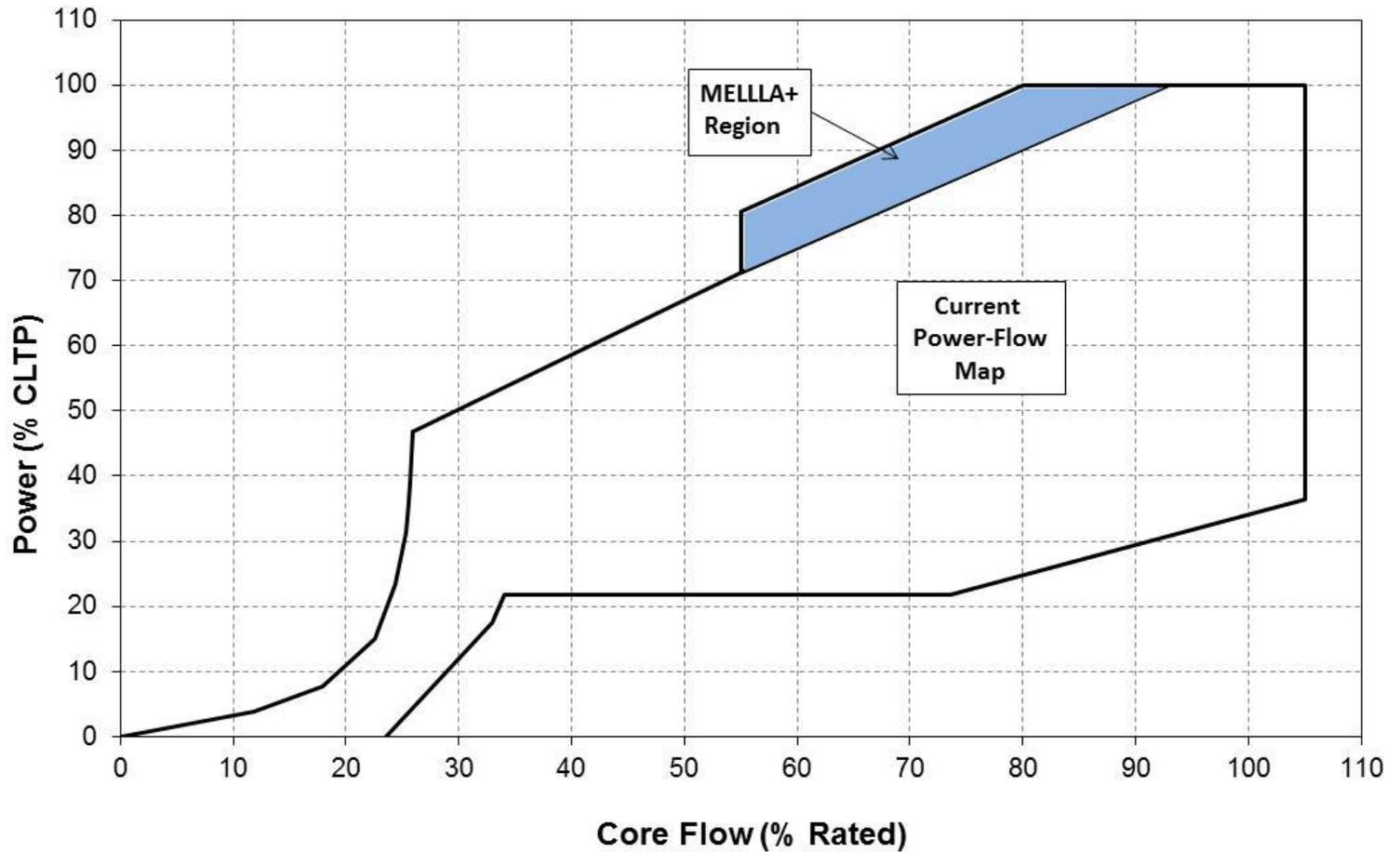
OLTP Limit 3833 MWt

CLTP Limit 4408 MWt

- **MELLLA+ Offers Improved Operational Flexibility**
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 - Reduced Operator Challenges
 - Reduced Enrichment Requirements

