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UNITED STATES NUCLEAR REGULATORY COMMISSION'S ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

May 24, 2007

The contents of this transcript of the proceeding of the United States Nuclear Regulatory Commission Advisory Committee on Reactor Safeguards, taken on May 24, 2007, as reported herein, is a record of the discussions recorded at the meeting held on the above date.

This transcript has not been reviewed, corrected and edited and it may contain inaccuracies.

1	UNITED STATES OF AMERICA
2	NUCLEAR REGULATORY COMMISSION
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4	ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)
5	SUBCOMMITTEE ON THERMAL HYDRAULICS
6	+ + + +
7	OPEN SESSION MEETING
8	+ + + +
9	THURSDAY,
10	MAY 24, 2007
11	+ + + +
12	ROCKVILLE, MARYLAND
13	+ + + +
14	
15	The subcommittee met at the Nuclear
16	Regulatory Commission, Two White Flint North,
17	Room T-2B3, 11545 Rockville Pike, at 8:30 a.m., Sanjoy
18	Banerjee, Chairman, presiding.
19	
20	COMMITTEE MEMBERS PRESENT:
21	SANJOY BANERJEE Chairman
22	GRAHAM B. WALLIS Member
23	MICHAEL CORRADINI Member
24	(via teleconference)
25	THOMAS S. KRESS Member

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1	COMMITTEE MEMBERS PRESENT:	(cont'd)
2	MARIO V. BONACA	Member
3	SAID ABDEL-KHALIK	Member
4	ACRS STAFF PRESENT:	
5	RALPH CARUSO	Designated Federal
6		Official
7	NRC STAFF PRESENT:	
8	MICHELLE HONCHARIK	
9	GREG CRANSTON	
10	ZENA ABDULLAHI	
11	TONY NAKANISHI	
12		
13	ALSO PRESENT:	
14	PATRICIA CAMPBELL	
15	P.T. TRAN	
16	JOSE CASILLAS	
17	FRAN BOLGER	
18	RICK KINGSTON	
19	JENS ANDERSEN	
20	BRIAN MOORE	
21	JOSE MARCHE-LUEBA	
22	MARK COLEMAN	
23	MIKE COLBY	
24	WALTER MERTZ	
25	TONY REESE	

1	ALSO PRESENT: (cont'd)
2	DAVID DIAMOND
3	RANDY JACOBS
4	ALAN CHUNG
5	CHAD LYMAN
6	DILIP RAHIMI
7	Y.C. JIU
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1 P-R-O-C-E-E-D-I-N-G-S 2 (8:30 a.m.)CHAIRMAN BANERJEE: The meeting will now 3 4 come to order. 5 This is a meeting of the Advisorv 6 Committee on Reactor Safeguards, Subcommittee on 7 Thermal Hydraulic Phenomena. 8 I am Sanjoy Banerjee, Chairman of the 9 Subcommittee. Subcommittee members in attendance are ACRS members Mario Bonaca, Tom Kress, Graham Wallis, 10 Mike Corradini on screen there, and Said Abdel-Khalik. 11 12 Also present is our consultant, David Diamond, from 13 Brookhaven National Laboratory. The purpose of the meeting today is to 14 15 review several topical reports related to an expansion 16 of the BWR operating domain known as extended --Maximum Extended Load Line Limit Analysis Plus, 17 MELLLA+. The subcommittee will hold discussions with 18 19 representatives of the NRC staff, its contractors, 20 General Electric. and other interested parties 21 regarding these matters. 22 The subcommittee will gather information, 23 analyze relevant issues and facts, and formulate

proposed positions and actions as appropriate for deliberation by the full committee.

24

1 Ralph Caruso is the Designated Federal 2 Official for this meeting. 3 The rules for participation in today's 4 meeting have been announced as part of the notice of 5 this meeting previously published in the Federal 6 Register on April 3, 2007, and April 18, 2007. 7 Portions of the meeting will be closed for the 8 discussion of proprietary information. 9 A transcript of the meeting is being kept 10 and will be made available as stated in the Federal 11 Register notice. 12 Ιt is requested that speakers first 13 identify themselves and speak with sufficient clarity 14 and volume so that they can be readily heard. 15 We have received no requests from any 16 member of the public for time to make an oral 17 presentation. 18 We look forward to an interesting meeting, 19 one which has been postponed several times. 20 case, we are holding it now. 21 We will now proceed with the meeting, and 22 I call upon Ms. Michelle Honcharik of the NRC staff to 23 begin. Michelle? 24 MS. HONCHARIK: Good morning. My name is 25 Michelle Honcharik. I am the NRR Project Manager for

GE Interactions. I work for Stacey Rosenberg in the Special Projects Branch of the Division of Policy and Rulemaking.

As mentioned, we are here today to present the NRR staff's findings and conclusions from the review of two GE topical reports, NEDC-3306P, the GE Boiling Water Reactor Maximum Extended Load Line Limit Analysis Plus, referred to as MELLLA+ or M+ in some of the slides later, and NEDC-33173, Applicability of GE Methods to Expanded Operating Domains, also referred to as Methods or Interim Methods or IMLTR.

A little bit of history here. Revision 1 of the MELLLA+ topical was submitted to the NRC in August of 2002. Over the years, the NRC staff performed a series of audits and issued requests for additional information culminating in two items, the first of which was GE's submission of Revision 2 to the MELLLA+ topical report in November of 2005. This is the revision that was provided to the ACRS for review today.

Revision 2 addressed changes resulting from the staff RAIs, such as changes in disposition, evaluation, scope, and commitments for plant-specific submittals. The staff safety evaluation for the MELLLA+ topical report was issued on April 30, 2007.

The presentations today will focus primarily on the MELLLA+ topical end review. The second item was the issuance Revision 0 of NEDC-33173, the interim methods, in February of 2006. This is referred to as interim methods, because GE plans to submit supplemental information and a revision later this year eliminate some of the limitations on the report's use. These limitations will be discussed in more detail tomorrow. The staff safety evaluation on the interim methods topical report was issued on March 14, 2007, and the presentations tomorrow will focus on this report and the staff's review. I now turn over to Greg Cranston. MR. CRANSTON: Good morning. My name is Greg Cranston. I am the Branch Chief for the Reactor Systems Branch of the Division of Safety Systems. My staff has been involved in the review of these topics reports, and we'll be making presentations today and tomorrow. As Michelle pointed out, we are covering the EPU methods as well as the MELLLA+ methods. We will also be discussing two other areas that relate to

topical reports in the area of BWR core stability,

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which cover NEDC-33075, which is the boiling water reactor detect and suppress solution confirmation density topical, and NEDC-33147, which is the DSS-CD TRACG applications in conjunction with that.

The presenters from the NRC include Zena Abdullahi, who will be wearing her reactor systems hat today. She is transitioning into -- she has transitioned into ACRS, but she will be -- she was heavily involved with the reviews and the preparations of the presentation associated with these documents.

We also have assistance from our consultants from Oak Ridge National Laboratory, and that includes Jose Marche-Lueba, Jeff Skeehan, and Grady Yoder.

And with that, I'd like to now turn it over to Patricia Campbell with GE.

MS. CAMPBELL: Good morning. I'm Patricia Campbell, Director of Regulatory Affairs for GE Energy Nuclear. We have a number of technical and regulatory staff here today to present information and respond to your questions. We appreciate the opportunity to discuss these important actions with you. This is a culmination of extensive efforts and interactions on the part of the NRC and GE.

We will now provide a non-proprietary

2	overview. P.T. Tran, Project Manager
	MEMBER WALLIS: Can I ask a question about
3	what we're doing here? I notice there's an open
4	session and then there's a closed session.
5	MS. CAMPBELL: That's true.
6	MEMBER WALLIS: I assume we can't ask
7	anything really specific technically until we get to
8	the closed session. Is that true?
9	MS. CAMPBELL: That's correct. And we
10	will provide an overview
11	MEMBER WALLIS: Now, what are we going to
12	do before that?
13	MS. CAMPBELL: in the closed session as
14	well.
15	MEMBER WALLIS: You're just going to give
16	an overview until them?
17	MS. CAMPBELL: Yes, sir.
18	MEMBER WALLIS: We can't really ask any
	working mosting with a few the break is that two
19	probing questions until after the break, is that true?
19 20	MS. CAMPBELL: We could easily get into
20	MS. CAMPBELL: We could easily get into
20 21	MS. CAMPBELL: We could easily get into some proprietary information, so
20 21 22	MS. CAMPBELL: We could easily get into some proprietary information, so MEMBER WALLIS: So I'd better be quiet.

1 We will now provide Okay. 2 proprietary overview. P.T. Tran, Project Manager, New 3 Product Introduction, will present a brief summary of the actions we will discuss in more detail with you 4 5 today. 6 MS. TRAN: Good morning. I am P.T. Tran, 7 and I'm the Project Manager for the MELLLA+ LTR and the nuclear methods LTR. First, I would like to also 8 9 thank the ACRS members and the NRC staff for your 10 support of this meeting. 11 I would like to start off our presentation 12 with an overview and summaries of the MELLLA+ LTR and 13 the nuclear method. The objective of the MELLLA+ 14 program is to restore the operational flexibility for 15 the GE BWR program plans by expanding the operating 16 boundary allowing the operation at 120 17 original licensed thermal power, or OLTP. call it EPU, with a core flow as low as 80 percent 18 19 uprated. 20 The MELLLA+ topical report essentially 21 documents the process and defines the scope of work 22 required for expansion of the operating domain for BWR 23 plant applications. The nuclear methods report 24 documents the applicability of the GE nuclear methods 25 for the expansion operating domain and provides the

2 MELLLA+ LTR, including the EPU. 3 It is also included in the process and 4 defines the scope. A plant application must comply 5 with the methodology for the application. 6 Now, let's take a look at the power flow map and understand why there is a need for MELLLA+. 7 8 This is -- what we see here is the initial reactor 9 power flow map with a single point at rated power and 10 rated core flow. We call it the OLTP point. And we 11 introduced the ELLLA region for -- to allow plant 12 operating flexibility, then followed by the increased 13 That also helped the plant core flow region. operation during -- at the end of second close down. 14 After that we introduced the MELLLA -- at 15 the MELLLA operating region is these characterized by 16 17 that blue region right there. And it is defined by 18 the point at 100 percent rated power and 75 percent 19 core flow. 20 Then, we start the power uprate program. 21 The first one is the stretch power uprate of five 22 percent OLTP. As you can see, for the power uprate 23 program, we maintain the MELLLA boundary and extend 24 along the line of the MELLLA boundary. 25 And with that, the power flow window

licensing basis for the NRC to issue the SE for the

	getting smaller as we go up in power. And when we
2	introduced the EPU power program up to 120 percent
3	power uprate, the MELLLA boundary for that EPU now
4	come to a single point, about 99 percent core flow and
5	120 percent power uprate.
6	And there is no more flexibility for plant
7	operating at 120 percent power uprate, and the
8	individual plants really desire to have the power flow
9	window back, so that they can regain the flexibility,
10	and we introduced the MELLLA+ program.
11	Now, the MELLLA+ program was defined in a
12	generic term that is 120 percent power uprate and 80
13	percent core flow as the minimum corner of the MELLLA+
14	window. The individual plants may choose a smaller
15	expansion.
16	MEMBER WALLIS: I think I can ask you in
17	the open session it looks as if you have expanded
18	the operating domain by a factor of two or something.
19	It looks even more than that in the picture. But it's
20	the same reactor, more or less. What has changed to
21	make it possible to expand the domain so much?
22	MR. KINGSTON: Do you mean in terms of
23	MEMBER WALLIS: How would you reassure the
24	public that this is okay, to expand the domain of
25	operation so much, as is shown in your figure?

1	CHAIRMAN BANERJEE: From the green to all
2	those other colors.
3	MEMBER WALLIS: Yes, you've added a lot of
4	new territory here. What has happened to make it
5	possible to do that?
6	MR. CASILLAS: My name is Jose Casillas.
7	I work for General Electric. I'm Plant Performance
8	Consulting Engineer. And, essentially, what
9	MEMBER CORRADINI: Could the gentleman
10	speak up a bit?
11	MEMBER WALLIS: Could you move your
12	microphone in? I am actually asking the staff. I am
13	not asking General Electric, but maybe I should.
14	Well, am I asking General Electric, or who am I
15	talking to? It's all GE. Okay. I guess it's GE,
16	okay. So I wasn't sure I'm sorry. You're all GE
17	people.
18	MS. TRAN: Yes.
19	MEMBER WALLIS: I didn't realize that.
20	MR. CASILLAS: Yes. As P.T. Tran showed,
21	there is essentially I think your question has to
22	do more with power rather than the flow window, and
23	MEMBER WALLIS: Both. I mean, what has
24	happened to make this reactor able to operate over
25	such a bigger range now than it did when it started?

