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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)

SUBCOMMITTEE ON THERMAL HYDRAULICS

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OPEN SESSION MEETING

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THURSDAY,

MAY 24, 2007

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ROCKVILLE, MARYLAND

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The subcommittee met at the Nuclear Regulatory Commission, Two White Flint North, Room T-2B3, 11545 Rockville Pike, at 8:30 a.m., Sanjoy Banerjee, Chairman, presiding.

COMMITTEE MEMBERS PRESENT:

SANJOY BANERJEE	Chairman
GRAHAM B. WALLIS	Member
MICHAEL CORRADINI	Member
(via teleconference)	
THOMAS S. KRESS	Member

COMMITTEE MEMBERS PRESENT: (cont'd)

MARIO V. BONACA	Member
SAID ABDEL-KHALIK	Member

ACRS STAFF PRESENT:

RALPH CARUSO	Designated Federal Official

NRC STAFF PRESENT:

MICHELLE HONCHARIK

GREG CRANSTON

ZENA ABDULLAHI

TONY NAKANISHI

ALSO PRESENT:

PATRICIA CAMPBELL

P.T. TRAN

JOSE CASILLAS

FRAN BOLGER

RICK KINGSTON

JENS ANDERSEN

BRIAN MOORE

JOSE MARCHE-LUEBA

MARK COLEMAN

MIKE COLBY

WALTER MERTZ

TONY REESE

ALSO PRESENT: (cont'd)

DAVID DIAMOND

RANDY JACOBS

ALAN CHUNG

CHAD LYMAN

DILIP RAHIMI

Y.C. JIU

I-N-D-E-X

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

(8:30 a.m.)

CHAIRMAN BANERJEE: The meeting will now come to order.

This is a meeting of the Advisory Committee on Reactor Safeguards, Subcommittee on Thermal Hydraulic Phenomena.

I am Sanjoy Banerjee, Chairman of the Subcommittee. Subcommittee members in attendance are ACRS members Mario Bonaca, Tom Kress, Graham Wallis, Mike Corradini on screen there, and Said Abdel-Khalik. Also present is our consultant, David Diamond, from Brookhaven National Laboratory.

The purpose of the meeting today is to review several topical reports related to an expansion of the BWR operating domain known as extended -- Maximum Extended Load Line Limit Analysis Plus, MELLLA+. The subcommittee will hold discussions with representatives of the NRC staff, its contractors, General Electric, and other interested parties regarding these matters.

The subcommittee will gather information, analyze relevant issues and facts, and formulate proposed positions and actions as appropriate for deliberation by the full committee.

Ralph Caruso is the Designated Federal Official for this meeting.

The rules for participation in today's meeting have been announced as part of the notice of this meeting previously published in the Federal Register on April 3, 2007, and April 18, 2007. Portions of the meeting will be closed for the discussion of proprietary information.

A transcript of the meeting is being kept and will be made available as stated in the Federal Register notice.

It is requested that speakers first identify themselves and speak with sufficient clarity and volume so that they can be readily heard.

We have received no requests from any member of the public for time to make an oral presentation.

We look forward to an interesting meeting, one which has been postponed several times. In any case, we are holding it now.

We will now proceed with the meeting, and I call upon Ms. Michelle Honcharik of the NRC staff to begin. Michelle?

MS. HONCHARIK: Good morning. My name is 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 of 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 to 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,

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

overview. P.T. Tran, Project Manager --

MEMBER WALLIS: Can I ask a question about what we're doing here? I notice there's an open session and then there's a closed session.

MS. CAMPBELL: That's true.

MEMBER WALLIS: I assume we can't ask anything really specific technically until we get to the closed session. Is that true?

MS. CAMPBELL: That's correct. And we will provide an overview --

MEMBER WALLIS: Now, what are we going to do before that?

MS. CAMPBELL: -- in the closed session as well.

MEMBER WALLIS: You're just going to give an overview until them?

MS. CAMPBELL: Yes, sir.

MEMBER WALLIS: We can't really ask any probing questions until after the break, is that true?

MS. CAMPBELL: We could easily get into some proprietary information, so --

MEMBER WALLIS: So I'd better be quiet. Is that --

MS. CAMPBELL: It would be nice to be able to wait until the proprietary session. Thank you.

Okay. We will now provide a non-proprietary overview. P.T. Tran, Project Manager, New Product Introduction, will present a brief summary of the actions we will discuss in more detail with you today.

MS. TRAN: Good morning. I am P.T. Tran, and I'm the Project Manager for the MELLLA+ LTR and the nuclear methods LTR. First, I would like to also thank the ACRS members and the NRC staff for your support of this meeting.

I would like to start off our presentation with an overview and summaries of the MELLLA+ LTR and the nuclear method. The objective of the MELLLA+ program is to restore the operational flexibility for the GE BWR program plans by expanding the operating boundary allowing the operation at 120 percent original licensed thermal power, or OLTP. We also call it EPU, with a core flow as low as 80 percent uprated.

The MELLLA+ topical report essentially documents the process and defines the scope of work required for expansion of the operating domain for BWR plant applications. The nuclear methods report documents the applicability of the GE nuclear methods for the expansion operating domain and provides the

licensing basis for the NRC to issue the SE for the MELLLA+ LTR, including the EPU.

It is also included in the process and defines the scope. A plant application must comply with the methodology for the application.

Now, let's take a look at the power flow map and understand why there is a need for MELLLA+. This is -- what we see here is the initial reactor power flow map with a single point at rated power and rated core flow. We call it the OLTP point. And we introduced the ELLLA region for -- to allow plant operating flexibility, then followed by the increased core flow region. That also helped the plant operation during -- at the end of second close down.