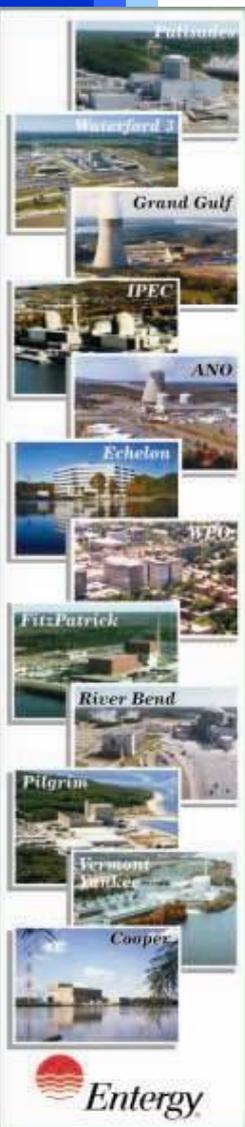


Proposed Extended Operating Domain



Safety Analysis Methods

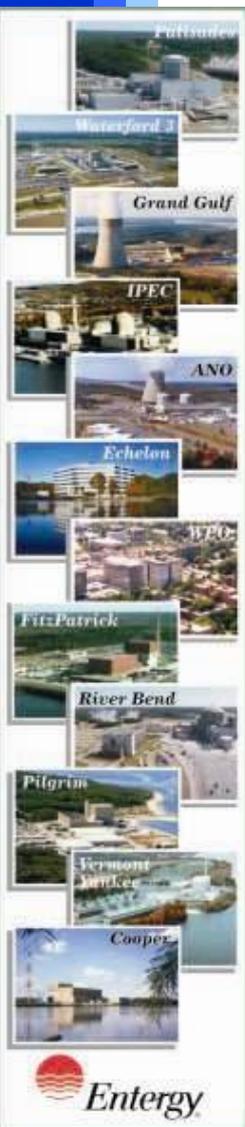
- **Met all 80 Limitations and Conditions**
 - **Methods LTR NEDC-33173 (24 Limitations)**
 - **MELLLA+ LTR NEDC-33006 (52 limitations)**
 - **DSS-CD LTR NEDC-33075 (4 limitations)**
 - **TRACG LTR NEDC-33147 (0 limitations)**
- **Two Audits:**
 - **GEH April 2014**
 - **GGNS October 2014**



GGNS-Specific Evaluations ATWS Analysis

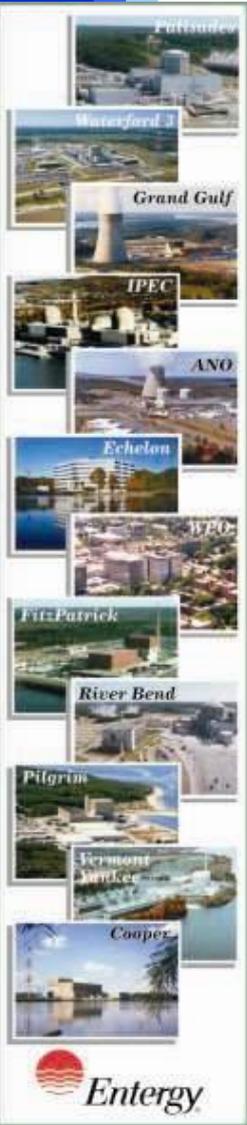
Evaluation of MELLLA+ LTR NEDC-33006P-A

- Operation in the MELLLA+ Region Results in a Higher Power Level in the Event of an ATWS
- Operator Action to Initiate Reduction of Reactor Water Level Within 90 Seconds of ATWS Identification



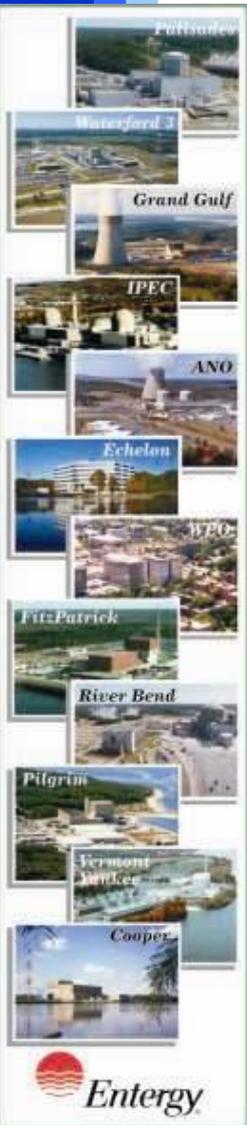
ATWS Time Critical Operator Actions

TCOA	MELLLA+
Initiate Reactor Water Level Reduction	90 Seconds
Initiate Standby Liquid Control Injection	300 Seconds
Initiate Suppression Pool Cooling	660 Seconds