1	MR. CASILLAS: Well, the let me address
2	first the power. The initial what we call the
3	stretch uprate, that involved essentially a built-in
4	margin that had been existing from the time that the
5	plants were designed. They were designed to
6	accommodate approximately a five percent power
7	increase. And so eventually that additional design
8	margin was applied for in terms of license.
9	For the extended power uprate going all
10	the way to 120, that involved
11	MEMBER CORRADINI: Can I ask the
12	gentleman? So you mean the dark green to the light
13	green was inherent margin that was never documented?
14	MEMBER BONACA: Never used as
15	MR. CASILLAS: The 100 to 105 was margin
16	that was standard in the design of all the BWRs that
17	had not been included in the license in the initial
18	license application.
19	MEMBER CORRADINI: Thank you.
20	MR. CASILLAS: Yes. Then, the 120 power
21	increase was a result of the realization of all of the
22	NSSS margins that existed in the BWR. And the
23	application or the extraction of that margin required
24	significant balance of plant modifications.
25	MEMBER WALLIS: Up to now, it is

1 essentially the reactor wasn't changed much, but it 2 just had an inherent capacity to --3 MR. CASILLAS: Yes. The reactor had the 4 capacity to produce the -- all the way to 120. 5 balance of plant systems needed -required 6 significant changes in terms of capacity. 7 MEMBER WALLIS: What do you mean by that? 8 I mean, talking -- you're addressing the public here. 9 MR. CASILLAS: The generator, the --10 MEMBER WALLIS: The turbine, the nonnuclear part. 11 12 MR. CASILLAS: Exactly. The non-nuclear 13 part, right. 14 MEMBER CORRADINI: May I follow up 15 Graham's question? Because I guess he is asking the 16 starting question I was trying to discern from the 17 executive summaries and all of the documents. I could repeat it back to you to make sure I've got it 18 19 right is you're saying if there was a large enough 20 turbine and a large enough power systems components, 21 there is nothing inherently limiting in the reactor 22 design in terms of sizing of the components, nor 23 instability regions. It is just that now you know 24 enough that you can go into regions where 25 conservatively ignore it.

1 CASILLAS: I would say is MR. that 2 correct, yes. MEMBER BONACA: Still, but you are moving 3 into territory where you are ebbing into a margin of 4 5 the plant. So I'm trying to understand, you know, you 6 still have a buffer typically between the operating 7 domain and the set domain that you commit to the NRC. 8 Now, what you have done here, you have moved into the territory, because you have pushed 9 10 up your setpoints, your high power, and high flow, and so on and so forth. And so I'm trying to understand 11 12 the justification of trading in this margin, and this has been accepted, of course, by the NRC, but --13 MR. CASILLAS: Well, the increase in power 14 15 to 120 is old -- I mean, that has -- I think most 16 every boiling water reactor has extended their power to the orange and the yellow regions. 17 The only new 18 part that we are addressing that is new essentially is the purple region, and that was the low flow region. 19 20 And that presents some unique challenges. 21 But the question of the increased steam 22 flows and velocities, the average power increase in 23 production, that has -- is all addressed in --So there has been no 24 MEMBER WALLIS: 25 technical innovation or something? Or why wasn't this

1	done on the first day?
2	MR. CASILLAS: Do you mean from the
3	original
4	MEMBER WALLIS: What is it that makes it
5	possible sort of 30 years later to expand the region
6	so much? What has happened? Something must have
7	happened. Either your knowledge is infinitely better,
8	or the technology is better, or something. But
9	something has given you the confidence to do this.
10	MR. BOLGER: This is Fran Bolger from GE.
11	One of the capabilities that has increased over the
12	years is the ability of the fuel, and we have improved
13	the capability and the critical power performance of
14	the fuel over the years.
15	MEMBER WALLIS: Yes. I thought there must
16	be some technical change, and that certainly is one.
17	MEMBER CORRADINI: May I ask that? So
18	that is a technical change that we have to discuss in
19	private, or can you elaborate on that? Because I am
20	I can imagine there is changes in geometry and
21	changes in materials that might change the local
22	critical heat flux or the overall critical power
23	ratio.
24	But I think this large enough of a change
25	I still attribute to what was discussed before, which

1	is you had a very large margin. You've now had the
2	abilities to calculate something in more precise
3	nature, so you have consciously gone into that margin
4	or conservative region and are operating where you had
5	this zone a larger zone of uncertainty, and you are
6	more certain as to how the behavior the behavior of
7	the system.
8	Am I missing something, or do we have to
9	talk about this later in private?
10	MS. CAMPBELL: I think this is something
11	that we will get into later.
12	MEMBER WALLIS: Well, is what he says
13	correct? You are now more certain about the behavior
14	of the system?
15	MR. KINGSTON: Well, I think we could ask
16	Dr. Andersen to perhaps talk about the improvements
17	MEMBER WALLIS: Because, I mean, when we
18	get to that when we get to the closed session,
19	we're going to examine whether or not your
20	correlations have improved over 30 years, and things
21	like that.
22	MS. CAMPBELL: Exactly.
23	MEMBER WALLIS: And he is going to tell us
24	that?
25	MS. CAMPBELL: We will be discussing it

1 over the next two days. 2 MR. CASILLAS: I think you have alluded to 3 the two aspects. One is the --MEMBER WALLIS: Are you going to say for 4 the record that you are now able to calculate better 5 6 than you could before? Is that one of the things 7 which has happened? 8 MR. CASILLAS: Well, let me say that there 9 is the two aspects that have been brought up. 10 the capability of the field, and there has been a lot of advances in the field, and that certainly with the 11 12 fuel designs that we had at the time of -- that 13 reactors were designed we could not produce this 14 amount. 15 And the second part is the ability of the 16 systems and the safety margins to be maintained. That 17 is the more important part of that. I mean, I think 18 Dr. Andersen can -- will get into a lot of the methods 19 and how we are able to calculate and demonstrate that. 20 MEMBER WALLIS: Let's see. 21 need to get this clear. It can be open. The safety 22 margins maybe were inherent, because I don't know that 23 there has been a great advance in calculate. 24 25 MEMBER BONACA: Well, I think your linear

1	heat rate has gone down significantly, and maybe I
2	mean, those are the issues that drive the fuel
3	performance, right? I mean, so for
4	MR. CASILLAS: All of those details would
5	be discussed in the proprietary session, from the fuel
6	performance to the safety systems.
7	CHAIRMAN BANERJEE: So you are saying that
8	your ability to predict things with confidence has
9	increased? So it is simply sharpening your pencil
10	that allows you to do this?
11	MS. CAMPBELL: We will let Dr. Andersen
12	respond to that.
13	MR. CASILLAS: I don't know how to exactly
14	characterize the
15	CHAIRMAN BANERJEE: Have the equations for
16	multi-phased code changed since this?
17	MR. ANDERSEN: Excuse me. This is Jens
18	Andersen from Global Nuclear Fuels. When we are using
19	the same methods to analyze the plants, then the
20	margins that are built into the methods are the same.
21	But what really has changed is, as was mentioned
22	earlier by Fran Bolger and Jose Casillas, is that we
23	have improved the fuel design.
24	When the plants were originally designed
25	back in the '70s, they were designed with 7x7 and 8x8
· · · · · · · · · · · · · · · · · · ·	i e e e e e e e e e e e e e e e e e e e

1	fuel. We are now using 10x10 fuel, which has smaller
2	fuel rods, much larger surface area, and you have a
3	much larger critical power capability of the fuel
4	bundles.
5	So if you look at the margin to the
6	thermal limits, the critical power limits, they have
7	really not been reduced. It's just the fact that the
8	fuel is able to produce so much more power and have
9	such a higher critical power that we can take
10	advantage of the improved performance of the fuel.
11	MEMBER WALLIS: And you did not need to
12	add any safety systems? Didn't change the design by
13	adding any safety system. They were inherently able
14	to accommodate all these changes. Is that true?
15	MS. TRAN: That's correct.
16	MEMBER WALLIS: So you have increased the
17	power of the engine of the car, but the brakes are
18	still the same, to take a very simple analogy. My
19	impression is that that is true. The brakes were
20	always good enough for the increased power of the
21	engine, but now you've increased the power.
22	CHAIRMAN BANERJEE: They have ABS now.
23	(Laughter.)
24	MEMBER WALLIS: No. What they haven't got
25	I don't think they said they had anything new in

	salety. It's the same salety system
2	CHAIRMAN BANERJEE: Suppression detect
3	and
4	MEMBER WALLIS: Well, maybe there is
5	something better about the safety.
6	MS. CAMPBELL: I believe we'll cover that
7	in detail.
8	MEMBER WALLIS: Well, I think you owe the
9	public some explanation about why
10	CHAIRMAN BANERJEE: We are asking broad
11	questions.
12	MEMBER WALLIS: I'm asking a very broad
13	question. You want to reassure I get these
14	questions all the time from friends and acquaintances,
15	you know, people from the public about how can you
16	keep increasing this domain of operation. You need to
17	explain it in a way that's understandable.
18	MR. CASILLAS: That is correct. There is
19	in terms of margins, in certain areas we have we
20	have taken advantage of the excess margin that were
21	built in the boiling water reactor. In some other
22	areas, we've taken advantage of improved methodologies
23	to understand the phenomena and be able to
24	MEMBER WALLIS: I think you could say
25	you've got improved safety instrumentation. Isn't

1	that true?
2	MR. CASILLAS: Correct. Yes.
3	MEMBER WALLIS: Thank you.
4	MEMBER KRESS: Can we go back to the
5	MELLLA curve, please?
6	MR. CARUSO: Theron, can you put up the
7	computer?
8	MEMBER KRESS: I want to ask you a
9	question about the well, on my chart it's purple
10	the vertical line brings you up to it looks like
11	105 percent at a particular flow on the MELLLA+ line
12	region. At a fixed flow, that requires a change in
13	enthalpy. How is that accomplished? By increasing
14	decreasing the inlet temperature, or increasing the
15	pressure? How do you get this change in enthalpy?
16	MR. CASILLAS: Let me first say that the
17	figure that you see in front of you is a cartoon, and
18	it is not it is not
19	MEMBER WALLIS: Not to scale?
20	MR. CASILLAS: It's not very precise. In
21	fact, some regions are larger than they should be, and
22	some are smaller than they should be. But it's a
23	cartoon.
24	MEMBER WALLIS: It's not very far off.
25	MR. CASILLAS: It is, actually, for those

of us that have been looking at it. 1 2 MS. CAMPBELL: It's a simplification. MR. CASILLAS: And so -- but, indeed, the 3 4 only difference that MELLLA+ will represent in terms of operation will be the ability to operate with a 5 6 lower recirculation pump flow at the same power levels 7 that have already been approved. So MELLLA+ 8 accomplished merely by reducing the core flow, and, of 9 course, that is --10 MEMBER KRESS: No, no. That --11 MEMBER CORRADINI: So can I --12 MEMBER KRESS: My question was, clearly, the recirculation has to do with the ability to 13 transfer the heat properly from the fuel. But you've 14 got a fixed core flow, and that doesn't count the 15 16 recirculation. That counts -- that is the net flow 17 that goes through. And in order to get that vertical 18 line, you have to increase the impact of that flow. 19 You've already got the high quality 20 so you can't produce more steam, 21 think you have to reduce the inlet think. I 22 temperature or increase the pressure, and that's my 23 question. Well, how do you get that change in impact? 24 This is a boiling water MR. CASILLAS: 25 reactor, and, as such, it's entirely controlled by

1	recirculation flow pump flow. It does not
2	MEMBER WALLIS: I think you have a higher
3	exit quality.
4	MEMBER KRESS: That may be. That's what
5	I'm asking. Do you have a higher exit quality, or do
6	you have a lower inlet temperature, or
7	MR. BOLGER: This is Fran Bolger.
8	MEMBER WALLIS: You have a higher exit
9	quality, right?
10	MR. CASILLAS: If you can put the picture
11	up again
12	MEMBER WALLIS: The same flow if you
13	had a lower flow and the same power, you could have a
14	higher quality, because
15	MR. CASILLAS: Exactly. You do.
16	MEMBER KRESS: Well, I thought they
17	already had a high quality, but maybe that's it.
18	MEMBER WALLIS: They have a higher quality
19	than before.
20	CHAIRMAN BANERJEE: So the question
21	relates to the vertical part of that. At a constant
22	core flow, you are getting an increase in power.
23	MR. CASILLAS: Eighty percent.
24	CHAIRMAN BANERJEE: So you have to
25	increase the quality or reduce the temperature, one or

1	the other. There is no other way.
2	MR. BOLGER: This is Fran Bolger. If you
3	are sitting there on that approximately where that
4	arrow points to the MELLLA, and you wanted to move up
5	into that region, the MELLLA+ region, if you withdrew
6	control rods that would allow you to maneuver into
7	that region.
8	MEMBER WALLIS: But you would increase the
9	exit quality by doing so.
10	MR. CASILLAS: Yes.
11	MEMBER WALLIS: Yes.
12	MEMBER KRESS: Okay. Then, it is quality
13	you're changing.
14	MEMBER WALLIS: There is some line up
15	there where you have steam coming out. There is some
16	point, if you went a bit further over there, where you
17	have pure steam coming out.
18	MEMBER KRESS: Yes. How much quality do
19	you have left before you're at 100 percent?
20	MEMBER WALLIS: It would be interesting on
21	this figure maybe when we get into the closed
22	session, you could show us a boundary outside which
23	you cannot get, because, I mean, this adding on little
24	pieces like this presumably is getting to some
25	boundary beyond which you can't