After that we introduced the MELLLA -- at the MELLLA operating region is these characterized by that blue region right there. And it is defined by the point at 100 percent rated power and 75 percent core flow.

Then, we start the power uprate program. The first one is the stretch power uprate of five percent OLTP. As you can see, for the power uprate program, we maintain the MELLLA boundary and extend along the line of the MELLLA boundary.

And with that, the power flow window

getting smaller as we go up in power. And when we introduced the EPU power program up to 120 percent power uprate, the MELLLA boundary for that EPU now come to a single point, about 99 percent core flow and 120 percent power uprate.

And there is no more flexibility for plant operating at 120 percent power uprate, and the individual plants really desire to have the power flow window back, so that they can regain the flexibility, and we introduced the MELLLA+ program.

Now, the MELLLA+ program was defined in a generic term that is 120 percent power uprate and 80 percent core flow as the minimum corner of the MELLLA+ window. The individual plants may choose a smaller expansion.

MEMBER WALLIS: I think I can ask you in the open session -- it looks as if you have expanded the operating domain by a factor of two or something. It looks even more than that in the picture. But it's the same reactor, more or less. What has changed to make it possible to expand the domain so much?

MR. KINGSTON: Do you mean in terms of --

MEMBER WALLIS: How would you reassure the public that this is okay, to expand the domain of operation so much, as is shown in your figure?

CHAIRMAN BANERJEE: From the green to all those other colors.

MEMBER WALLIS: Yes, you've added a lot of new territory here. What has happened to make it possible to do that?

MR. CASILLAS: My name is Jose Casillas. I work for General Electric. I'm Plant Performance Consulting Engineer. And, essentially, what --

MEMBER CORRADINI: Could the gentleman speak up a bit?

MEMBER WALLIS: Could you move your microphone in? I am actually asking the staff. I am not asking General Electric, but maybe I should. Well, am I asking General Electric, or who am I talking to? It's all GE. Okay. I guess it's GE, okay. So I wasn't sure -- I'm sorry. You're all GE people.

MS. TRAN: Yes.

MEMBER WALLIS: I didn't realize that.

MR. CASILLAS: Yes. As P.T. Tran showed, there is essentially -- I think your question has to do more with power rather than the flow window, and --

MEMBER WALLIS: Both. I mean, what has happened to make this reactor able to operate over such a bigger range now than it did when it started?

MR. CASILLAS: Well, the -- let me address first the power. The initial -- what we call the stretch uprate, that involved essentially a built-in margin that had been existing from the time that the plants were designed. They were designed to accommodate approximately a five percent power increase. And so eventually that additional design margin was applied for in terms of license.

For the extended power uprate going all the way to 120, that involved --

MEMBER CORRADINI: Can I ask the gentleman? So you mean the dark green to the light green was inherent margin that was never documented?

MEMBER BONACA: Never used as --

MR. CASILLAS: The 100 to 105 was margin that was standard in the design of all the BWRs that had not been included in the license -- in the initial license application.

MEMBER CORRADINI: Thank you.

MR. CASILLAS: Yes. Then, the 120 power increase was a result of the realization of all of the NSSS margins that existed in the BWR. And the application or the extraction of that margin required significant balance of plant modifications.

MEMBER WALLIS: Up to now, it is

essentially the reactor wasn't changed much, but it just had an inherent capacity to --

MR. CASILLAS: Yes. The reactor had the capacity to produce the -- all the way to 120. The balance of plant systems needed -- required significant changes in terms of capacity.

MEMBER WALLIS: What do you mean by that? I mean, talking -- you're addressing the public here.

MR. CASILLAS: The generator, the --

MEMBER WALLIS: The turbine, the non-nuclear part.

MR. CASILLAS: Exactly. The non-nuclear part, right.

MEMBER CORRADINI: May I follow up Graham's question? Because I guess he is asking the starting question I was trying to discern from the executive summaries and all of the documents. So if I could repeat it back to you to make sure I've got it right is you're saying if there was a large enough turbine and a large enough power systems components, there is nothing inherently limiting in the reactor design in terms of sizing of the components, nor instability regions. It is just that now you know enough that you can go into regions where you conservatively ignore it.

MR. CASILLAS: I would say that is correct, yes.

MEMBER BONACA: Still, but you are moving into territory where you are ebbing into a margin of the plant. So I'm trying to understand, you know, you still have a buffer typically between the operating domain and the set domain that you commit to the NRC.

Okay. Now, what you have done here, you have moved into the territory, because you have pushed up your setpoints, your high power, and high flow, and so on and so forth. And so I'm trying to understand the justification of trading in this margin, and this has been accepted, of course, by the NRC, but --

MR. CASILLAS: Well, the increase in power to 120 is old -- I mean, that has -- I think most every boiling water reactor has extended their power to the orange and the yellow regions. The only new part that we are addressing that is new essentially is the purple region, and that was the low flow region. And that presents some unique challenges.

But the question of the increased steam flows and velocities, the average power increase in production, that has -- is all addressed in --

MEMBER WALLIS: So there has been no technical innovation or something? Or why wasn't this

done on the first day?

MR. CASILLAS: Do you mean from the original --

MEMBER WALLIS: What is it that makes it possible sort of 30 years later to expand the region so much? What has happened? Something must have happened. Either your knowledge is infinitely better, or the technology is better, or something. But something has given you the confidence to do this.

MR. BOLGER: This is Fran Bolger from GE. One of the capabilities that has increased over the years is the ability of the fuel, and we have improved the capability and the critical power performance of the fuel over the years.

MEMBER WALLIS: Yes. I thought there must be some technical change, and that certainly is one.