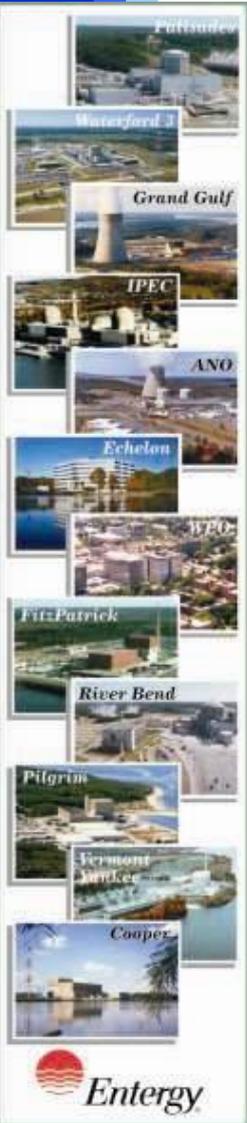
Simulator Video

- Audit confirmed time to initiate water level reduction was less than 90 seconds.
- Benchmark of Monticello confirmed that Operators can initiate within 90 seconds.
- Operator Training Programs and initial actions are comparable.



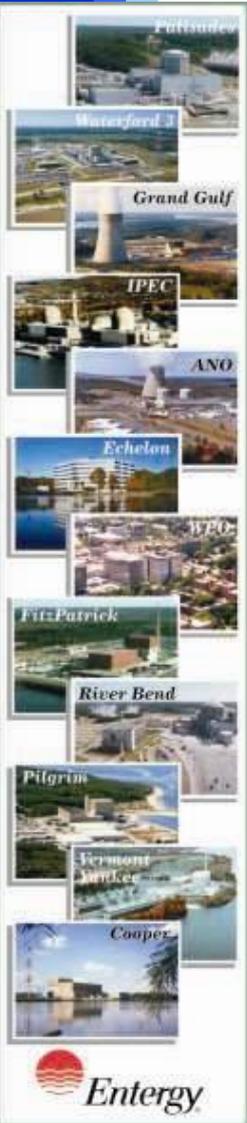
ACRS Sub-Committee Requests

- **Operator Action Times**
- **TRACG T_{min} (minimum stable film boiling temperature)**
- **Peak Cladding Temperature Margin**