Well, you could keep 1 MEMBER KRESS: 2 embracing the steam temperature. You know, 3 MEMBER BONACA: I had some 4 questions before about margin, and the -- you know, 5 the implication is that you can move in the region and 6 you are not leaving any margin. But in reality, you 7 know, think about the issue of NPSH credit. I mean, 8 you are going in the region -- there is a price to be 9 paid for that. That's one of the issues that we go 10 11 through, and at some point I would like to understand 12 over the next two days what other things are there 13 where there is margin being eaten. You are asking for 14 approval, but it's tough to give you some of the 15 margin to operate at this high power level. 16 Again, you show NPSH credit is just one, 17 I believe, of the issues that is a result of going to 18 120 percent power, or 105. 19 MR. CASILLAS: All of that is --20 MEMBER CORRADINI: May I just ask a 21 question relative to what I heard Mario and Tom and 22 Graham saying? And maybe summarize it this way, is 23 that if you're fixing the inlet temperature and you're 24 fixing the pressure, and you're essentially changing 25 the purple region to allow yourself to reduce flow and

still maintain the same power, outside of the purple 1 2 region there is a region where you do not want to go. 3 And I think at least for illustrative 4 purposes that is what I hear them asking you to 5 identify, given some fixed conditions. Whether you 6 fix inlet temperature or inlet enthalpy and fix 7 pressure, where are your limits? Because I think you 8 are reducing margin. 9 I have no immediate feeling as to where I don't want to cross beyond. And some of it is fuel 10 11 design, some of it is just simply better analysis 12 given a fuel design. And I can't -- I'm trying to 13 unravel how much to partition between those two. that is I think the genesis of a lot of our questions. 14 15 MR. CASILLAS: Let me say, some of the 16 comments to allude normal operating seem to 17 What does the reactor do when it's conditions. operating under normal conditions? But some of the 18 19 other remarks appear to be under certain postulated 20 events, NPSH pressures and so on. And so this is two 21 entirely different aspects of that. 22 The aspect of normal operation as to how 23 do you do and what -- how do you get there, and what 24 happens when you get there, is actually not --25 MEMBER WALLIS: Yes. It would be very

1	useful on this figure to have some kind of a boundary
2	which says, "In normal operation, we couldn't go
3	outside this boundary." In the case of accidents,
4	certain accidents restrict us to being inside another
5	boundary. And then, we could get some idea of how
6	close these things are to those limits. That would
7	help.
8	MR. CASILLAS: And so both of those
9	aspects will be addressed and described in
10	MEMBER WALLIS: Okay. So someone will
11	sketch we'll look for perhaps another sketch on
12	this figure, what those boundaries are.
13	MEMBER BONACA: But clearly, you know, you
14	cannot go out of this figure I mean, you cannot
15	have more power or less than this. I mean, this is
16	your bound. You are staying there. But there is an
17	implication for all of the other systems in the plant,
18	which are not being modified I mean, a number of
19	them are modified, just to accommodate this power
20	change, and a number of them are not.
21	Again, I'm referring, for example, to the
22	pump, to the RHR pumps. I mean, they are not, so,
23	therefore, there you are asking for credit. And
24	before there was a regulatory margin there, and now
25	the NRC grants you for some credit, and, you know,

1 which at times is questionable. 2 What else is out there that is not --3 MR. CASILLAS: And, certainly, increase to 120 power addressed a lot of the capacity 4 issues, and actually MELLLA+ just -- only covers the 5 6 flow, and that affects only a very limited number of 7 But a lot areas, and that's what will be discussed. 8 of the margin has been addressed, just by increasing 9 the power to the 120 rate. 10 MEMBER BONACA: Okay. So we will not hear 11 anything about it until the --12 CHAIRMAN BANERJEE: But, obviously, the 13 flow matters, because imagine you are talking of 14 critical power issue. The flow has an effect on that. 15 MR. CASILLAS: Yes. 16 CHAIRMAN BANERJEE: So in any case, my 17 suggestion is that -- if you all agree, that we defer this discussion until we go into closed session, and 18 19 let them continue to give us the overview right now. 20 I think, though, the point that Professor 21 Wallis made was that this overview should not be too 22 superficial, because we are trying to actually get a 23 picture, which is not going into the details of your 24 technology, but we are trying to get a picture which 25 would convince the public that this is admissible or

permissible or whatever.

And I don't think you are doing a particularly good job in explaining that. So we should need -- you need to do something more convincing about these margins, give a feel for what's going on, without getting into the details. Are we preserving the same margins, or are we not? Give us that sort of feedback.

Are you just sharpening your pencil?

Because at the end of the day, you are subdividing the fuel friction as going up or whatever. So there is other sorts of things that are happening, so we need to get some understanding of how you are coping with that in broad terms. Is that going to be coming in your future slides or not?

MR. CASILLAS: Yes. Yes, all of that is to be addressed. But just to be responsive to the -your earlier comment that we are not providing enough information, certainly the MELLLA+ only involves operating at the already approved power levels, but at reduced core flows.

CHAIRMAN BANERJEE: Right.

MR. CASILLAS: And that is only very small perturbation on that, and the major portion of that is the effect of events that may occur when they are

1	initiated within those boundaries.
2	MEMBER WALLIS: But you can't separate the
3	two. The core flow is there to cool the reactor, and
4	you can't say that it's unimportant. You've got to
5	have enough core flow to do the job. So there is some
6	place where you are limited, and that and you have

are doing, and that the public is secure. And I guess you are going to do that in the closed session. It would be nice if you could put it into words in the open session.

got to somehow give the impression that you are not

getting too close to that limit, and you know what you

CHAIRMAN BANERJEE: Without details, you don't have to give us details, but in rough terms -MEMBER BONACA: You'll do that.

MR. CASILLAS: Yes.

CHAIRMAN BANERJEE: Well, why don't we continue, and then what we do is when we finish -there are a few slides to go through. Maybe some of our questions will be answered there, and then we can --

MEMBER BONACA: One last question. You are going also to address mixed core, right? I mean, cores we already have -- predominantly your 10x10 fuel, but, I mean, because we are going to be

1	reviewing applications for plants that have mixed fuel
2	and
3	MR. CASILLAS: Yes, 9x9, 8x8 fuels.
4	MEMBER BONACA: Okay.
5	MR. CASILLAS: Correct. Yes.
6	MEMBER BONACA: So
7	MEMBER WALLIS: And you are making more
8	plutonium than you make in a present reactor.
9	MR. CASILLAS: Certainly that will that
10	is important, yes.
11	CHAIRMAN BANERJEE: The core is faster in
12	some sense.
13	MEMBER WALLIS: Well, I think those kinds
14	of technical changing this, these are the things
15	which are significantly changed, and this is why it's
16	okay to do it. You could say that in 20 minutes in a
17	public meeting, I think, in a convincing way. But
18	please go on.
19	CHAIRMAN BANERJEE: Well, why don't we
20	continue, then.
21	MS. TRAN: Okay. I just want to talk
22	about the different LTRs that we have to support the
23	MELLLA+ LTR program here. One is the MELLLA+ LTR
24	itself that defines the process and the scope of work
25	for MELLLA+. It is also addressed, identified the

1 area impacted by MELLLA+ and provides the disposition. 2 As part of developing the MELLLA+ program, 3 also developed the stability solution we 4 specifically addressed the concern of 5 because we are open at a higher drop line for MELLLA+, 6 and it's -- we call it the detect and suppression 7 solution confirmation density, or we call it DSS-CD 8 LTR. 9 In support of the DSS-CD LTR, we also 10 provide the NRC with the TRACG DSS-CD LTR. TRACG is 11 the --MEMBER WALLIS: Now, while we are in this 12 13 open session, could you -- you know, there are some interim methods and things here. Could you tell us, 14 15 how much of this technical work has been completed? 16 And how much is sort of promised to be completed? 17 Isn't there some work which is interim? You're asking for an approval with a promise that you will do 18 19 further work, or is all the work completed you need to 20 do? 21 MS. Yes. And I have TRAN: that 22 information actually --23 MEMBER WALLIS: Can you explain that in a 24 public meeting, how much of it remains to be finished? 25 I could provide the MS. TRAN: Yes.

explanation. I have one slide talking about the interim methods, and I could -- right now, what I am trying to give you is the pictures of the LTR that is supported in the MELLLA+ and what they are.

So the TRACG DSS-CD LTR provides the

methodology for the DSS-CD analysis. Those two reports have been reviewed and approved by the staff. However, because it is related to this MELLLA+, and stability is one of the areas impacted by the high -- we are going to have a presentation to provide the ACRS member with the information for DSS-CD and the TRACG support in that document.

And as part of working on the MELLLA+ program, we also do review of the methodology that we have in-house to make sure that our methodology can support the MELLLA+ application. As part of the NRC review of the methodology that we have done internally by GE, the NRC has a number of questions, and we identified some of the areas that we need to provide some additional information.

We have worked with the NRC on what we call an interim methods approach that would help to facilitate the review and approval theme of the MELLLA+ LTR, and into interim until we -- GE can provide further data that will support the conclusion

1 that we have initially based on the work that we have 2 done by GE. 3 We will have a complete discussion of 4 these methods LTR at -- by tomorrow on the closed 5 session. Let's go to the MELLLA+ LTR itself. 6 7 we look at the MELLLA+ program, we essentially look at 8 the -- address all of the scope of work that we have 9 reviewed as part of the EPU program. Every aspect of 10 the plans we essentially go and review all of that to 11 make sure that the safety of the system and the plan 12 evaluation will confirm that the effects of MELLLA+ operating still support the implementation of MELLLA+. 13 for a plant. 14 15 should be noted, as we discussed 16 before, that the MELLLA+ program expanded from the --17 as an increment change to the EPU program, it is not 18 a -- go into an EPU and then go into a MELLLA+ at the 19 What we recommend and supported our same time. 20 customer would be to do an EPU, get that EPU license, and then request for a license change of the MELLLA+ 21 22 program. 23 So the MELLLA+ program doesn't really 24 change the maximum thermal power or the maximum core 25 And, thus, the effects of MELLLA+ are flow rate.

1	limited to only the NSSS system, and primarily due to
2	the core and the reactor internals performance during
3	postulated events and the accident event.
4	I'll follow the EPU topic step and
5	address. We look at all of the aspects and
6	MEMBER WALLIS: Now, can you in the open
7	session say, when you evaluate the reactor core and
8	fuel performance and the safety performance, that
9	these conditions that you haven't operated these
10	plants at before, is this only a theoretical
11	prediction, or have you done experiments to verify
12	that at these new conditions things will be okay?
13	Is it only a theoretical prediction, or
14	have you done experiments to show that, at the new
15	conditions, things will be okay? Or is the experiment
16	going to be performed in a reactor, operating reactor?
17	MS. CAMPBELL: That's some of our followup
18	actions for the final
19	MR. CASILLAS: Yes. Yes.
20	MEMBER WALLIS: Yes or no? I mean
21	MR. CASILLAS: No. There is the
22	essentially, what we will be able to show is that in
23	when you operate in the MELLLA+ area, you are
24	really not introducing any new phenomena that has not
25	been addressed by test or predictions to

1	MEMBER WALLIS: So you're saying that the
2	tests have already been done previously in some other
3	context?
4	MR. CASILLAS: Yes.
5	CHAIRMAN BANERJEE: So, for example, with
6	critical heat flux, you have then tested full-scale
7	10x10 boundaries. Where did you do that? Will you
8	discuss those?
9	MR. CASILLAS: That was
10	CHAIRMAN BANERJEE: At the lower flows?
11	MR. CASILLAS: Correct. Yes.
12	CHAIRMAN BANERJEE: You will be discussing
13	that.
14	MR. CASILLAS: Yes.
15	CHAIRMAN BANERJEE: Well, that's the
16	operating region.
17	MR. CASILLAS: Correct.
18	CHAIRMAN BANERJEE: This is not a
19	prediction of a code. This is a real experiment.
20	MR. CASILLAS: Correct.
21	CHAIRMAN BANERJEE: Okay.
22	MEMBER WALLIS: So you can reassure the
23	public that the conditions of operation have been
24	tested experimentally?
25	MR. CASILLAS: Yes.