MEMBER CORRADINI: May I ask that? So that is a technical change that we have to discuss in private, or can you elaborate on that? Because I am -- I can imagine there is changes in geometry and changes in materials that might change the local critical heat flux or the overall critical power ratio.

But I think this large enough of a change I still attribute to what was discussed before, which

is you had a very large margin. You've now had the abilities to calculate something in more precise nature, so you have consciously gone into that margin or conservative region and are operating where you had this zone -- a larger zone of uncertainty, and you are more certain as to how the behavior -- the behavior of the system.

Am I missing something, or do we have to talk about this later in private?

MS. CAMPBELL: I think this is something that we will get into later.

MEMBER WALLIS: Well, is what he says correct? You are now more certain about the behavior of the system?

MR. KINGSTON: Well, I think we could ask Dr. Andersen to perhaps talk about the improvements --

MEMBER WALLIS: Because, I mean, when we get to that -- when we get to the closed session, we're going to examine whether or not your correlations have improved over 30 years, and things like that.

MS. CAMPBELL: Exactly.

MEMBER WALLIS: And he is going to tell us that?

MS. CAMPBELL: We will be discussing it

over the next two days.

MR. CASILLAS: I think you have alluded to the two aspects. One is the --

MEMBER WALLIS: Are you going to say for the record that you are now able to calculate better than you could before? Is that one of the things which has happened?

MR. CASILLAS: Well, let me say that there is the two aspects that have been brought up. One is the capability of the field, and there has been a lot of advances in the field, and that certainly with the fuel designs that we had at the time of -- that reactors were designed we could not produce this amount.

And the second part is the ability of the systems and the safety margins to be maintained. That is the more important part of that. I mean, I think Dr. Andersen can -- will get into a lot of the methods and how we are able to calculate and demonstrate that.

MEMBER WALLIS: Let's see. I think we need to get this clear. It can be open. The safety margins maybe were inherent, because I don't know that there has been a great advance in ability to calculate.

MEMBER BONACA: Well, I think your linear

heat rate has gone down significantly, and maybe -- I mean, those are the issues that drive the fuel performance, right? I mean, so for --

MR. CASILLAS: All of those details would be discussed in the proprietary session, from the fuel performance to the safety systems.

CHAIRMAN BANERJEE: So you are saying that your ability to predict things with confidence has increased? So it is simply sharpening your pencil that allows you to do this?

MS. CAMPBELL: We will let Dr. Andersen respond to that.

MR. CASILLAS: I don't know how to exactly characterize the --

CHAIRMAN BANERJEE: Have the equations for multi-phased code changed since this?

MR. ANDERSEN: Excuse me. This is Jens Andersen from Global Nuclear Fuels. When we are using the same methods to analyze the plants, then the margins that are built into the methods are the same. But what really has changed is, as was mentioned earlier by Fran Bolger and Jose Casillas, is that we have improved the fuel design.

When the plants were originally designed back in the '70s, they were designed with 7x7 and 8x8

fuel. We are now using 10x10 fuel, which has smaller fuel rods, much larger surface area, and you have a much larger critical power capability of the fuel bundles.

So if you look at the margin to the thermal limits, the critical power limits, they have really not been reduced. It's just the fact that the fuel is able to produce so much more power and have such a higher critical power that we can take advantage of the improved performance of the fuel.

MEMBER WALLIS: And you did not need to add any safety systems? Didn't change the design by adding any safety system. They were inherently able to accommodate all these changes. Is that true?

MS. TRAN: That's correct.

MEMBER WALLIS: So you have increased the power of the engine of the car, but the brakes are still the same, to take a very simple analogy. My impression is that that is true. The brakes were always good enough for the increased power of the engine, but now you've increased the power.

CHAIRMAN BANERJEE: They have ABS now.

(Laughter.)

MEMBER WALLIS: No. What they haven't got -- I don't think they said they had anything new in

safety. It's the same safety system --

CHAIRMAN BANERJEE: Suppression detect and --

MEMBER WALLIS: Well, maybe there is something better about the safety.

MS. CAMPBELL: I believe we'll cover that in detail.

MEMBER WALLIS: Well, I think you owe the public some explanation about why --

CHAIRMAN BANERJEE: We are asking broad questions.

MEMBER WALLIS: I'm asking a very broad question. You want to reassure -- I get these questions all the time from friends and acquaintances, you know, people from the public about how can you keep increasing this domain of operation. You need to explain it in a way that's understandable.

MR. CASILLAS: That is correct. There is -- in terms of margins, in certain areas we have -- we have taken advantage of the excess margin that were built in the boiling water reactor. In some other areas, we've taken advantage of improved methodologies to understand the phenomena and be able to --

MEMBER WALLIS: I think you could say you've got improved safety instrumentation. Isn't

that true?

MR. CASILLAS: Correct. Yes.

MEMBER WALLIS: Thank you.

MEMBER KRESS: Can we go back to the MELLLA curve, please?

MR. CARUSO: Theron, can you put up the computer?

MEMBER KRESS: I want to ask you a question about the -- well, on my chart it's purple -- the vertical line brings you up to it looks like 105 percent at a particular flow on the MELLLA+ line region. At a fixed flow, that requires a change in enthalpy. How is that accomplished? By increasing -- decreasing the inlet temperature, or increasing the pressure? How do you get this change in enthalpy?

MR. CASILLAS: Let me first say that the figure that you see in front of you is a cartoon, and it is not -- it is not --

MEMBER WALLIS: Not to scale?

MR. CASILLAS: It's not very precise. In fact, some regions are larger than they should be, and some are smaller than they should be. But it's a cartoon.

MEMBER WALLIS: It's not very far off.

MR. CASILLAS: It is, actually, for those

of us that have been looking at it.