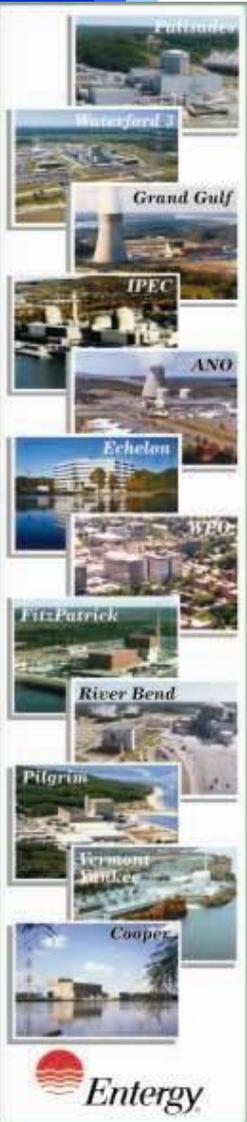
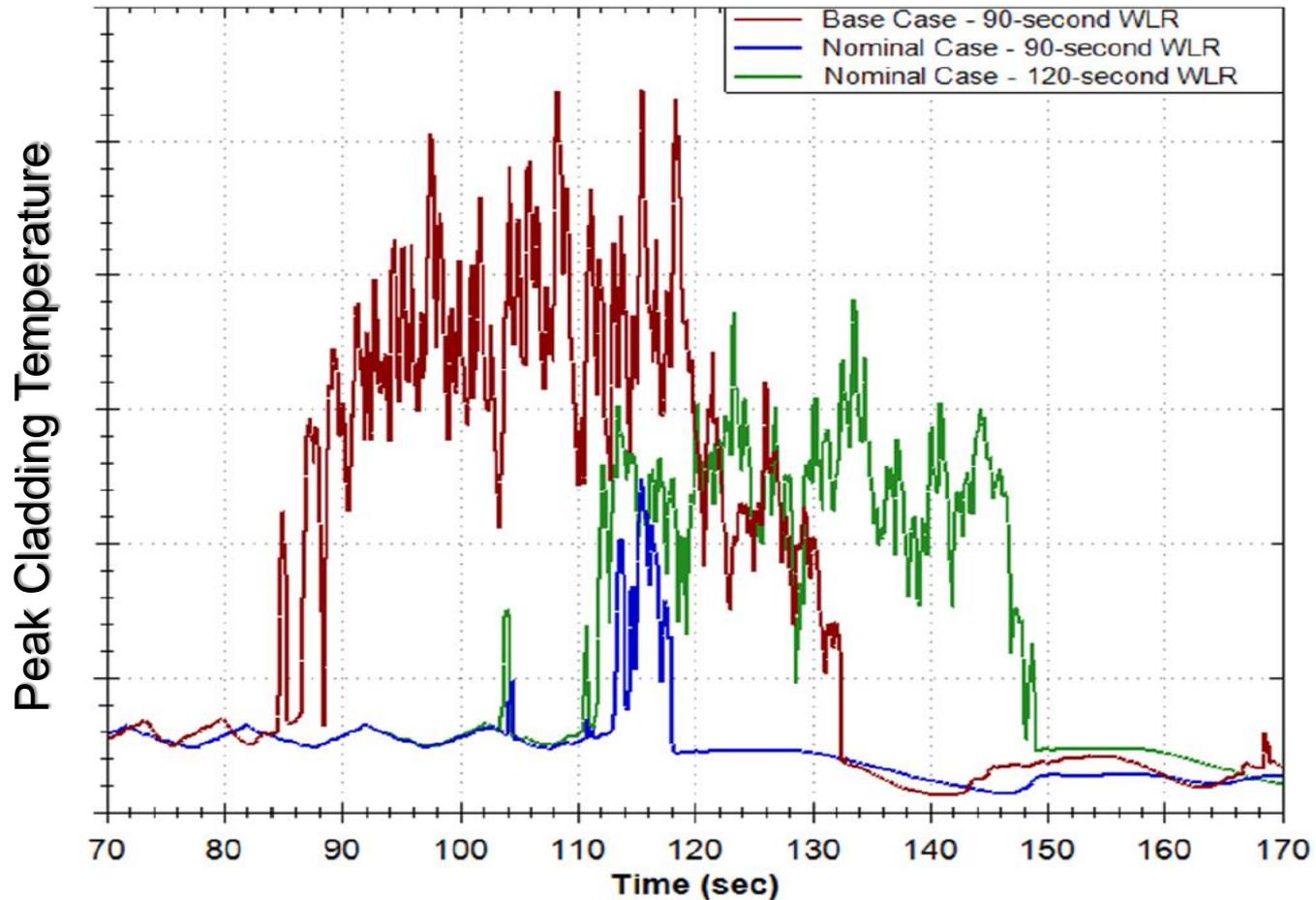
ATWS-I PCT Margins

- **ATWS-I Analysis is best-estimate**
- **GGNS runs applied conservative values in some sensitive inputs**
 - **Minimum core flow**
 - Assumed 80% although the core is designed with 85%
 - **Rod peaking**
 - Assumed on 95% LHGR limit although the core is designed with >10% margin
 - **Post-ATWS Feedwater Temperature Transient**
 - Assumed bounding (faster) drop than expected to increase reactivity insertion
- **Sensitivity evaluations were prepared to quantify the margin**