1	CHAIRMAN BANERJEE: Under normal operation
2	anyway.
3	MEMBER WALLIS: Normal operation, yes.
4	MEMBER ABDEL-KHALIK: Excuse me. Just a
5	follow up to Dr. Wallis' question. Where has the
6	stability been demonstrated experimentally for
7	operation in the MELLLA+ region?
8	MR. CASILLAS: That is going to be also
9	presented.
10	MEMBER ABDEL-KHALIK: Okay. In the closed
11	session?
12	MR. CASILLAS: Yes.
13	CHAIRMAN BANERJEE: So there have been
14	experiments in a facility. Oh, excuse me.
15	MEMBER ABDEL-KHALIK: You can say that
16	in the open session, that stability of operation
17	within the MELLLA+ region has been experimentally
18	demonstrated without giving details.
19	MR. CASILLAS: Well, how we would qualify
20	that demonstration will be explained in the closed
21	session. And I don't think we can elaborate on how we
22	demonstrate the stability performance and the
23	acceptable of the of the systems that are part of
24	the MELLLA+ to mitigate some of these events, unless
25	we get into the technical details, which we'll be

1 doing in the closed session. 2 CHAIRMAN BANERJEE: So in answer -- direct 3 answer to Professor Abdel-Khalik's question, 4 haven't directly done experiments to verify this. 5 are using some combination of experiments and 6 analysis. That is what I read from your answer. Ιt 7 is almost like Greenspan talk. 8 (Laughter.) 9 I don't understand most of what you say 10 about this. MR. CASILLAS: Well, if you look at the 11 12 operating -- at the operating map that we 13 expanding, the characteristics in that operating map are not any different from the remainder of the 14 15 operating map. Now, there are some new conditions 16 that you may encounter as a result of some postulated 17 events, and that is the subject of the safety But the conditions that you will be 18 analysis. operating are not -- are not any different than what 19 20 you have --21 CHAIRMAN BANERJEE: But they are not 22 outside of your experimental --23 MR. CASILLAS: Correct. 24 MEMBER WALLIS: But they are inside where 25 you are now in your plants. Otherwise, there wouldn't

	be a purple region. I mean, it shows that you are in
2	a different region of operation than you are now in
3	the plants.
4	MR. CASILLAS: Well, we have we have
5	specified limitations for operation in that region,
6	such that we will retain the we are within the
7	experience base that
8	MEMBER WALLIS: But it's not a plant
9	experience base. It has to be an experimental
10	facility base or something? And the plants haven't
11	been operating in the purple region, have they? Or
12	have they accidentally operated in the purple region
13	and given you data?
14	MR. CASILLAS: No, we are talking about a
15	lot of different areas. There's normal operation, and
16	then there is stability margins.
17	MEMBER WALLIS: I guess it's all part of
18	the same question. I mean, how much of your going
19	into the purple region is supported by experiment, and
20	how much of it is supported by theory?
21	MR. CASILLAS: Yes. And I think the
22	question that was raised had to do specifically with
23	stability.
23 24	stability. MEMBER WALLIS: Well, that was the second

1	MR. CASILLAS: And with respect to the
2	stability, the stability margins, and why it
3	represents it's part of our experience base, and
4	why it's acceptable will be all presented in
5	MEMBER WALLIS: But we won't know the
6	experiment until it happens in a plant? We won't
7	know
8	MR. CASILLAS: Oh, no, no, no. That's not
9	what I said.
10	MEMBER WALLIS: won't get data until it
11	happens in a plant?
12	MR. CASILLAS: No. No, that's not I
13	think all those questions will be addressed when
14	CHAIRMAN BANERJEE: But, I mean, to give
15	a direct answer to that, have you had experiments that
16	have been done in that purple space or not? I mean,
17	that's really I mean, his question relates to
18	stability. Some other questions relate to some other
19	issues. But it's whether in that operating region
20	there is there are applicable experiments. That's
21	really what the or is it all analysis, which is
22	supported by experiments under different conditions?
23	Do you have experiments, or not? That's
24	MR. KINGSTON: We can ask Dr. Andersen to
25	respond to that

	MR. ANDERSEN: This is Jens Andersen
2	again.
3	CHAIRMAN BANERJEE: We can't seem to get
4	the answer.
5	MR. ANDERSEN: When we develop, and as I
6	had alluded to before, it is primarily the performance
7	of the fuel that is allowing us to go to these power
8	uprates. When we develop a new fuel product, we do
9	extensive testing of the fuel, and we test it way
10	beyond the boundaries that are shown in the power flow
11	map.
12	So we have data that bounds the possible
13	range where the fuel can operate. And when we get to
14	the closed session, I'll be happy to show you some of
15	that.
16	CHAIRMAN BANERJEE: Okay. So you have
17	experiments.
18	MR. ANDERSEN: Yes.
19	CHAIRMAN BANERJEE: That's the direct
20	answer.
21	MR. ANDERSEN: Yes.
22	CHAIRMAN BANERJEE: All right.
23	MEMBER WALLIS: An answer of yes a few
24	minutes ago would have been good.
25	MR. ANDERSEN: Right.

1	(Laughter.)
2	CHAIRMAN BANERJEE: We will hold you to
3	that, Jens.
4	MR. ANDERSEN: Okay.
5	CHAIRMAN BANERJEE: Both stability and
6	MR. ANDERSEN: I hope I can satisfy you.
7	All right.
8	MS. TRAN: So the scope of the MELLLA+
9	program that we defined consists of looking at the
10	applicable fuel performance area, including fuel
11	thermal limits instability, so it's some of the
12	example. We also looked at the core cooling and
13	connected system to confirm the acceptability of the
14	MELLLA+ to the system. And the engineering safety
15	features will address the impact of MELLLA+ on
16	containment, on ECCS system, and standby gas
17	treatments and other engineering safety features.
18	On the instruments, patient and controlled
19	setpoints, we look at the impact of MELLLA+ on the
20	MEMBER WALLIS: I'm sorry. You've got a
21	long list here, but some of this you don't do, you
22	leave it up to the plant. The plant has to do a
23	plant-specific analysis of some of these things, and
24	we don't get to see that yet.

MS.

TRAN:

25

This MELLLA+ LTR program

1 defined the process and the scope of the work. 2 MEMBER WALLIS: But you talk about 3 connected systems, and a connected system core coolant 4 involves also, say, NPSH of the core spray pumps, 5 right? That's a connected system and a safety feature 6 and all that. 7 MS. TRAN: Yes. 8 And this is something MEMBER WALLIS: 9 which you are not going to talk about, I think, 10 because it is going to be left up to the plant to 11 Each plant has to show that that's okay. 12 MS. TRAN: Yes. A plant-specific --13 MEMBER WALLIS: So there are some features 14 of this that are very plant-specific, which we are not able to review at this time. 15 16 MS. TRAN: A plant-specific application 17 In the closed will perform all of the analysis. 18 will provide additional session, we willΙ 19 information. 20 MEMBER WALLIS: This is one of 21 difficulties I think we are going to have is that we 22 are going to be asked to approve something, but part 23 of the package isn't there yet, but it has to be done 24 by each plant independently. 25 We do have a demonstration MS. TRAN:

1	calculation that we perform, and it
2	MEMBER WALLIS: Are you going to show us
3	those?
4	MS. TRAN: Yes, we will show it to you at
5	the closed session.
6	MEMBER WALLIS: Thank you.
7	CHAIRMAN BANERJEE: So you will at least
8	separate for us what is plant-specific and what is
9	not
10	MS. TRAN: Yes. Yes. I will go into
11	CHAIRMAN BANERJEE: so we can
12	understand that.
13	MS. TRAN: That's correct. This is to a
14	summary of the scope of work that we have identified
15	that the plants will have to be looked at during the
16	applications.
17	CHAIRMAN BANERJEE: For example, if you
18	need containment overpressure credit, this would be
19	specific to the plants, right?
20	MS. TRAN: That will be plant-specific.
21	MEMBER WALLIS: But if it turned out that
22	MELLLA required a very large containment overpressure
	MELLLA required a very large containment overpressure from any typical plant, I think we ought to know that.
22	

1	impacted by MELLLA+ will be evaluated and completed on
2	a plant-specific application. At this time, we do not
3	have any MELLLA+ plant-specific applications submitted
4	to the staff.
5	MEMBER WALLIS: Well, no. We have Vermont
6	Yankee here, and we had a long discussion about the
7	containment overpressure.
8	MR. BOLGER: This is Fran Bolger. The
9	NPSH situation is not exacerbated by MELLLA+.
10	MEMBER WALLIS: I think it is. I think I
11	read it in their well, we'll get to that in the
12	specific thing when this seemed to be exacerbated
13	in the report I read, that
14	MR. CASILLAS: That is correct. I think
15	what we are trying to say is that all of the areas
16	that could be impacted in the reactor design areas
17	have been reviewed, and we have we have summarized
18	those areas which are actually impacted or affected
19	by MELLLA+.
20	MEMBER WALLIS: Well, let's take Vermont
21	Yankee. I understand Vermont Yankee I want to ask
22	you this question. Can I ask you I'm sorry. I
23	want to get back to my question, because you don't
24	seem to be focusing on it.

When Vermont Yankee was here, we spent a

1	long time on containment overpressure. Now, they
2	conceivably can go into this MELLLA+ region if the NRC
3	approves it.
4	MR. CASILLAS: Yes.
5	MEMBER WALLIS: And they can come back
6	with another request for containment overpressure,
7	presumably. Now, we'd like to know before I think
8	I'd like to know before I approve MELLLA+ what kind
9	of, you know, problems I'm going to have when
10	something like Vermont Yankee comes in and wants to
11	use it.
12	MR. CASILLAS: Yes. But you're assuming
13	that there will be additional overpressure
14	MEMBER WALLIS: Well, I think I read
15	something like that in one of these things that we're
16	going to talk about in the closed session.
17	MR. CASILLAS: And that is
18	MEMBER WALLIS: That will be clarified
19	then.
20	MS. TRAN: We will provide a discussion of
21	the containment in
22	MEMBER WALLIS: Well, not only a
23	discussion. You will give us some numbers, will you?
24	MS. TRAN: Yes. We have some calculations
25	that

1	MR. CASILLAS: Yes.
2	MS. TRAN: we performed for some of our
3	the actual
4	MEMBER WALLIS: See, it may well be that
5	you'll reassure us perfectly in the closed session.
6	MR. CASILLAS: Yes.
7	MS. TRAN: Yes.
8	CHAIRMAN BANERJEE: That's why we should
9	get through this and
10	MEMBER WALLIS: I'm sorry. I'm
11	CHAIRMAN BANERJEE: No. I think these are
12	good questions to flag. So
13	MS. TRAN: So, essentially, this is a list
14	of all of the aspects of the plants that we have
15	reviewed for the generic program as well as
16	identifying the plant-specific scope of work that
17	needs to be completed on a plant-specific application.
18	And also, confirmation
19	MEMBER WALLIS: But this thing, it doesn't
20	ensure that the limits are met for plant-specific
21	application, because some things require additional
22	plant-specific analysis.
23	CHAIRMAN BANERJEE: Yes. There is
24	confusion between what you are asking for approval for
25	and what is plant-specific, clearly.

1	MEMBER WALLIS: And we understand that the
2	fuel
3	CHAIRMAN BANERJEE: There are generic
4	aspects.
5	MEMBER WALLIS: the fuel loading
6	analysis is all plant-specific. The fact that you can
7	actually implement this is left up to the plant
8	MS. TRAN: Yes.
9	MEMBER WALLIS: because they have
10	this fuel loading becomes a very critical matter.
11	MS. TRAN: That's correct. The LTR
12	provides the process and the road map for a plant-
13	specific application. What we view as
14	MEMBER WALLIS: But this seems to leave an
15	awful lot up to the plant.
16	MS. TRAN: Well, we do have a
17	demonstration calculation to provide the disposition
18	of our assessment on the impact of MELLLA+ on each
19	aspect of the plan. We do have the actual calculation
20	that we will provide in the closed session.
21	MR. CASILLAS: Yes, but it's less than a
22	half a dozen areas that are specifically that need
23	to be specifically addressed on the plant-specific
24	application. All the other two dozen areas are
25	described in the generic process, such that you do not

1	you do not have to rereview those when you do the
2	plant-specific only the areas which are critical to
3	the plant application.
4	And for those areas that are critical, we
5	will present you results of the studies that have been
6	done and the very clear formulas that will be
7	addressed in the plant-specific in the criteria that
8	it must meet.
9	CHAIRMAN BANERJEE: This is today you
10	are going to do that?
11	MS. TRAN: Yes, within today.
12	CHAIRMAN BANERJEE: And tomorrow
13	MS. TRAN: This afternoon.
14	CHAIRMAN BANERJEE: what is the
15	MS. TRAN: Tomorrow focus on the
16	discretional method.
17	CHAIRMAN BANERJEE: Methods.
18	MS. TRAN: Yes.
19	CHAIRMAN BANERJEE: And today you'll show
20	us some calculations.
21	MS. TRAN: That's correct.
22	CHAIRMAN BANERJEE: So why don't we
23	continue, then.
24	MS. TRAN: Yes. And let's go to the next
25	slide where we said that the MELLLA+ LTR is

1	actually defines the process for a plant-specific
2	application to ensure that the design, the regulatory
3	and licensing limits are met for plant-specific
4	application.
5	And it allows the more efficient NRC
6	review on plant-specific application, because it is
7	already defined what plant-specific analysis needs to
8	be completed for an application. This doesn't mean
9	that it's an LTR provided any plant can go and
10	implement MELLLA+. It only defined the scope of work
11	for each plant-specific application.
12	MEMBER WALLIS: Are you going to explain
13	to us how it enables us to be more efficient?
14	CHAIRMAN BANERJEE: I think that's
15	MEMBER WALLIS: I think it's that's a
16	bold statement, that you're going to make the NRC more
17	efficient. Let's move on.
18	MR. CASILLAS: Again, it was what I
19	tried to summarize is that in the plant-specific we
20	will identify, as part of this LTR process, the
21	reduced that it's important for the plant-specific
22	application only, and that is where the efficiency is
23	about. But we will not go back and review all of the
24	potential areas that are not affected.
25	MEMBER WALLIS: Thank you.