MS. CAMPBELL: It's a simplification.

MR. CASILLAS: And so -- but, indeed, the only difference that MELLLA+ will represent in terms of operation will be the ability to operate with a lower recirculation pump flow at the same power levels that have already been approved. So MELLLA+ is accomplished merely by reducing the core flow, and, of course, that is --

MEMBER KRESS: No, no. That --

MEMBER CORRADINI: So can I --

MEMBER KRESS: My question was, clearly, the recirculation has to do with the ability to transfer the heat properly from the fuel. But you've got a fixed core flow, and that doesn't count the recirculation. That counts -- that is the net flow that goes through. And in order to get that vertical line, you have to increase the impact of that flow.

You've already got the high quality outlet, so you can't produce more steam, I don't think. I think you have to reduce the inlet temperature or increase the pressure, and that's my question. Well, how do you get that change in impact?

MR. CASILLAS: This is a boiling water reactor, and, as such, it's entirely controlled by

recirculation flow -- pump flow. It does not --

MEMBER WALLIS: I think you have a higher exit quality.

MEMBER KRESS: That may be. That's what I'm asking. Do you have a higher exit quality, or do you have a lower inlet temperature, or --

MR. BOLGER: This is Fran Bolger.

MEMBER WALLIS: You have a higher exit quality, right?

MR. CASILLAS: If you can put the picture up again --

MEMBER WALLIS: The same flow -- if you had a lower flow and the same power, you could have a higher quality, because --

MR. CASILLAS: Exactly. You do.

MEMBER KRESS: Well, I thought they already had a high quality, but maybe that's it.

MEMBER WALLIS: They have a higher quality than before.

CHAIRMAN BANERJEE: So the question relates to the vertical part of that. At a constant core flow, you are getting an increase in power.

MR. CASILLAS: Eighty percent.

CHAIRMAN BANERJEE: So you have to increase the quality or reduce the temperature, one or

the other. There is no other way.

MR. BOLGER: This is Fran Bolger. If you are sitting there on that -- approximately where that arrow points to the MELLLA, and you wanted to move up into that region, the MELLLA+ region, if you withdrew control rods that would allow you to maneuver into that region.

MEMBER WALLIS: But you would increase the exit quality by doing so.

MR. CASILLAS: Yes.

MEMBER WALLIS: Yes.

MEMBER KRESS: Okay. Then, it is quality you're changing.

MEMBER WALLIS: There is some line up there where you have steam coming out. There is some point, if you went a bit further over there, where you have pure steam coming out.

MEMBER KRESS: Yes. How much quality do you have left before you're at 100 percent?

MEMBER WALLIS: It would be interesting on this figure -- maybe when we get into the closed session, you could show us a boundary outside which you cannot get, because, I mean, this adding on little pieces like this presumably is getting to some boundary beyond which you can't --

MEMBER KRESS: Well, you could keep embracing the steam temperature.

MEMBER BONACA: You know, I had some questions before about margin, and the -- you know, the implication is that you can move in the region and you are not leaving any margin. But in reality, you know, think about the issue of NPSH credit. I mean, you are going in the region -- there is a price to be paid for that.

That's one of the issues that we go through, and at some point I would like to understand over the next two days what other things are there where there is margin being eaten. You are asking for approval, but it's tough to give you some of the margin to operate at this high power level.

Again, you show NPSH credit is just one, I believe, of the issues that is a result of going to 120 percent power, or 105.

MR. CASILLAS: All of that is --

MEMBER CORRADINI: May I just ask a question relative to what I heard Mario and Tom and Graham saying? And maybe summarize it this way, is that if you're fixing the inlet temperature and you're fixing the pressure, and you're essentially changing the purple region to allow yourself to reduce flow and

still maintain the same power, outside of the purple region there is a region where you do not want to go.

And I think at least for illustrative purposes that is what I hear them asking you to identify, given some fixed conditions. Whether you fix inlet temperature or inlet enthalpy and fix pressure, where are your limits? Because I think you are reducing margin.

I have no immediate feeling as to where I don't want to cross beyond. And some of it is fuel design, some of it is just simply better analysis given a fuel design. And I can't -- I'm trying to unravel how much to partition between those two. So that is I think the genesis of a lot of our questions.

MR. CASILLAS: Let me say, some of the comments seem to allude to normal operating conditions. What does the reactor do when it's operating under normal conditions? But some of the other remarks appear to be under certain postulated events, NPSH pressures and so on. And so this is two entirely different aspects of that.

The aspect of normal operation as to how do you do and what -- how do you get there, and what happens when you get there, is actually not --

MEMBER WALLIS: Yes. It would be very

useful on this figure to have some kind of a boundary which says, "In normal operation, we couldn't go outside this boundary." In the case of accidents, certain accidents restrict us to being inside another boundary. And then, we could get some idea of how close these things are to those limits. That would help.

MR. CASILLAS: And so both of those aspects will be addressed and described in --

MEMBER WALLIS: Okay. So someone will sketch -- we'll look for perhaps another sketch on this figure, what those boundaries are.

MEMBER BONACA: But clearly, you know, you cannot go out of this figure -- I mean, you cannot have more power or less -- than this. I mean, this is your bound. You are staying there. But there is an implication for all of the other systems in the plant, which are not being modified -- I mean, a number of them are modified, just to accommodate this power change, and a number of them are not.

Again, I'm referring, for example, to the pump, to the RHR pumps. I mean, they are not, so, therefore, there you are asking for credit. And before there was a regulatory margin there, and now the NRC grants you for some credit, and, you know,

which at times is questionable.