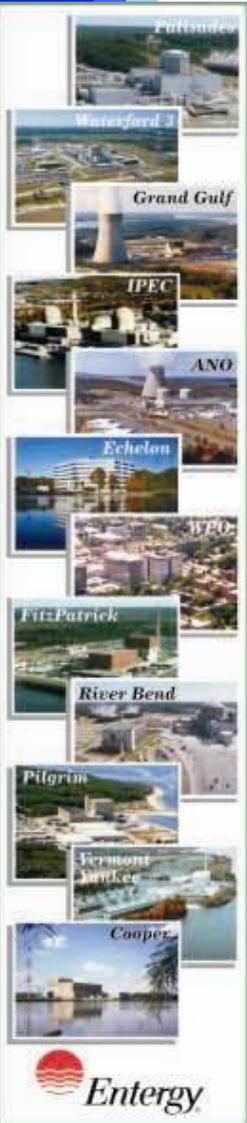
Margin Analysis

Results of Sensitivity Runs



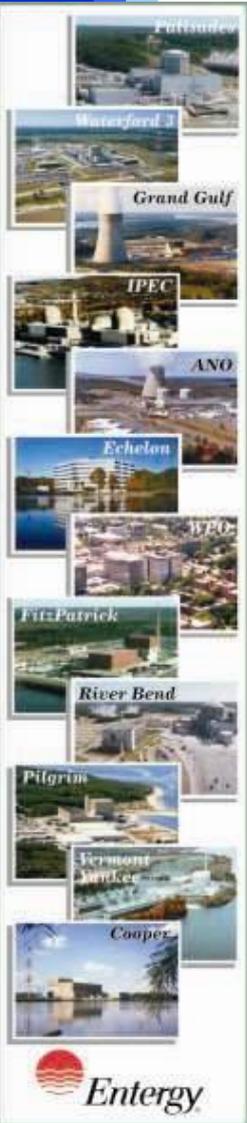
License Condition

- **License Condition to Ensure Time Critical Operator Actions**
 - **Validation of Time Critical Actions Will Confirm Crew's Ability to Perform**
 - **Results Will Be Reported to NRC**



Conclusions

- **GGNS Can Operate Safely in the MELLLA+ Region**
 - Quality of Analysis
 - Quality Training
 - Time Critical Operator Actions Will Be Met



Regulatory Guide 1.27 Ultimate Heat Sink for Nuclear Power Plants (Revision 3)

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RES/DE/CIB

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NRR/DSS/SBPB

ACRS Full Committee Meeting
May 7, 2015

Agenda

- Overview of RG 1.27
- Reasons for Revision
- Summary of Revisions
- Technical Revision
- Addressing Public Comments
- Addressing ACRS Subcommittee Comments
- Conclusions



Overview of RG 1.27

- The ultimate heat sink (UHS) is the system of structures and components and associated water supply credited for functioning as a heat sink to absorb reactor residual heat and essential station heat loads after a normal reactor shutdown or a shutdown following an accident or transient including a loss-of-coolant accident (LOCA)
- The UHS performs three principal safety functions:
 - Dissipation of residual heat after reactor shutdown
 - Dissipation of residual heat after an accident such as a loss-of-coolant accident
 - Dissipation of maximum expected decay heat from the spent fuel pool

Overview of RG 1.27

- Describes applicable rules and regulations related to UHS
- Contains systems design considerations for UHS
 - Provides meteorological conditions considered in the design of UHS
- Contains natural phenomena and site hazards design for the UHS
- Provides guidance for inspection, maintenance and system performance testing
- Provides guidance for water chemistry and micro-bio control

Reasons for Revision

- Outdated
 - Last revision: January 1976
- Need to update RG 1.27
 - New reactor applications
 - Revisions in regulations
 - Lessons learned from operating experience
- NRC Staff Commitment to Commissioners in 2006 (ML060760667)
 - Update RGs where appropriate to go along with the SRP update associated with new reactor applications
 - Commitment to update RGs on a regular basis

Summary of Revisions

- The introduction section was revised to include applicable rules and regulations
- The discussion section was revised to incorporate/update relevant design considerations for UHS
- Changes to the 4 existing regulatory positions and added two new regulatory positions