1	MS. TRAN: And let's talk about the
2	Methods LTR Rev 0. The Methods LTR Rev 0 provides a
3	licensing basis for applicability of GE methods for
4	what I would call the near-term licensing application.
5	It addresses NRC questions. And as I mentioned
6	earlier, when we performed the work for the generic
7	MELLLA+ LTR program, we reviewed our codes and
8	methods, assured that it could it's applicable for
9	MELLLA+ application.
LO	And because the NRC raised some questions,
L1	we worked with the NRC to ensure that we provide the
L2	additional margins to the set the limits in an
L3	interim until we can provide the NRC with the
L4	additional measurement data, until such time this LTR
L5	will provide the process and the scope of work and the
L6	information each plant-specific application on MELLLA+
L7	and EPU would need to provide to the staff for their
L8	application.
L9	MEMBER ABDEL-KHALIK: Could you please
20	elaborate? What does that mean? Including additional
21	margin at interim basis what does that mean?
22	MEMBER WALLIS: Are these the .02 and .03?
23	Is that the ones you need?
24	MS. TRAN: Yes. These are the .02 and
25	.01, added to the

1 MR. CASILLAS: Fuel operating limits. 2 Yes, fuel operating limits. MS. TRAN: 3 MR. CASILLAS: That will be in excess of 4 those calculated with our current methods. 5 MEMBER ABDEL-KHALIK: I understand that. 6 MR. CASILLAS: Yes. 7 MEMBER ABDEL-KHALIK: But what does the 8 statement mean -- "including additional margins as 9 interim basis mean? 10 MS. TRAN: We meant that we -- it is our 11 intent as part of the MELLLA+ program and the review 12 of the methods, we plan to submit to the staff the 13 additional information that the staff was having 14 questions. We intended to provide this data as soon 15 as possible, so that we could justify that the 16 original work that we've done, reviewed by the NRC, 17 that our codes and methods are applicable to MELLLA+ 18 without the additional margin, so that we 19 essentially remove the margin that is now being imposed on our -- on the plant-specific application. 20 21 CAMPBELL: This relates to the MS. 22 limitations and conditions, and we are going to have 23 those as an interim application until such time that we come back to the NRC with additional information. 24

And those are all identified, and we've interacted

2 need and all that --3 MEMBER WALLIS: This is one of the things 4 we talked about earlier, that there are some things 5 that you have not yet completed. We have to perhaps 6 have the faith that you are going to do it right. 7 MS. CAMPBELL: There are some confirmatory 8 data. We'll be talking about that. Brian Moore is 9 going to address that. 10 MR. MOORE: This is Brian Moore from GE. 11 During the review on the methodology capability, 12 concerns were raised by the staff on the particular areas which formed the validation bases. 13 14 entered into a procedure of basically expanding the 15 uncertainties to address those regions, resulting in 16 additional margin, to cover the concern, basically 17 taking a very conservative approach in our standard 18 licensing methodology framework to introduce basically 19 a buffer that would allow the NRC to go forward, 20 basically introducing padding to address the NRC concerns specifically related to each area. 21 22 MEMBER ABDEL-KHALIK: The big picture --23 you are not adding margin. This whole process takes 24 away margin. 25 MS. CAMPBELL: Well, we are limiting where

with the NRC on what additional information they will

1 we go with these limits. 2 CHAIRMAN BANERJEE: I think it's just the 3 wording here. 4 If I may, one of the -- the MR. MOORE: 5 BWR is the limits -- the thermal limits are not based 6 on the core power and flow. They are based on the 7 bundle power that relates to critical power, the fuel 8 rod performance which relates to the linear heat 9 generation rate, and basically the stored energy, 10 which rolls to LOCA. 11 And so you can say you're going into a power flow map that we have not seen before, but 12 13 ultimately the speed limits are based on those fundamental categories. 14 So when we introduce 15 additional margin, we are introducing it specifically 16 on the safety limit MCPR, and the operating limit MCPR, which address, you know, basically just the 17 18 bundle critical power flow ratio. MEMBER WALLIS: I think we'd like to know 19 20 how close you are to those limits. In other words, what is the margin? 21 22 MR. CASILLAS: Okay. 23 MEMBER WALLIS: And I noticed in the --24 that you are promising to treat uncertainties with a 25 95/95 or 95 percent confidence that you -- 95 percent

1	you are in the 95th percentile. That's a very
2	stringent requirement. Are you really going to be
3	able to do that for us on
4	MR. CASILLAS: We are not changing any of
5	that. It's the same as what we
6	MEMBER WALLIS: You have to have a lot of
7	data to get to that sort of confidence in probability.
8	MR. MOORE: If I may, the specifics of
9	that are part of the interim methods LTR, and the
10	procedure by which we've done that we'd like to
11	maintain is closed information.
12	MEMBER WALLIS: Yes. But I think that you
13	could reassure the public that the method that you
14	promise to use is a very stringent one.
15	MR. MOORE: That is correct.
16	CHAIRMAN BANERJEE: Let's go on.
17	MS. TRAN: I think that's
18	CHAIRMAN BANERJEE: That's it?
19	MS. TRAN: that's the end of the
20	presentation.
21	CHAIRMAN BANERJEE: Well, I also, you
22	covered the topical report content summary in this or
23	you
24	MR. CASILLAS: Right.
25	CHAIRMAN BANERJEE: have something more

1	to say about that?
2	Okay. So, then, thanks very much, and I
3	will ask the NRC staff, then, to come. And we get
4	back into a discussion of this as a closed session,
5	then
6	MS. CAMPBELL: Yes.
7	CHAIRMAN BANERJEE: after the break.
8	MS. ABDULLAHI: Maybe I can sit here,
9	so
10	CHAIRMAN BANERJEE: We would rather look
11	at you than Corradini.
12	(Laughter.)
13	MR. CARUSO: We can't hear you, Mike.
14	MEMBER WALLIS: Could you please get Mike
15	Corradini on the phone properly? We can't hear him.
16	Don't make it deafening.
17	MEMBER CORRADINI: I was following most of
18	this, trying to be quiet since we're in open session,
19	but then somehow I went totally dark.
20	CHAIRMAN BANERJEE: Oh. You didn't hear
21	the last part of it, or what happened?
22	MEMBER CORRADINI: The last few minutes,
23	but that's all right. Ignore that. Just I'm
24	following.
25	CHAIRMAN BANERJEE: All right. So we'll

1	be back into closed session after the break, so
2	MR. CARUSO: We're still in open session.
3	CHAIRMAN BANERJEE: We're still in open
4	session. Okay. Please. I'm noticing we're running
5	half an hour behind. We're running a little bit
6	behind time, so
7	MEMBER WALLIS: We've seen that before.
8	CHAIRMAN BANERJEE: Yes. It will just
9	mean that we go up to 7:00 this evening rather than
10	6:00.
11	MS. ABDULLAHI: Hi. I'm Zena Abdullahi.
12	I'm the lead reviewer for MELLLA+ and methods. This
13	review was done with a lot of ORNL staff and also BNL
14	staff. There have been also many NRC staff that are
15	not presenting today that have contributed to it, and
16	I just want to mention that some of the staff members
17	are Tony Nakanishi, Len Ward contributed some work to
18	it, Paul Clifford, and I just want to say that the
19	work the fact that we are presenting these things
20	doesn't mean that we are the only people who worked on
21	it.
22	CHAIRMAN BANERJEE: Are some of them here?
23	MS. ABDULLAHI: Tony Nakanishi is right
24	CHAIRMAN BANERJEE: I don't see Len Ward.
25	Is he here?

MS. ABDULLAHI: No, he is not. He will be 1 2 here tomorrow for the methods. 3 CHAIRMAN BANERJEE: 4 MS. ABDULLAHI: And Paul Clifford, who 5 helped with the thermal mechanical. Plus, we had ORNL 6 and BNL. 7 I would like to start out in this opening 8 session that the NRC staff did find the steady 9 progression of BWR operating conditions, or we were 10 cognizant of that, and with the MELLLA+ we were 11 worried and spent a lot of energy and time trying to 12 assure ourselves that it is feasible and possible to 13 operate under these conditions. What we also did is we tried to 14 15 confirmatory analysis. Now, I'm not talking on the 16 slide yet, so I'm just giving you an overview of the 17 issues that I heard you discussing with GE. We try to 18 do confirmatory analyses, and now what are 19 approving is Rev 2. 20 Now, we were not reviewing these topical reports since 2002 steadily, but there has been a 21 22 progression of times where things had to be done and it was put on hold until something is done, plus the 23 24 priorities of staff.

So I just want to emphasize that we have

reviewed, we looked at it, and there are a number of limitations and a number of agreements in which we have placed on this operating condition in order to assure ourselves and the public, as a representative of the public as well, that we would be able to -- the plants will operate safely and meet the requirements -- the regulatory requirements.

MEMBER WALLIS: If I were a member of the public, and I noticed the number of limitations and conditions, I would say, "Why do they do it this way? Why don't they just wait until GE has finished the job, and then approve it?" Why do you say it's sort of okay with all these conditions? Why don't you make GE make the conditions go away and then approve it?

MS. ABDULLAHI: I probably need some explanation. I know where you're coming from, and I do understand that. I would like to point out that, for one, the limitations don't always mean that something has to be -- limitations have a couple of roles. One role of the limitation is to ensure that an important change in calculation or the number of calculations you do, it's sort of an emphasize for future users of this topical report. So that's one purpose of limitation.

The second purpose of a limitation is

1 where we are -- their information that we would like 2 like margins, what we call the adders or the 3 penalties some people call it, that you add, and those 4 you want to document it right there also for your users as well as make it clear this is what needs to 5 6 And it's sort of a legal way of making it 7 done. The third aspect is -- and which is what 8 9 you're asking me is, well, why don't you wait until 10 you finish -- they finish all the work. Well, if you 11 really look at it, we also looked at this topical 12 report and the methods. And the methods is actually 13 applicable to EPUs, and plants with EPUs are operating 14 today with EPUs. 15 So when you review something, you 16 basically look at it, see the safety significance of 17 it, and then you come to a conclusion on what -- would 18 this additional change make it more acceptable? 19 call it reasonable assurance. Well, give me the 20 reasonable assurance. 21 Now, it doesn't mean that the GE, if we --22 we have to have a commitment, we won't let them --23 they would have to meet those commitments as well. 24 just -- because of that Okay. Ι 25 discussion, I felt I had to say this.

1 Now, this is the power flow map, and you already saw it. Now, the difference between this one 2 3 -- where are you? You don't have that one? 4 Again, this is the two LTRs and the EPU and how they 5 interconnect together. The MELLLA+ topical report is 6 interconnected by the state -- supported by the 7 stability topical report, which is supported by the 8 DSS-CD topical report. 9 For instance, some of the improvements or 10 worries that people had about MELLLA+ is the reason 11 that DSS-CD is being used to support it. Okay? 12 MELLLA+ -- for instance, you cannot use option 3 as of 13 now, as it stands. Okay? So these are some of the 14 improvements that have gone into it. 15 interim method goes into --The it 16 supports the EPU and MELLLA+ plant-specific 17 applications. 18 MEMBER ABDEL-KHALIK: So let me just try 19 to understand this process. As a part of this review, 20 did you go back and look at the TRACG report, that 21 33147P? 22 MS. ABDULLAHI: This is specific 23 application that came in and was reviewed and approved 24 by the staff. And I will let Jose explain it. It is 25 only for DSS-CD.

	MR. MARCHE-LUEBA: The answer is yes.
2	Yes, that report was reviewed and approved.
3	MEMBER ABDEL-KHALIK: Previously.
4	MR. MARCHE-LUEBA: During the DSS-CD
5	review, as part of the DSS-CD review, which has
6	already been completed and issued, the application
7	for the DSS-CD application, we needed to approve some
8	calculations performed by TRACG to demonstrate that
9	the DSS-CD performs. And we found out TRACG had
10	was not approved for that application, so we required
11	them to submit a qualification report for that
12	application.
13	CHAIRMAN BANERJEE: So it's a specific
14	application approval, correct?
15	MR. MARCHE-LUEBA: Correct.
16	CHAIRMAN BANERJEE: It's not a blanket
17	approval.
18	MR. MARCHE-LUEBA: It's not a blanket
19	approval, and you will see in the closed session a
20	slide that has all of the specific applications where
21	TRACG is allowed to be used, and there is more than
22	you probably know. These are
23	CHAIRMAN BANERJEE: Well, you are saying
24	it's acceptable, but it's not approved.
25	MR. MARCHE-LUEBA: Approved. It's

1	approved.
2	CHAIRMAN BANERJEE: Approved.
3	MR. MARCHE-LUEBA: Approved.
4	MS. ABDULLAHI: This one.
5	MR. MARCHE-LUEBA: There are at least five
6	different TRACG SERs for specific applications like
7	this one.
8	CHAIRMAN BANERJEE: Okay.
9	MEMBER WALLIS: Would you say what you
10	mean by the word "interim" in there or what you
11	understand by the word "interim" in that
12	MS. ABDULLAHI: Yes, that's a good
13	question.
14	MEMBER WALLIS: right-hand side there?
15	MS. ABDULLAHI: Yes. The term we have
16	reviewed what was generally called at the time generic
17	topical generic methods, referred to as generic
18	methods, and at that time we reached the conclusion
19	that additional validation data would be useful and
20	good to we would need additional validation data.
21	So this interim method stems from the fact
22	that in order to in lieu of those additional
23	validation data, they will take a penalty, or they
24	will take additional uncertainty increases. And that
	1 1 2 2 5 5

is the difference between interim and generic.

1	MEMBER WALLIS: Have you spelled out
2	MS. ABDULLAHI: Let me ask hold on. Am
3	I going into proprietary?
4	MEMBER WALLIS: Have you spelled out what
5	they need to do in order to move from interim to
6	final? Have you spelled out the requirement in some
7	way?
8	MS. ABDULLAHI: Well, this is one of the
9	things that the interim will the limitation do is
10	they tell you in the SE it explains what is missing
11	and what we expect to achieve. Now, have we sat down
12	and wrote to them exactly the details? We have not in
13	this case. But it's very apparent. It is known what
14	needs to be done. And they are in progress, and they
15	have given us a presentation of where they are.
16	MEMBER WALLIS: A draft of a thesis where
17	you say it looks okay but you've got to do all of
18	these various things before we'll sign it?
19	MS. ABDULLAHI: No. It's different. It's
20	basically data that they are in progress of doing it.
21	They made a commitment, an official letter commitment
22	that they will do those datas, and they are providing
23	those information.
24	Now, I do not know if I'm crossing the
25	line into proprietary and non-proprietary.