What else is out there that is not --

MR. CASILLAS: And, certainly, the increase to 120 power addressed a lot of the capacity issues, and actually MELLLA+ just -- only covers the flow, and that affects only a very limited number of areas, and that's what will be discussed. But a lot of the margin has been addressed, just by increasing the power to the 120 rate.

MEMBER BONACA: Okay. So we will not hear anything about it until the --

CHAIRMAN BANERJEE: But, obviously, the flow matters, because imagine you are talking of critical power issue. The flow has an effect on that.

MR. CASILLAS: Yes.

CHAIRMAN BANERJEE: So in any case, my suggestion is that -- if you all agree, that we defer this discussion until we go into closed session, and let them continue to give us the overview right now.

I think, though, the point that Professor Wallis made was that this overview should not be too superficial, because we are trying to actually get a picture, which is not going into the details of your technology, but we are trying to get a picture which 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

initiated within those boundaries.

MEMBER WALLIS: But you can't separate the two. The core flow is there to cool the reactor, and you can't say that it's unimportant. You've got to have enough core flow to do the job. So there is some place where you are limited, and that -- and you have got to somehow give the impression that you are not getting too close to that limit, and you know what you 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.

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

reviewing applications for plants that have mixed fuel and --

MR. CASILLAS: Yes, 9x9, 8x8 fuels.

MEMBER BONACA: Okay.

MR. CASILLAS: Correct. Yes.

MEMBER BONACA: So --

MEMBER WALLIS: And you are making more plutonium than you make in a present reactor.

MR. CASILLAS: Certainly that will -- that is important, yes.

CHAIRMAN BANERJEE: The core is faster in some sense.

MEMBER WALLIS: Well, I think those kinds of technical -- changing this, these are the things which are significantly changed, and this is why it's okay to do it. You could say that in 20 minutes in a public meeting, I think, in a convincing way. But please go on.

CHAIRMAN BANERJEE: Well, why don't we continue, then.

MS. TRAN: Okay. I just want to talk about the different LTRs that we have to support the MELLLA+ LTR program here. One is the MELLLA+ LTR itself that defines the process and the scope of work for MELLLA+. It is also addressed, identified the

area impacted by MELLLA+ and provides the disposition.

As part of developing the MELLLA+ program, we also developed the stability solution -- specifically addressed the concern of stability because we are open at a higher drop line for MELLLA+, and it's -- we call it the detect and suppression solution confirmation density, or we call it DSS-CD LTR.

In support of the DSS-CD LTR, we also provide the NRC with the TRACG DSS-CD LTR. TRACG is the --

MEMBER WALLIS: Now, while we are in this open session, could you -- you know, there are some interim methods and things here. Could you tell us, how much of this technical work has been completed? And how much is sort of promised to be completed? Isn't there some work which is interim? You're asking for an approval with a promise that you will do further work, or is all the work completed you need to do?

MS. TRAN: Yes. And I have that information actually --

MEMBER WALLIS: Can you explain that in a public meeting, how much of it remains to be finished?

MS. TRAN: Yes. I could provide the

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

that we have initially based on the work that we have done by GE.

We will have a complete discussion of these methods LTR at -- by tomorrow on the closed session.

Let's go to the MELLLA+ LTR itself. When we look at the MELLLA+ program, we essentially look at the -- address all of the scope of work that we have reviewed as part of the EPU program. Every aspect of the plans we essentially go and review all of that to make sure that the safety of the system and the plan evaluation will confirm that the effects of MELLLA+ operating still support the implementation of MELLLA+ for a plant.

It should be noted, as we discussed before, that the MELLLA+ program expanded from the -- as an increment change to the EPU program, it is not a -- go into an EPU and then go into a MELLLA+ at the same time. What we recommend and supported our customer would be to do an EPU, get that EPU license, and then request for a license change of the MELLLA+ program.

So the MELLLA+ program doesn't really change the maximum thermal power or the maximum core flow rate. And, thus, the effects of MELLLA+ are

limited to only the NSSS system, and primarily due to the core and the reactor internals performance during postulated events and the accident event.

I'll follow the EPU topic step and address. We look at all of the aspects and --

MEMBER WALLIS: Now, can you in the open session say, when you evaluate the reactor core and fuel performance and the safety performance, that these conditions that you haven't operated these plants at before, is this only a theoretical prediction, or have you done experiments to verify that at these new conditions things will be okay?

Is it only a theoretical prediction, or have you done experiments to show that, at the new conditions, things will be okay? Or is the experiment going to be performed in a reactor, operating reactor?

MS. CAMPBELL: That's some of our followup actions for the final --

MR. CASILLAS: Yes. Yes.

MEMBER WALLIS: Yes or no? I mean --

MR. CASILLAS: No. There is the -- essentially, what we will be able to show is that in -- when you operate in the MELLLA+ area, you are really not introducing any new phenomena that has not been addressed by test or predictions to --

MEMBER WALLIS: So you're saying that the tests have already been done previously in some other context?

MR. CASILLAS: Yes.

CHAIRMAN BANERJEE: So, for example, with critical heat flux, you have then tested full-scale 10x10 boundaries. Where did you do that? Will you discuss those?

MR. CASILLAS: That was --

CHAIRMAN BANERJEE: At the lower flows?

MR. CASILLAS: Correct. Yes.

CHAIRMAN BANERJEE: You will be discussing that.

MR. CASILLAS: Yes.

CHAIRMAN BANERJEE: Well, that's the operating region.

MR. CASILLAS: Correct.

CHAIRMAN BANERJEE: This is not a prediction of a code. This is a real experiment.

MR. CASILLAS: Correct.

CHAIRMAN BANERJEE: Okay.

MEMBER WALLIS: So you can reassure the public that the conditions of operation have been tested experimentally?