Summary of Revisions

Regulatory Position (1976)	Regulatory Position (2015)
1. System design and meteorological conditions	1. System design and meteorological conditions
2. Natural Phenomena-hazards	2. Natural Phenomena-hazards
3. Defense-in-depth	3. Defense-in-depth
4. Technical Specifications	4. Technical Specifications
	5. Inspection, maintenance, & testing
	6. Water Chemistry and Micro-bio controls

Technical Revision

Regulatory Position (RP)1 – System Design Considerations for the UHS

- Added clarifications regarding transient analysis for UHS where the water supply may be limited
- Clarified the critical time periods and the bases and procedure used to select critical meteorological data
- Added the following systems design considerations:
 - Construction material should be fire resistant
 - Heat load that are important to safety should be included in determining the UHS thermal performance (spent fuel pool)
 - UHS active mechanical component should automatically start to support DBA heat loads
 - UHS inventory to support 30 day period for UHSs should account for potential water losses

Technical Revision

Regulatory Position 2 – Natural Phenomena and Site Hazards

- The UHS should be capable of withstanding the most severe natural phenomena expected at the site in accordance with GDC 2
- Added clarifications regarding failure of manmade structural features
- Added the following site hazard design considerations:
 - Potential changes in ocean, river, or lake levels
 - Potential for adverse environmental conditions such as icing and freezing of the UHS water storage facility
 - The effects of pipe whip, jets, energy line breaks and dynamic effects
 - Potential clogging of suction flow paths

Technical Revision

RP 5 – Inspection, Maintenance, and Performance Testing (new)

- Inspection and maintenance program should be established for the UHS system piping, structures, and components (detection of corrosion, erosion, protective coating failure, silting, and bio-fouling).
- Dam or other water-controlling structure and connecting piping systems within the jurisdiction of the licensee should be included in the Structures Monitoring Program in accordance with RG 1.160 and the Maintenance Rule. RG 1.127, “Inspection of Water-Control Structures Associated with Nuclear Power Plants” provides more details on inspection and performance monitoring of water-controlling structures.

RP 6 – Water Chemistry and Microbiological Control (new)

- The quality of the water used in cooling towers, spray ponds, and heat exchangers should be considered in the design and operation of the UHS.
- Redundant and infrequently used cooling loops should be flushed and flow tested periodically at the maximum design flow to ensure that they are not fouled or clogged.

Addressing Public Comments

- The draft RG (DG-1275) was published for public comment September 2013
- Comments received from:
 - NEI (10), General Public (1) & Anonymous (2)
- The comments were evaluated by the staff and incorporated into the draft RG 1.27, revision 3, as appropriate

Addressing Subcommittee Comments

- When describing natural phenomena and site hazards, the RG uses terms such as “reasonably be expected to occur during the plant lifetime” and “reasonable probable combinations of less severe natural phenomena”. The ACRS questioned this terminology as too vague and asked the staff to look into screening criteria for external hazards
- Proposed Staff Response:
 - NUREG 2150, “A Proposed Risk Management Regulatory Framework,” dated April 2012 found: The processes for establishing the external hazard design bases do not use consistent event frequency and magnitude methods and recommended that the NRC should reassess methods used to estimate the frequency and magnitude of external hazards and implement a consistent process that includes both deterministic and PRA methods.
 - The staff has decided not to include screening criteria for external hazards in RG 1.27. Appropriate guidance and criteria can be found in other RGs such as RG 1.59 “Design Basis Flood for Nuclear Power Plants” for flooding and RG 1.221 “Design-Basis Hurricane and Hurricane Missiles for Nuclear Power Plants” for hurricane wind speeds or when the recommendations of NUREG 2150 are implemented.
 - The staff proposes to delete “reasonably be expected” and to replace “reasonable probable combinations” with “appropriate combinations”. The use of the term “appropriate” is consistent with the terminology used in GDC 2.

Addressing Subcommittee Comments

- In the discussion, the RG states that “it would be prudent for licensee to ensure other water controlling structures affecting the safety of the site are being monitored under another program such as...” The ACRS questioned the use of the word prudent rather than saying something stronger such as the measures being applied to these other structures.
- Proposed Staff Response – The staff has revised the sentence to read “Inspection and monitoring of dam or other water control structure should be conducted to ensure that changes in structural, hydraulic, and foundation conditions can be detected. Regulatory Guide 1.127, “Inspection of Water-Control Structures Associated with Nuclear Power Plants” provides more details on inspection and performance monitoring of water-controlling structures.”