1 CHAIRMAN BANERJEE: Well, let's take a 2 broader question here, then. But look at it this way. 3 I guess you are -- you want an ACRS letter at the end 4 of the day, right? 5 MS. ABDULLAHI: Yes. Which will come in 6 CHAIRMAN BANERJEE: 7 front of the full committee in June and --8 MS. ABDULLAHI: Right. 9 CHAIRMAN BANERJEE: -- we will report to 10 the subcommittee, of course, but the reason this is 11 happening is for Hope Creek, I presume, at this time, 12 right? So have things been resolved sufficiently that 13 the staff now feels that this method is -- I mean, I 14 want a broad view of this -- to be taken forward to 15 the full committee for approval and then to apply it 16 to Hope Creek? Or at least so that we can consider 17 Hope Creek under this methodology? MS. ABDULLAHI: I think that I do believe 18 19 that, yes, there is a sufficient understanding in 20 which now we can go forward with the methods and apply 21 it to Hope Creek. 22 MEMBER WALLIS: There's an assumption that 23 this additional data which GE is going to acquire is 24 going to validate these interim methods. That seems 25

to be an assumption.

MS. ABDULLAHI: Well, it's really -- the 1 2 way I look at it it's slightly different. saying, okay, we will put an additional margin on 3 these safety limits, regulatory limits. What matters 4 5 down the stream and make sure that you meet, you know, GDC-10, okay? On the other hand, the vendor, or GE in 6 7 this case, will be getting additional data. 8 of an opinion that they are fine, that they are -- you 9 know, that they have good enough methods. So this is 10 part of the review process that you go through. 11 So if we give them back -- if they will --12 they send us a commitment, they said they will do it. 13 Now, they have started it. They have put in a --14 given us several presentations in which they have 15 shown us that data. And so it's not something that is 16 actually long-term, and I think you can look at it 17 from another side. It's some --It seems like he was 18 MEMBER WALLIS: 19 talking, but we can't hear him. Is that right? This is Greg Cranston. 20 MR. CRANSTON: 21 want to just interrupt for a second in conjunction 22 with Hope Creek. Hope Creek is proceeding along for 23 EPU and the MELLLA+, but it is not contingent upon 24 approval of anything that is happening here today. 25 We are moving in a parallel path, and we

1	are approaching this on a plant-specific basis at the
2	same time using the methods that are described in
3	these topicals. But if for some reason there are
4	still some open items or issues of concern, Hope Creek
5	will still proceed and we'll be reviewing it on a
6	plant-specific basis.
7	So, and we have alerted them to that fact,
8	so that they are not held up schedule-wise should
9	there be any issues that we need to further pursue.
10	CHAIRMAN BANERJEE: Right, because I think
11	you can't assume that there won't be some issues.
12	MR. CRANSTON: Yes. Correct.
13	CHAIRMAN BANERJEE: Right.
14	Can we continue on approval of everything?
15	MS. ABDULLAHI: No. No, we Vermont was
16	the case Vermont was a case of
17	CHAIRMAN BANERJEE: Vermont was just an
18	EPU.
19	MS. ABDULLAHI: Right.
20	CHAIRMAN BANERJEE: It was not MELLLA+.
21	MS. ABDULLAHI: No, no. Vermont EPU had
22	a method. It was a plant-specific method. The
23	interim method is sort of a parallel of Vermont
24	Yankee. Now, I don't know what exactly where I was
25	in the question you asked but if I can proceed

1	CHAIRMAN BANERJEE: When is the Hope Creek
2	power uprate subcommittee meeting set for, then, right
3	now?
4	MR. CARUSO: August.
5	CHAIRMAN BANERJEE: August?
6	MR. CARUSO: August. It has moved to
7	August.
8	CHAIRMAN BANERJEE: Okay. Carry on.
9	MS. ABDULLAHI: I don't know if I answered
10	the last question, but what
11	CHAIRMAN BANERJEE: I think it's
12	sufficient.
13	MS. ABDULLAHI: Yes, okay. Yes, there is
14	an incentive. When you put a margin uncertainty
15	when you put a margin on certain parameters, nobody
16	wants to keep that extra margin, so there is incentive
17	to get the data and move forward.
18	If we go to slide I guess 3, what we
19	intended to do is define what MELLLA+ operation
20	entails, establish some of what we consider to be
21	significant impacts on fuel-dependent analyses, and
22	present some of our bases for safety finding. And
23	tomorrow what we want to do is support EPU and MELLLA+
24	application, discussing significant methodology topics
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reviewed, and present bases for the staff safety

1	findings.
2	Of course, you saw this power flow map,
3	and
4	MEMBER WALLIS: I haven't seen this. But
5	I haven't seen this red point before.
6	MR. MARCHE-LUEBA: Yes, that's right.
7	MEMBER WALLIS: What is that red point up
8	there?
9	MR. MARCHE-LUEBA: This is Jose Marche-
10	Lueba. Develop we've talked in previous meetings
11	about the rod lines. This is the 100 percent rod
12	line, which approximates what the reactor will do when
13	you change the flow. If you start on 100 percent
14	power, 100 percent flow, and you change the
15	circulation flow slowly so that you maintain the
16	equilibrium, you will follow this line approximately,
17	because every day on Tuesday you have a different
18	coefficient than on Wednesday. So there is a margin
19	around it.
20	The MELLLA+ line, it was called now, if
21	you extrapolate it to 100 percent flow it will heat
22	132 138 percent power. So MELLLA+ operation is at
23	the 138 percent rod line.
24	CHAIRMAN BANERJEE: So, Jose, can we
25	expect with further subdivision that one day they will

	Come to 138, and then they will go this way?
2	(Laughter.)
3	And then, drop off?
4	MR. MARCHE-LUEBA: That's for the industry
5	to say, but I think it would be very expensive to get
6	there.
7	MEMBER WALLIS: But not only that, Jose,
8	they have a higher flow. I mean, they showed us a
9	yellow region, which went to 110 percent flow or
10	something. Now we're going to be up to 150 percent
11	power or something. I mean, why did you show this?
12	They are not going to operate at the red point, are
13	they?
14	MR. MARCHE-LUEBA: Your concern was power
15	to flow ratio.
16	MEMBER WALLIS: Yes. But they're not
17	going to operate at the red point.
18	MR. MARCHE-LUEBA: No. But is the power
19	to flow consistent with operation of 138 percent
20	power. So that's so you have a mental picture in
21	your mind, this is a power to flow ratio consistent
22	with operation of 138 percent.
23	MS. ABDULLAHI: So when we discuss later
24	on some of the safety analyses, and we say certain
25	statements, this line will sort of give you an

1	understanding of why.
2	MR. MARCHE-LUEBA: My concern when we
3	worry about obvious instability is you're operating at
4	the core, and then you will
5	MEMBER WALLIS: So if the operator is on
6	this rod line, and he somehow or other mistakenly
7	increases his flow rate, he will go up to that
8	towards that red point.
9	MR. MARCHE-LUEBA: If you were to have a
10	pump uprate, whatever it's called upshift no, it
11	is not upshift increase of pump speed you will hit
12	the scram setpoint of
13	MEMBER WALLIS: Scram would not let you
14	get up there.
15	MR. MARCHE-LUEBA: Yes. Your APRM scram
16	will hit you before that.
17	MEMBER WALLIS: Do you have any idea of
18	where the boundary is outside which you can't operate
19	this thing? We asked that in
20	MR. MARCHE-LUEBA: No. And nobody does,
21	because you during I've been quiet for the last
22	hour, and I wanted to champion you got into the
23	line power to flow ratio, and what counts is what
24	power to flow ratio has the hot channel. Okay? Your
25	limit is set by the hottest channel, not by the core

1	average.
2	And the way these plans that are here
3	I want to be able to operate these by spending a lot
4	of money, buying a lot of fuel during the reload, and
5	being able to redesign their core so that they flatten
6	the power distribution and they are able to keep the
7	hot channel where it was and bring more channels close
8	to
9	MEMBER WALLIS: So that means that the
10	yes, I'm sorry.
11	MEMBER KRESS: Yes. That brings to
12	question the idea of reduced margins. It appears like
13	the hot channel has the same margin, but we're
14	bringing a lot more of the fuel a lot closer to these
15	margins, so you actually do reduce margins.
16	MR. MARCHE-LUEBA: You do reduce the core
17	margin, correct.
18	MEMBER KRESS: Yes, the core margin.
19	MR. MARCHE-LUEBA: Correct.
20	MEMBER KRESS: We need to make that point,
21	because we've seen
22	MEMBER CORRADINI: May I
23	MEMBER KRESS: keeping the same margin.
24	MEMBER CORRADINI: May I ask a question
25	that follows on Tom's question? So when you said the

hot channel, we're talking the hot assembly. 1 2 MR. MARCHE-LUEBA: That is correct. 3 Okay. And so just to MEMBER CORRADINI: 4 give me a rule of thumb, we're talking, what, 300 5 assemblies? MR. MARCHE-LUEBA: Up to 800 assemblies in 6 7 the core. MEMBER CORRADINI: Okay. I'm sorry, 800, 8 9 So just to follow Tom's point, if what 10 you're saying is the case, that now we're -- by 11 flattening the power, and having more channels 12 operating near the limit, then it's going to be a 13 combination of three things -- knowing how your fuel 14 behaves, knowing to monitor, and then, finally, a reduction in the margin simply because they are all 15 16 operating closer to it. 17 So have you -- I guess I will repeat my 18 question to you that I asked earlier, which is the 19 partitioning between essentially more surface area, 20 fuel pins going from 7x7 to 10x10, which essentially 21 then changes one of your limits, to better monitoring 22 I'll Sanjoy's essentially -use words 23 sharpening your pencil and doing a better analysis. I'm trying to get a feeling for which of these is 24

dominant, or they're all equally causing you to have

1	this ability to move into that trapezoid MELLLA+.
2	MR. MARCHE-LUEBA: The number one item was
3	that you said before was the change from fuel from
4	7x7 to 10x10. That allows you to
5	MEMBER CORRADINI: Right. It essentially
6	increases by a factor of two your surface area.
7	MR. MARCHE-LUEBA: Yes. The other item
8	which was not discussed previously is our ability to
9	analyze core, core reloads, with faster computers.
10	MEMBER CORRADINI: Right.
11	MR. MARCHE-LUEBA: In the 1970s, it had to
12	be done by hand, and it was a black art to be able to
13	know where to put the new assemblies. Now they are
14	able to iterate and optimize the assembly reloading,
15	so that they can get these flat power distributions
16	that they need for operation in that core.
17	And as I said before, that cost them a lot
18	of money, because you flatten this core by throwing
19	away fuel that you could have still used and putting
20	brand-new fuel in there. So it is a lot of money.
21	The utilities are spending money to get there.
22	CHAIRMAN BANERJEE: But all this means
23	that the fuel is faster, because the diameter is
24	MR. MARCHE-LUEBA: That is correct.
25	CHAIRMAN BANERJEE: smaller. There is
	II.

	going to be more plute in the core because it's
2	flattened. So the delayed neutron fractions also
3	change, so the whole thing is becoming much less
4	stable core. It's a flatter core.
5	MR. MARCHE-LUEBA: The stability is really
6	bad for there's a big impact on the instability.
7	You will see that on
8	MEMBER CORRADINI: Can you repeat that,
9	please?
10	MR. MARCHE-LUEBA: There is a big impact
11	on the thermal hydraulic instability, the stability of
12	the core. You will see that on the presentations we
13	will give in the closed session tremendous impact.
14	MS. ABDULLAHI: If I go back on the
15	look at slide 5
16	MEMBER WALLIS: Can I go back to something
17	he said, though?
18	MS. ABDULLAHI: Sure.
19	MEMBER WALLIS: I mean, do you say now
20	it's not just one assembly which is the hottest
21	channel. They're sort of spreading it out, so there
22	are now lots of hottest channels.
23	MR. MARCHE-LUEBA: Yes.
24	MEMBER WALLIS: So if you were wrong in
25	some way, instead of having one channel have fuel

	damage, you might have many channels have ruer damage,
2	if you were somehow wrong in your prediction of the
3	limit.
4	MR. MARCHE-LUEBA: That is correct.
5	MEMBER WALLIS: So there is something
6	really lost here in margin that it's not sort of
7	margin to an accident, it's in a margin to an event
8	which might somehow be more extensive in the core.
9	MR. MARCHE-LUEBA: Somehow that is built
10	somehow into the safety limit, that that
11	MEMBER WALLIS: But that's not the same
12	thing. I'm just having a safety limit for the hottest
13	channel. Doesn't say how many are allowed to get
14	close to it.
15	MS. ABDULLAHI: Actually, if I may expand
16	on this, there are different limits, right?
17	MEMBER WALLIS: Is there some core-wide
18	limit?
19	MS. ABDULLAHI: There are different
20	limits. Well, some of the limits are fixed, right?
21	And those limits are the linear heat generation rate.
22	Okay. For those particular limits, we require that,
23	you know, they maintain the certain regulatory
24	requirements that they have to meet, and that's where
25	the limit is coming from.