MR. CASILLAS: Yes.

CHAIRMAN BANERJEE: Under normal operation anyway.

MEMBER WALLIS: Normal operation, yes.

MEMBER ABDEL-KHALIK: Excuse me. Just a follow up to Dr. Wallis' question. Where has the stability been demonstrated experimentally for operation in the MELLLA+ region?

MR. CASILLAS: That is going to be also presented.

MEMBER ABDEL-KHALIK: Okay. In the closed session?

MR. CASILLAS: Yes.

CHAIRMAN BANERJEE: So there have been experiments in a facility. Oh, excuse me.

MEMBER ABDEL-KHALIK: You can say that -- in the open session, that stability of operation within the MELLLA+ region has been experimentally demonstrated without giving details.

MR. CASILLAS: Well, how we would qualify that demonstration will be explained in the closed session. And I don't think we can elaborate on how we demonstrate the stability performance and the acceptable of the -- of the systems that are part of the MELLLA+ to mitigate some of these events, unless we get into the technical details, which we'll be

doing in the closed session.

CHAIRMAN BANERJEE: So in answer -- direct answer to Professor Abdel-Khalik's question, you haven't directly done experiments to verify this. You are using some combination of experiments and analysis. That is what I read from your answer. It is almost like Greenspan talk.

(Laughter.)

I don't understand most of what you say about this.

MR. CASILLAS: Well, if you look at the operating -- at the operating map that we are expanding, the characteristics in that operating map are not any different from the remainder of the operating map. Now, there are some new conditions that you may encounter as a result of some postulated events, and that is the subject of the safety analysis. But the conditions that you will be operating are not -- are not any different than what you have --

CHAIRMAN BANERJEE: But they are not outside of your experimental --

MR. CASILLAS: Correct.

MEMBER WALLIS: But they are inside where you are now in your plants. Otherwise, there wouldn't

be a purple region. I mean, it shows that you are in a different region of operation than you are now in the plants.

MR. CASILLAS: Well, we have -- we have specified limitations for operation in that region, such that we will retain the -- we are within the experience base that --

MEMBER WALLIS: But it's not a plant experience base. It has to be an experimental facility base or something? And the plants haven't been operating in the purple region, have they? Or have they accidentally operated in the purple region and given you data?

MR. CASILLAS: No, we are talking about a lot of different areas. There's normal operation, and then there is stability margins.

MEMBER WALLIS: I guess it's all part of the same question. I mean, how much of your going into the purple region is supported by experiment, and how much of it is supported by theory?

MR. CASILLAS: Yes. And I think the question that was raised had to do specifically with stability.

MEMBER WALLIS: Well, that was the second -- he asked specifically that, yes.

MR. CASILLAS: And with respect to the stability, the stability margins, and why it represents -- it's part of our experience base, and why it's acceptable will be all presented in --

MEMBER WALLIS: But we won't know the experiment until it happens in a plant? We won't know --

MR. CASILLAS: Oh, no, no, no. That's not what I said.

MEMBER WALLIS: -- won't get data until it happens in a plant?

MR. CASILLAS: No. No, that's not -- I think all those questions will be addressed when --

CHAIRMAN BANERJEE: But, I mean, to give a direct answer to that, have you had experiments that have been done in that purple space or not? I mean, that's really -- I mean, his question relates to stability. Some other questions relate to some other issues. But it's whether in that operating region there is -- there are applicable experiments. That's really what the -- or is it all analysis, which is supported by experiments under different conditions? Do you have experiments, or not? That's --

MR. KINGSTON: We can ask Dr. Andersen to respond to that.

MR. ANDERSEN: This is Jens Andersen again.

CHAIRMAN BANERJEE: We can't seem to get the answer.

MR. ANDERSEN: When we develop, and as I had alluded to before, it is primarily the performance of the fuel that is allowing us to go to these power uprates. When we develop a new fuel product, we do extensive testing of the fuel, and we test it way beyond the boundaries that are shown in the power flow map.

So we have data that bounds the possible range where the fuel can operate. And when we get to the closed session, I'll be happy to show you some of that.

CHAIRMAN BANERJEE: Okay. So you have experiments.

MR. ANDERSEN: Yes.

CHAIRMAN BANERJEE: That's the direct answer.

MR. ANDERSEN: Yes.

CHAIRMAN BANERJEE: All right.

MEMBER WALLIS: An answer of yes a few minutes ago would have been good.

MR. ANDERSEN: Right.

(Laughter.)

CHAIRMAN BANERJEE: We will hold you to that, Jens.

MR. ANDERSEN: Okay.

CHAIRMAN BANERJEE: Both stability and --

MR. ANDERSEN: I hope I can satisfy you. All right.

MS. TRAN: So the scope of the MELLLA+ program that we defined consists of looking at the applicable fuel performance area, including fuel thermal limits instability, so it's some of the example. We also looked at the core cooling and connected system to confirm the acceptability of the MELLLA+ to the system. And the engineering safety features will address the impact of MELLLA+ on containment, on ECCS system, and standby gas treatments and other engineering safety features.

On the instruments, patient and controlled setpoints, we look at the impact of MELLLA+ on the --

MEMBER WALLIS: I'm sorry. You've got a long list here, but some of this you don't do, you leave it up to the plant. The plant has to do a plant-specific analysis of some of these things, and we don't get to see that yet.

MS. TRAN: This MELLLA+ LTR program

defined the process and the scope of the work.

MEMBER WALLIS: But you talk about connected systems, and a connected system core coolant involves also, say, NPSH of the core spray pumps, right? That's a connected system and a safety feature and all that.

MS. TRAN: Yes.