Addressing Subcommittee Comments

- In Regulatory Position 1.j, with respect to auto start of mechanical component, the sentence is confusing, more guidance should be provided regarding operator actions.
- Proposed Staff Response – The staff has revised the sentence to read “UHS mechanical components, such as pumps, valves, and cooling tower fans, should automatically start and open/close as appropriate to support DBA heat loads. If the UHS mechanical component does not incorporate design features that automatically start and open/close components, operator actions are required to support its intended safety function. For example, placing UHS safety-related makeup water in service to the UHS cooling tower may require operator actions to start makeup pumps to satisfy the 30 days UHS water inventory. RG 1.62, “Manual Initiation of Protective Actions” provides guidance for manual initiation of protective actions.”

Addressing Subcommittee Comments

- The guidance provided in RG 1.27 Rev 3 is applicable to plants with active safety systems and does not apply to plants that utilize a passive containment cooling system as their UHS. The ACRS asked about UHS review guidance for passive plants and whether the guidance for passive plants should be included in RG 1.27.
- Proposed Staff Response - Passive designs have unique attributes and have not lent themselves to a common review procedure. The staff has reviewed these designs on a case-by-case basis and does not see the benefit in developing a regulatory guide at this time.
- Other comments have been evaluated and incorporated into the RG as appropriate

Conclusions

- RG 1.27 has been revised to address current regulations and lessons learned from operating experience since the guide was last revised in 1976
- Revised RG 1.27 provides necessary guidance for nuclear power plant licensees and applicants to use to establish UHS features of plant systems required by NRC rules and regulations
- Public comments received and addressed
- RG 1.27 ready for final publication

BACKUP SLIDES

Public Comments & NRC Response

Public Comment	NRC Response
<p>Background discussion regarding design considerations for UHS is too prescriptive, with some elements that may not have an established or NRC endorsed mechanism to evaluate, and new design inputs that may belong to 'beyond design basis' considerations, a process still in regulatory development.</p> <p>For example, "consider the effects of climate changes that might occur over the design life of the facility", etc. What would be the criteria & methodology to quantify? Moreover, the Fukushima Flooding Task Force is working with NRC on various guidance on dam failures, etc. and language here is duplicative of other guidance.</p>	<p>The staff partially disagreed with this comment. In Rev 3 of draft RG 1.27, the staff added discussions on system design considerations for the UHS, clarified the meteorological conditions to be considered and considerations for natural phenomena and site hazards. The staff disagreed that these discussions represent beyond design basis scenarios.</p> <p>Regarding the example cited, the intent of this statement was to ensure that long-term possible environmental changes are considered in the design of the UHS. Staff has revised the sentence to read:</p> <p>“For natural sources, historical experience indicates that river blockage (e.g., ice dams or flood debris) or diversion may be possible, as well as potential changes in ocean, river, or lake levels as a result of severe natural events, or possible changes in climatological conditions in the site region resulting from human or natural causes.”</p> <p>The staff also added the following in Regulatory position C.1.e:</p> <p>“Current literature on possible changes in the climatological conditions in the site region should also be reviewed to be confident that the methods used to predict weather extremes are reasonable.”</p>

Public Comments & NRC Response

Public Comment	NRC Response
<p>The guidance for scoping of SSC's in the Maintenance Rule is in NUMARC 93-01 Rev. 4a, and endorsed by R.G. 1.160. Further, in many cases, the water controlling structures are not in the jurisdiction of the licensee, but other entities. Reference to the Maintenance Rule should be removed, as it is an arbitrary inclusion as written.</p>	<p>The staff partially agreed with this comment that not all water control structures affecting a plant site would be within the jurisdiction of the licensee/applicant. The discussion of the Maintenance Rule has been revised to clarify that only those structures within the jurisdiction of the licensee should be monitored in accordance with the Maintenance Rule and RG 1.160. However, it would be prudent for the licensee to ensure other water controlling structures affecting the safety of the site are being monitored under another program such as the US Army Corps of Engineers National Dam Inspection Program.</p>