1	In those cases, the bundles will be
2	operating. We have to operate within the limit,
3	basically. The fixed power the fixed kilowatt flow
4	to exposure line, okay, now if they're going to tell
5	me that's it's proprietary, I don't know. I don't
6	think it is proprietary.
7	The second thing is the SLMCPR requires
8	that 99 according to NRC requirements, 99.9 percent
9	of the fuel rods avoid boiling transition.
10	MEMBER WALLIS: According to some
11	prediction.
12	MS. ABDULLAHI: According to some
13	prediction, some
14	MEMBER WALLIS: 99.9 are just close to the
15	limit.
16	MS. ABDULLAHI: experiment.
17	MEMBER WALLIS: Then, if your prediction
18	is off, there is uncertainty in that prediction.
19	MS. ABDULLAHI: Exactly. And which is
20	what we focus in the methodology, really, was trying
21	to assure us, and, of course, we need to get the
22	similar assurance, you know, through this process,
23	that, in fact, that a slide underprediction or
24	would not get us to a point where we may not
25	MEMBER WALLIS: See. I think I read

1	something. I don't want to get into anything
2	proprietary. I think I read something in your
3	evaluation about the uncertainty in this prediction.
4	MS. ABDULLAHI: Yes.
5	MEMBER WALLIS: And it's not just a
6	question of 99.9, but it is a flatter call you have
7	to figure that in in figuring out how much of the core
8	might did you I assume we are going to get into
9	that.
10	MS. ABDULLAHI: We are going to get into
11	that, and I guess for the public I want to add that
12	when they do the when you calculate the SLMCPR, it
13	would be since you only allow one out of the whole,
14	you will make sure that the limit you come up with
15	takes into account the number of
16	MEMBER WALLIS: How do you allow one out
17	of a whole if 99 percent are all the same, and they
18	are close to the limit? How can you it's either 99
19	or nothing. It's not one.
20	MEMBER BONACA: The theory, I mean, it has
21	a statistical basis in fact.
22	MS. ABDULLAHI: Right.
23	MEMBER BONACA: And so, therefore
24	MS. ABDULLAHI: 95
25	MEMBER BONACA: the more pins you have
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closer to the limit the more you are likely to have a 1 2 certain amount of fuel damage, I mean, in transients. 3 MS. ABDULLAHI: Right. So, but you considered 4 MEMBER BONACA: 5 that. 6 CHAIRMAN BANERJEE: So I think the issue 7 that --8 MS. ABDULLAHI: GE has -- wants to make a 9 statement here. 10 MR. COLEMAN: I'm Mark Coleman from GE. 11 The statistical limits are what are making the sense 12 at the moment. We have conditions such that we are 13 not going to let any more than .1 percent of the fuel rods, the entire core, no matter how they spread out 14 15 among the bundles are going to go into volume 16 transition. 17 And then, if you have more bundles and more rods near this limit, then statistically we have 18 19 to show that we are still going to have .1 percent, 20 which means that you would have a higher safety limit 21 So you'd have more margin built in by way of then. 22 the changing of the actual safety limit, which assures 23 that no matter what the condition is, the core 24 condition, that if you do have an accident -- not an

accident, but a transient occur, then you would not

	nave any more chan it percent of the fuel fous
2	actually reaching that limit. So it is all taken into
3	account in the safety limit methodology.
4	MEMBER WALLIS: Now, in the closed
5	session, are you going to show us
6	MEMBER BONACA: That is applied to the
7	individual cores.
8	MR. COLEMAN: Yes. Yes, and we will go
9	over that
10	MEMBER BONACA: The global limit that
11	you are assuming that.
12	MR. COLEMAN: Yes. So, really, there is
13	no degradation in the overall margin to that .1
14	percent.
15	MEMBER WALLIS: So in the closed session,
16	you are going to show us how you get this this
17	assurance and you're going to show us data on volume
18	transition at the conditions that you're going to
19	have?
20	MR. COLEMAN: Yes, we will.
21	MEMBER WALLIS: Because it's rather
22	remarkable to get such a good prediction of volume
23	transition.
24	MR. COLEMAN: We will show that, and we
25	will have the appropriate discussion of the
1	

1	uncertainties.
2	MEMBER WALLIS: Okay. Thank you.
3	MEMBER ABDEL-KHALIK: Let me ask another
4	sort of big picture question. What sets the knee of
5	the curve?
6	MR. MARCHE-LUEBA: The 55 percent hot?
7	MEMBER ABDEL-KHALIK: Right.
8	MR. MARCHE-LUEBA: You may need to ask GE.
9	It's an arbitrary number, just by the fact that it is
LO	now 52.1.
11	MEMBER ABDEL-KHALIK: Right.
12	MR. MARCHE-LUEBA: And I've heard it was
13	the stability region is somewhere out here, and it
L4	was picked high enough so it wouldn't cross it. The
L5	other thing well, you have to ask GE why they
16	picked an arbitrary number.
L7	MR. CASILLAS: This is Jose Casillas.
18	That map represents the maximum boundary, but and
L9	it's selected it's balanced between safety margins
20	and operational flexibilities. And so the studies
21	that were performed to define that was to obtain a
22	balance for that, and the specific application of the
23	plant will select just what they will be using for
24	that.

MEMBER WALLIS: Suppose you moved it down

	to 40 percent core from: courd you, in a public
2	session, say what would happen? What would we what
3	would happen if you removed that rod line down, that
4	138 power rod line down to 40 percent power?
5	MR. CASILLAS: Any expansion, either on
6	the upper or lower boundary, will produce will
7	create greater challenges on different aspects of the
8	safety analysis or the operation.
9	MEMBER WALLIS: Well, this isn't stability
10	which is limiting you, really?
11	MS. ABDULLAHI: Yes. It's
12	MEMBER WALLIS: Can you be specific about
13	what is
14	CHAIRMAN BANERJEE: He said no, it's not
15	stability.
16	MEMBER WALLIS: It's not stability.
17	MR. CASILLAS: No. No, there is
18	MS. ABDULLAHI: Go ahead.
19	MR. CASILLAS: There is other
20	considerations which will be discussed presented
21	for that.
22	MEMBER WALLIS: But can you tell the
23	public something about what you're avoiding by having
24	the knee there? You can't?
25	MR. CASILLAS: Clearly, there are several

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1	areas of the safety analysis that are impacted by
2	having lower core flow. Stability is only one of
3	those, and they will all be discussed and presented.
4	MR. MARCHE-LUEBA: In the closed session,
5	you will see what happens to the critical power ratio
6	as you treat the pumps, and then you see that as you
7	reduce the flow you gain critical power ratio. So you
8	gain margin at the lower flows, because you have lower
9	power.
10	MS. ABDULLAHI: Let me try to slide in
11	here and explain one thing. I'm going to give you
12	your answer.
13	MEMBER ABDEL-KHALIK: Just to clarify
14	things, at the end of the day, we'll understand why
15	the knee is set where it's at.
16	MR. CASILLAS: At the end of the day,
17	we'll see whether all of the areas that are impacted
18	by where by setting that the knee where it's at,
19	why it produces a reasonable compromise for all of the
20	areas.
21	MEMBER WALLIS: So when my colleague at
22	the university asked me why I approved this and says,
23	"How did they justify this knee?" am I allowed to tell
24	this colleague anything?
25	MR. CASILLAS: Yes.

1	MEMBER WALLIS: What am I allowed to say?
2	I mean, you are just saying it is all kinds of
3	considerations, but
4	MR. CASILLAS: Yes.
5	MEMBER WALLIS: that's not a very
6	reassuring
7	MR. CASILLAS: It's a balance between the
8	benefits of expanding the map and the penalties and
9	the consequences of expanding the map.
10	MEMBER WALLIS: Yes.
11	MR. CASILLAS: And the benefits will be
12	presented by the core performance, and the challenges
13	will be presented by the safety analysis. It's
14	MS. ABDULLAHI: Y.C. Jiu, did you want to
15	say something as well? I saw you
16	MR. JIU: Alan.
17	MS. ABDULLAHI: Alan, sorry. Alan, I just
18	saw him there. Okay.
19	I will just add that although the details
20	we cannot say right now, that there are specific
21	safety analyses that will be affected at that point.
22	MR. CASILLAS: Yes.
23	MS. ABDULLAHI: And I believe that if we
24	go through the list here, we could be able to tell you
25	which one of these we think may be affected. Now,

1	ultimately, we only know why they did the cut
2	according to what they told us. But as reviewers, all
3	we can tell you is what we think it would as to
4	have an effect on calculated there, and then tell you
5	where they have calculated and that point was
6	limiting.
7	MEMBER WALLIS: I am mulling over what I
8	just heard from GE, though. They said there was a
9	balance of safety challenges versus benefits. This is
10	something that we don't usually get into, but
11	presumably the benefits are to the utility, and the
12	safety challenges are to the public in some way,
13	right?
14	MS. ABDULLAHI: And the regulatory
15	MEMBER WALLIS: So that GE is somehow
16	making this balance? You must be making this balance
17	in some way. Are you making this balance? Or who is
18	making this balance between safety and benefits?
19	MS. ABDULLAHI: Between the benefit and
20	the
21	MEMBER WALLIS: Yes.
22	MS. ABDULLAHI: I do not consider the
23	benefit in terms of in terms of
24	MEMBER WALLIS: You don't consider benefit
25	at all, do you, when you decide whether something is

1	okay?
2	MS. ABDULLAHI: I look only at, can the
3	plant, with this particular change, meet the
4	regulatory and safety requirement? Can the analyses
5	used to perform this plant response in this condition
6	acceptable enough that the prediction can be used to
7	make a safety finding, a reasonable safety
8	CHAIRMAN BANERJEE: Do you have the
9	capability to do any confirmatory analysis?
10	MS. ABDULLAHI: We did a couple of them.
11	We would need more, and maybe ACRS can help NRR get
12	there.
13	CHAIRMAN BANERJEE: We are trying to.
14	MS. ABDULLAHI: I know. Mike Colby of GE
15	wants to
16	MR. COLBY: Yes, I just want to say in
17	terms of where that would be where that line would
18	be and how much of that region you want to get into,
19	we are not necessarily threatening any safety limits,
20	but what happens is is we will put so much constraints
21	on ourselves for operation if we would expand that
22	further that it would not be feasible for us to design
23	core designs, which would be economic for the
24	utilities to use.
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1	compromise, we're talking about compromises in terms
2	of what the utilities are going to use in terms of
3	their operations during and the core loadings and
4	everything that entails the core operation. So we
5	make it feasible for them to be able to use. If we
6	expand it too much, then because of the limitations
7	that we have to put on ourselves in order to preserve
8	the same safety margins, as we have right now, would
9	be too much for the core designs to handle.
10	MS. ABDULLAHI: If I may
11	MEMBER BONACA: Just if I can suggest,
12	this discussion will be much more effective after we
13	hear the proprietary session than before, because we
14	are all trying to figure things and, you know, in our
15	mind, and so my suggestion would be to postpone this
16	conversation until after we hear the proprietary
17	presentation.
18	MS. ABDULLAHÍ: Okay.
19	CHAIRMAN BANERJEE: So if you would please
20	exercise constraint.
21	MEMBER BONACA: No, just a suggestion that
22	it seems to me that we are speculating and thinking in
23	our mind about what could it be that this phrase
24	because we are not
25	CHAIRMAN BANERJEE: But I think it also

	sets the tone for what we want answered in
2	MEMBER WALLIS: At this moment, I am
3	trying to behave like a member of the public, rather
4	than
5	MS. ABDULLAHI: I understand.
6	MEMBER BONACA: It's just simply that we
7	will keep
8	CHAIRMAN BANERJEE: I think we want to
9	finish this. Is there anything else that
10	MS. ABDULLAHI: I am finished and okay.
11	CHAIRMAN BANERJEE: How much is important,
12	and how much is not?
13	MS. ABDULLAHI: Okay. I think this slide
14	is actually important, which says, "What are the
15	impact of MELLLA+?" And this flowchart shows that
16	what we consider to be the significant impacts, and
17	this is only focusing on the fuel dependent analyses,
18	and one of them is the stability, ATWS, ATWS
19	instability, ECCS LOCA, and SLMCPR.
20	These are the few areas that we found or
21	we think that you should in an overview be able to
22	hear and understand more.
23	CHAIRMAN BANERJEE: Does ECCS LOCA also
24	include issues related to containment and
25	MS. ABDULLAHI: No. This review today is

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1	really limited to reactor core and fuel performance
2	and fuel-dependent analyses.
3	MEMBER WALLIS: Not suppression pool? Not
4	suppression pool temperature or
5	MS. ABDULLAHI: We did some suppression
6	pool, but it's for the ATWS. There's another branch
7	that does the we have some net positive suction
8	head and suppression pool information, but that is
9	from ATWS perspective.
LO	Now, in terms of ECCS LOCA containment
L1	sites, there is a containment branch, and I
L2	MS. HONCHARIK: There aren't present here
L3	today. I'm trying to get someone here to address any
.4	questions that may come up later in the day during the
L5	closed session.
L6	CHAIRMAN BANERJEE: That has always been
L7	one of our issues with these uprates.
L8	MS. ABDULLAHI: And, again, as Dr. Wallis
L9	pointed out, that was one of the areas that is plant-
20	specific, I believe.
21	To conclude, having looked at all of the
22	safety analysis, and looked at some analysis brought
23	that GE had provided, and done our own comprehensive
24	review, we have concluded that MELLLA+ is not for
25	every plant. MELLLA+, some plants will be able to

1	operate at it, some plants may not. Some plants may
2	need modifications that they have to implement. This
3	is not what I have in here. I decided to skip, since
4	we are ending fast. And you will hear the reasoning
5	behind that, so
6	MEMBER WALLIS: It's a permission
7	sometimes?
8	MS. ABDULLAHI: Excuse me?
9	MEMBER WALLIS: Is it sort of vague?
10	Maybe you say because the conditions are really
11	specific. It's clear what you're allowing.
12	MS. ABDULLAHI: Yes. What we are allowing
13	is clear. The conditions that we specify says this,
14	this, this, this. So if a plant wants to be
15	able to meet all of these things, and make no plant
16	mod, you know, like no increase in their volume or no
17	they will hit a limit somewhere. And also,
18	depending yes.
19	MEMBER WALLIS: I'm sorry. You said
20	sometimes it will be okay, and sometimes it won't be,
21	and I
22	MS. ABDULLAHI: Per plant.
23	MEMBER WALLIS: And you have really
24	specified what those times are.
25	MS. ABDULLAHI: Yes.