MEMBER WALLIS: And this is something which you are not going to talk about, I think, because it is going to be left up to the plant to show. Each plant has to show that that's okay.

MS. TRAN: Yes. A plant-specific --

MEMBER WALLIS: So there are some features of this that are very plant-specific, which we are not able to review at this time.

MS. TRAN: A plant-specific application will perform all of the analysis. In the closed session, we will -- I will provide additional information.

MEMBER WALLIS: This is one of the difficulties I think we are going to have is that we are going to be asked to approve something, but part of the package isn't there yet, but it has to be done by each plant independently.

MS. TRAN: We do have a demonstration

calculation that we perform, and it --

MEMBER WALLIS: Are you going to show us those?

MS. TRAN: Yes, we will show it to you at the closed session.

MEMBER WALLIS: Thank you.

CHAIRMAN BANERJEE: So you will at least separate for us what is plant-specific and what is not --

MS. TRAN: Yes. Yes. I will go into --

CHAIRMAN BANERJEE: -- so we can understand that.

MS. TRAN: That's correct. This is to a summary of the scope of work that we have identified that the plants will have to be looked at during the applications.

CHAIRMAN BANERJEE: For example, if you need containment overpressure credit, this would be specific to the plants, right?

MS. TRAN: That will be plant-specific.

MEMBER WALLIS: But if it turned out that MELLLA required a very large containment overpressure from any typical plant, I think we ought to know that.

MS. TRAN: Yes. A plant-specific -- most of the -- all of the analyses that we identify as

impacted by MELLLA+ will be evaluated and completed on a plant-specific application. At this time, we do not have any MELLLA+ plant-specific applications submitted to the staff.

MEMBER WALLIS: Well, no. We have Vermont Yankee here, and we had a long discussion about the containment overpressure.

MR. BOLGER: This is Fran Bolger. The NPSH situation is not exacerbated by MELLLA+.

MEMBER WALLIS: I think it is. I think I read it in their -- well, we'll get to that in the specific thing when -- this seemed to be exacerbated in the report I read, that --

MR. CASILLAS: That is correct. I think what we are trying to say is that all of the areas that could be impacted in the reactor design areas have been reviewed, and we have -- we have summarized those areas which are actually impacted or affected by MELLLA+.

MEMBER WALLIS: Well, let's take Vermont Yankee. I understand Vermont Yankee -- I want to ask you this question. Can I ask you -- I'm sorry. I want to get back to my question, because you don't seem to be focusing on it.

When Vermont Yankee was here, we spent a

long time on containment overpressure. Now, they conceivably can go into this MELLLA+ region if the NRC approves it.

MR. CASILLAS: Yes.

MEMBER WALLIS: And they can come back with another request for containment overpressure, presumably. Now, we'd like to know before I think -- I'd like to know before I approve MELLLA+ what kind of, you know, problems I'm going to have when something like Vermont Yankee comes in and wants to use it.

MR. CASILLAS: Yes. But you're assuming that there will be additional overpressure --

MEMBER WALLIS: Well, I think I read something like that in one of these things that we're going to talk about in the closed session.

MR. CASILLAS: And that is --

MEMBER WALLIS: That will be clarified then.

MS. TRAN: We will provide a discussion of the containment in --

MEMBER WALLIS: Well, not only a discussion. You will give us some numbers, will you?

MS. TRAN: Yes. We have some calculations that --

MR. CASILLAS: Yes.

MS. TRAN: -- we performed for some of our -- the actual --

MEMBER WALLIS: See, it may well be that you'll reassure us perfectly in the closed session.

MR. CASILLAS: Yes.

MS. TRAN: Yes.

CHAIRMAN BANERJEE: That's why we should get through this and --

MEMBER WALLIS: I'm sorry. I'm --

CHAIRMAN BANERJEE: No. I think these are good questions to flag. So --

MS. TRAN: So, essentially, this is a list of all of the aspects of the plants that we have reviewed for the generic program as well as identifying the plant-specific scope of work that needs to be completed on a plant-specific application. And also, confirmation --

MEMBER WALLIS: But this thing, it doesn't ensure that the limits are met for plant-specific application, because some things require additional plant-specific analysis.

CHAIRMAN BANERJEE: Yes. There is confusion between what you are asking for approval for and what is plant-specific, clearly.

MEMBER WALLIS: And we understand that the fuel --

CHAIRMAN BANERJEE: There are generic aspects.

MEMBER WALLIS: -- the fuel loading analysis is all plant-specific. The fact that you can actually implement this is left up to the plant --

MS. TRAN: Yes.

MEMBER WALLIS: -- because they have -- this fuel loading becomes a very critical matter.

MS. TRAN: That's correct. The LTR provides the process and the road map for a plant-specific application. What we view as --

MEMBER WALLIS: But this seems to leave an awful lot up to the plant.

MS. TRAN: Well, we do have a demonstration calculation to provide the disposition of our assessment on the impact of MELLLA+ on each aspect of the plan. We do have the actual calculation that we will provide in the closed session.

MR. CASILLAS: Yes, but it's less than a half a dozen areas that are specifically -- that need to be specifically addressed on the plant-specific application. All the other two dozen areas are described in the generic process, such that you do not

-- you do not have to rereview those when you do the plant-specific -- only the areas which are critical to the plant application.

And for those areas that are critical, we will present you results of the studies that have been done and the very clear formulas that will be addressed in the plant-specific in the criteria that it must meet.

CHAIRMAN BANERJEE: This is -- today you are going to do that?

MS. TRAN: Yes, within today.

CHAIRMAN BANERJEE: And tomorrow --

MS. TRAN: This afternoon.

CHAIRMAN BANERJEE: -- what is the --

MS. TRAN: Tomorrow focus on the discretional method.