Public Comments & NRC Response

Public Comment	NRC Response
<p>Missing from this is any consideration of how sea level rise may impact the reliability of the UHS during the license period. Pond banks that were initially safe may be washed away by enhanced storm surge for example leaving no cooling water supply. Cooling water that was initially fresh may become brackish and damage equipment not designed for the changed water chemistry leading to failure of critical cooling systems.</p> <p>Changed tidal flow patterns may lead to accumulation of clogging debris where the original design prevented this. If the effects of subsidence on ground water are to be considered, then surely the effects of sea level rise up to at least 2 meters by 2080 must be considered as well.</p>	<p>The staff agreed in part with this comment.</p> <p>The staff agreed that these are important considerations for the design of the UHS systems. In fact, the potential change in sea level was included in the discussion section of proposed Revision 3 to RG 1.27, which states: “For natural sources, historical experience indicates that river blockage (e.g., ice dams or flood debris) or diversion may be possible, as well as changes in ocean or lake levels as a result of severe natural events”.</p> <p>The staff has added a new regulatory position under section C.2.a to further address this comment:</p> <p>“(5) potential changes in ocean, river, or lake levels as a result of severe natural events, or possible changes in climatological conditions in the site region resulting from human or natural causes, that may reasonably be expected to occur during the plant lifetime.”</p>

Public Comments & NRC Response

Public Comment	NRC Response
<p>Concern: Revision 2 of the RG 1.27, required transient analysis to include the worst 24-hours following the initial critical time period. This analysis period should remain part of the design basis analysis because peak heat loads from a realistic or conservative analysis may occur several hours after the start of the initial accident.</p> <p>Suggested Revision: Following the site specific UHS critical time period the worst 24-hour period should be maintained as a requirement for transient analysis for peak cooling water temperature.</p>	<p>The proposed revision did not relax considerations for the transient analysis. Instead, the proposed revision specified that the meteorological conditions resulting in the maximum intake water temperature to the plant should be the worst combination of controlling parameters for the critical time period(s) unique to the specific design of the UHS. Depending on the UHS design, the critical time period (i.e., the time interval after a DBA to when the intake water to the plant from the UHS reaches its maximum value) varies.</p> <p>In practice, the 24-hour, post-accident time period has, in many cases, been looked upon as a default time period. Now rather, the proposed revision clarifies that the responsibility for defining and justifying the time period(s) critical to the UHS design lies with the applicant or licensee.</p>

Public Comments & NRC Response

Public Comment	NRC Response
<p>Concern: The existing guidance allows flexible to defer cooling of the spent fuel pools to gain transient analysis margin. Requirements discussing cooling of spent fuel pools should be clarified. Also, the existing guidance allows for significant delays in cooling the non-accident unit to gain transient analysis margin. Emergency procedures direct operates to cool the units to ensure safety margin. Limiting the cooling capability for the UHS structure is inappropriate for a shared safety system (e.g. a cooling pond). Reducing UHS cooling capacity in this manner restricts operational flexibility and reduces plant safety margin.</p> <p>Suggested Resolution: The guidance should prescriptively discuss cooling requirements and the treatment of the associated heat loads in transient analysis to ensure that safety margin is adequately maintained.</p>	<p>The staff partially agreed with the comment.</p> <p>An additional safety function was added to the Background information to further clarifies spent fuel pool cooling: “The UHS performs three principle safety functions: (1)..... and (3) dissipation of maximum expected decay heat from the spent fuel pool to ensure the pool temperature remains within the design bounds for the structure,” This addition concurs with the SRP 9.1.3, “Spent Fuel Pool Cooling and Cleanup System.”</p> <p>No specified time was included for cooling the non accident unit because neither GDC 5 nor BTP 5-4 specify a cooldown time. GDC 5 specifies an orderly shutdown and cooldown of the accident unit and BTP 5-4, “Design Requirements of the Residual Heat Removal System,” Section B 1.D, specifies the RHR system must be capable of bringing the reactor to a cold shutdown condition, with only offsite or onsite power available, within a reasonable period of time following shutdown, assuming the most limiting single failure.</p>