1	MEMBER WALLIS: Okay. That's all.
2	MS. ABDULLAHI: No. What we're basically
3	saying is giving you an overview speculation that we
4	don't we are not improving MELLLA+, and we are not
5	asking you to approve MELLLA+, assuming every plant
6	will be able to implement and be fine. They would
7	have to demonstrate that, and we have our own little
8	areas that we think may be where the breaks will be.
9	MEMBER BONACA: So this even assuming
10	that they all will do modifications I'm trying to
11	understand the context of your statement.
12	MS. ABDULLAHI: I understand. I'm sure
13	it's vague. But what I'm saying, without plant
14	mods
15	MEMBER BONACA: Yes, without plant mods.
16	MS. ABDULLAHI: without plant mods
17	MEMBER BONACA: Yes, all right.
18	MS. ABDULLAHI: some analyses you made
19	need
20	MEMBER BONACA: Yes.
21	MS. ABDULLAHI: to do some things. And
22	we've done a thorough review, and we find it
23	acceptable at this stage. And I think we'll stop
24	right here, because you don't have time for the rest.
25	MR. MARCHE-LUEBA: Could I make a

statement?

MS. ABDULLAHI: Yes, go ahead.

CHAIRMAN BANERJEE: Go ahead.

MR. MARCHE-LUEBA: By agreeing earlier to something you said, I may have given the wrong impression. At the end of the day, plants are operated against a hard limit. If the speed limit on the interstate is 55 miles an hour, 65, it's called the operating limit MCPR. And that's what the plants operate that hot channel against.

For a plant that is today at EPU and wants to move to MELLLA+, that operating limit is going to be of the order of five percent higher tomorrow if they want to do it in MELLLA+. So it would be on the order of five percent more margin to the -- to the actual volume transition calculated on the GEXL tests. Okay?

So we've agreed that there are more channels close to power, all this and that, but when you add up all of the penalties we have closed on the SER, plus all of the penalties that the methodology imposes, or being able to calculate all the transients at the worst condition, the upper limit, which in the plant they say 1.4, it will go to 145.

So we do -- are imposing a five percent

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1	penalty in the operation. And they are able to do
2	that by spending money and buying more fuels and
3	getting a better power distribution from the core. So
4	not everything is bad.
5	CHAIRMAN BANERJEE: Thanks, Jose.
6	I think we'll thank you for your
7	presentation. We'll take a break now for until
8	about 10:30.
9	MEMBER CORRADINI: Sanjoy?
10	CHAIRMAN BANERJEE: Yes.
11	MEMBER CORRADINI: Could Theron give me a
12	call? Let me give him a number to call and to try
13	to settle the uncertainty of the just the signal
14	going in and out.
15	CHAIRMAN BANERJEE: All right. Theron,
16	you can get that. We'll take a break in the meantime
17	until 10:30.
18	(Whereupon, the proceedings in the
19	foregoing matter went off the record at
20	10:17 a.m. and went back on the record at
21	10:31 a.m. in Closed Session.)
22	
23	
24	

CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: Advisory Committee on

Reactor Safeguards

Thermal Hydraulic Phenomena

Docket Number:

n/a

Location:

Rockville, MD

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and, thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

Charles Morrison Official Reporter

Neal R. Gross & Co., Inc.

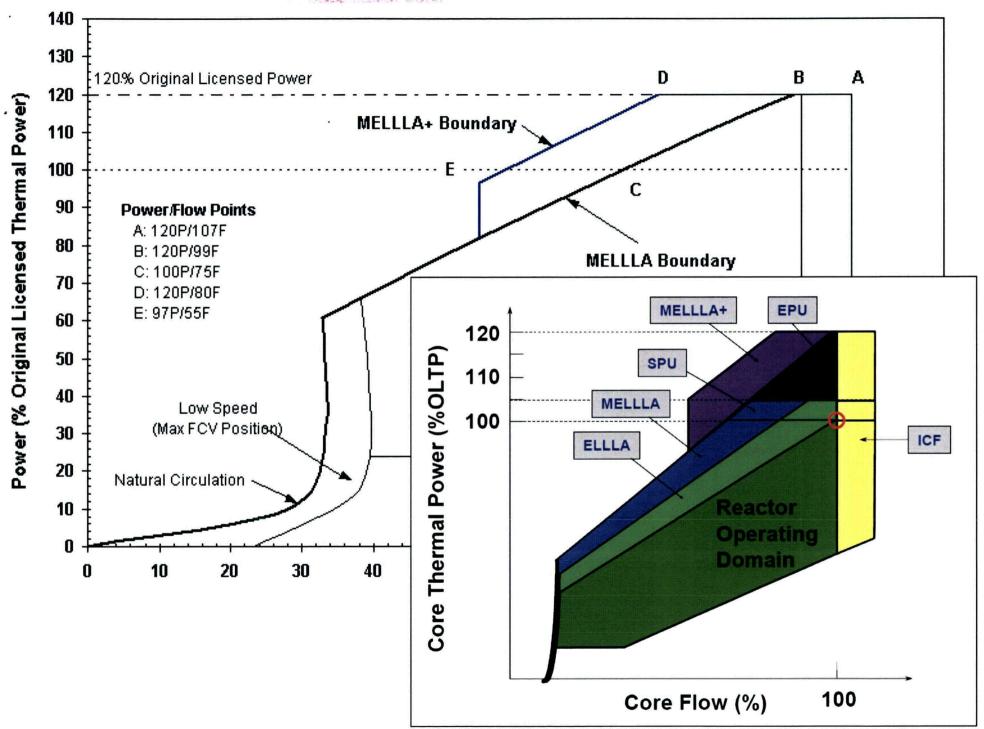


Review of NEDC-33006P and NEDC-33173P (Open Session)

Zena Abdullahi (Lead Reviewer)
With NRC staff, ORNL and PNNL Consultants

ACRS TH Subcommittee Meeting May 24-25, 2007



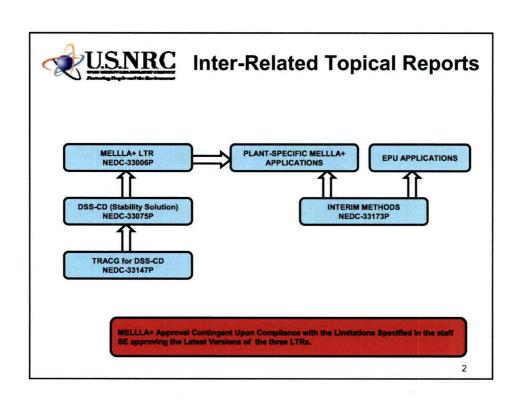




Overview of Review of NEDC-33006P and NEDC-33173P (Open Session)

Zena Abdullahi (Lead Reviewer)
With NRC staff and ORNL Consultants

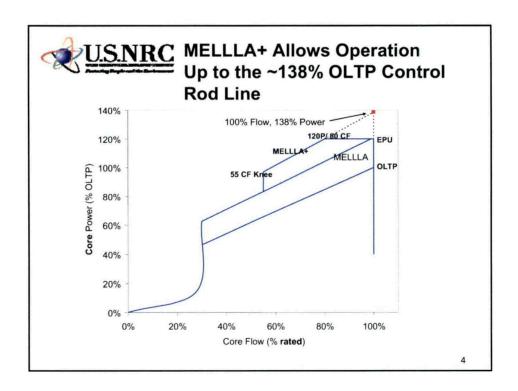
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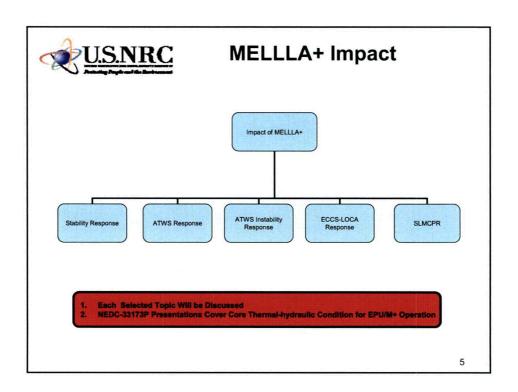




Overall Objective

- MELLLA+ (NEDC-33006P)
 - · Define what MELLLA+ operation entails
 - · Establish significant impacts on fuel dependent Analyses
 - · Present:
 - » Basis for safety findings
- Interim Methods (NEDC-33173P)
 - · Supports EPU and MELLLA+ Applications
 - · Discuss significant methodology topics reviewed
 - · Present:
 - » Basis for staff safety findings







- Staff performed comprehensive review because the reactor conditions and plant response will be outside the current experience base.
- · Significant staff safety findings in the ATWS, SLCMPR, and ECCS-LOCA.
- Approval of Revision 2 of the MELLLA+ LTR, which incorporated number of staff review and RAI conclusions.
- The staff performed confirmatory analyses where feasible and the necessary code modeling capability was available in order to obtain assurance that the BWRS can operate safely in the new operating domain.
- The staff performed comprehensive analytical methods and benchmarking qualification data review in order to obtain reasonable confidence that the predicted plant response was acceptable. This is covered in the staff SE of NEDC-33173P.



MELLLA+ CONCLUSION

- The staff concludes that the expanded operating domain defined by the MELLLA+ upper boundary does adversely impact the fuel dependent analyses.
- The extent of the expanded operating domain plants can operate under and meet the safety and regulatory requirements will be highly plantspecific.
- Plant-specific applications will provide the fuel dependent analyses and the SRLR, which will also include the fuel dependent analysis that are also cycle-dependent.

MELLLA+ operation is acceptable with the limitations specified in the staff SEs approving NEDC-33006P, NEDC-33173P, NEDC-33075P and NEDC-33147P.

7



ISNRC Restrictions & Limitations

- The draft SER contains 14 restrictions
- · Most relevant restrictions
 - SLMCPR adder of 0.02 (0.03 for MELLLA+) to account for potentially higher power distribution uncertainties
 - OLMCPR adder of 0.01 to account for potentially higher uncertainties in void fraction prediction
 - Validation of the void-quality correlation does not extend to modern fuels and operating strategies
 - Higher uncertainty in void-quality (VQ) correlation propagated to void reactivity coefficient (Cv)
 - Higher Cv uncertainty propagated to OLCMPR



- Other restrictions:
 - Uncertainty of for OPRM cells (for APRM) must be applied to stability setpoints to account for LPRM miss-calibrations due to bypass voiding
 - Bypass voids at steady state must remain below
 - EPU and MELLLA+ SRLRs must document compliance to transient thermal mechanical acceptance criteria

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USNRC Restrictions & Limitations (contd)

- Other restrictions
 - Additional plenum fission gas and fuel exposure gamma scans measurements will be performed
 - EPU or MELLLA+ plants with mixed fuel vendor cores will provide plant-specific justification for extension of GENE's analytical methods
 - Plant-specific applications will provide prediction of key parameters for cycle exposures for operation at EPU and MELLLA+.



- The staff performed a comprehensive review of impact of MELLLA+ operation.
 - The staff concludes that MELLLA+ operation is acceptable as revised by the SER limitations.
- The staff has also reviewed application of GE methods to EPU and MELLLA+
 - The staff concludes that GE Methods are acceptable as revised by the SER limitations.



- Topical reports reviewed and content summary (open)
- MELLLA+ LTR (NEDC-33006P) Review (closed)
 - Overview of MELLLA+ LTR
 - Application of TRACG for MELLLA+ (NEDC-33147P)
 - DSS/CD stability solution for MELLLA+ (NEDC-33075P)
 - Overview of staff review
 - Key topics and analysis
 - Stability
 - ATWS
 - ATWS/Stability
 - ECCS-LOCA
 - SLMCPR



- Methods LTR (NEDC-33173P) Review (closed)
 - Overview of Methods LTR
 - Overview of staff review
 - Key topics and analysis
 - · Neutronic methods evaluation
 - SLMCPR
 - · Bypass boiling
 - ATWS
 - Stability
 - · Void quality correlation
 - Thermal-Mechanical



- Limitations and Conditions (open)
- Follow-up Topics (open)
- Conclusions (open)
- Full Committee Guidance (open)