CHAIRMAN BANERJEE: Methods.

MS. TRAN: Yes.

CHAIRMAN BANERJEE: And today you'll show us some calculations.

MS. TRAN: That's correct.

CHAIRMAN BANERJEE: So why don't we continue, then.

MS. TRAN: Yes. And let's go to the next slide where we said that the MELLLA+ LTR is --

actually defines the process for a plant-specific application to ensure that the design, the regulatory and licensing limits are met for plant-specific application.

And it allows the more efficient NRC review on plant-specific application, because it is already defined what plant-specific analysis needs to be completed for an application. This doesn't mean that it's an LTR provided any plant can go and implement MELLLA+. It only defined the scope of work for each plant-specific application.

MEMBER WALLIS: Are you going to explain to us how it enables us to be more efficient?

CHAIRMAN BANERJEE: I think that's --

MEMBER WALLIS: I think it's -- that's a bold statement, that you're going to make the NRC more efficient. Let's move on.

MR. CASILLAS: Again, it was -- what I tried to summarize is that in the plant-specific we will identify, as part of this LTR process, the reduced -- that it's important for the plant-specific application only, and that is where the efficiency is about. But we will not go back and review all of the potential areas that are not affected.

MEMBER WALLIS: Thank you.

MS. TRAN: And let's talk about the Methods LTR Rev 0. The Methods LTR Rev 0 provides a licensing basis for applicability of GE methods for what I would call the near-term licensing application. It addresses NRC questions. And as I mentioned earlier, when we performed the work for the generic MELLLA+ LTR program, we reviewed our codes and methods, assured that it could -- it's applicable for MELLLA+ application.

And because the NRC raised some questions, we worked with the NRC to ensure that we provide the additional margins to the -- set the limits in an interim until we can provide the NRC with the additional measurement data, until such time this LTR will provide the process and the scope of work and the information each plant-specific application on MELLLA+ and EPU would need to provide to the staff for their application.

MEMBER ABDEL-KHALIK: Could you please elaborate? What does that mean? Including additional margin at interim basis -- what does that mean?

MEMBER WALLIS: Are these the .02 and .03? Is that the ones you need?

MS. TRAN: Yes. These are the .02 and .01, added to the --

MR. CASILLAS: Fuel operating limits.

MS. TRAN: Yes, fuel operating limits.

MR. CASILLAS: That will be in excess of those calculated with our current methods.

MEMBER ABDEL-KHALIK: I understand that.

MR. CASILLAS: Yes.

MEMBER ABDEL-KHALIK: But what does the statement mean -- "including additional margins as interim basis" mean?

MS. TRAN: We meant that we -- it is our intent as part of the MELLLA+ program and the review of the methods, we plan to submit to the staff the additional information that the staff was having questions. We intended to provide this data as soon as possible, so that we could justify that the original work that we've done, reviewed by the NRC, that our codes and methods are applicable to MELLLA+ without the additional margin, so that we can essentially remove the margin that is now being imposed on our -- on the plant-specific application.

MS. CAMPBELL: This relates to the limitations and conditions, and we are going to have those as an interim application until such time that we come back to the NRC with additional information. And those are all identified, and we've interacted

with the NRC on what additional information they will need and all that --

MEMBER WALLIS: This is one of the things we talked about earlier, that there are some things that you have not yet completed. We have to perhaps have the faith that you are going to do it right.

MS. CAMPBELL: There are some confirmatory data. We'll be talking about that. Brian Moore is going to address that.

MR. MOORE: This is Brian Moore from GE. During the review on the methodology capability, concerns were raised by the staff on the particular areas which formed the validation bases. We then entered into a procedure of basically expanding the uncertainties to address those regions, resulting in additional margin, to cover the concern, basically taking a very conservative approach in our standard licensing methodology framework to introduce basically a buffer that would allow the NRC to go forward, basically introducing padding to address the NRC concerns specifically related to each area.

MEMBER ABDEL-KHALIK: The big picture -- you are not adding margin. This whole process takes away margin.

MS. CAMPBELL: Well, we are limiting where

we go with these limits.

CHAIRMAN BANERJEE: I think it's just the wording here.

MR. MOORE: If I may, one of the -- the BWR is the limits -- the thermal limits are not based on the core power and flow. They are based on the bundle power that relates to critical power, the fuel rod performance which relates to the linear heat generation rate, and basically the stored energy, which rolls to LOCA.

And so you can say you're going into a power flow map that we have not seen before, but ultimately the speed limits are based on those fundamental categories. So when we introduce additional margin, we are introducing it specifically on the safety limit MCPR, and the operating limit MCPR, which address, you know, basically just the bundle critical power flow ratio.

MEMBER WALLIS: I think we'd like to know how close you are to those limits. In other words, what is the margin?

MR. CASILLAS: Okay.

MEMBER WALLIS: And I noticed in the -- that you are promising to treat uncertainties with a 95/95 or 95 percent confidence that you -- 95 percent

-- you are in the 95th percentile. That's a very stringent requirement. Are you really going to be able to do that for us on --

MR. CASILLAS: We are not changing any of that. It's the same as what we --

MEMBER WALLIS: You have to have a lot of data to get to that sort of confidence in probability.

MR. MOORE: If I may, the specifics of that are part of the interim methods LTR, and the procedure by which we've done that we'd like to maintain is closed information.

MEMBER WALLIS: Yes. But I think that you could reassure the public that the method that you promise to use is a very stringent one.

MR. MOORE: That is correct.

CHAIRMAN BANERJEE: Let's go on.

MS. TRAN: I think that's --

CHAIRMAN BANERJEE: That's it?

MS. TRAN: -- that's the end of the presentation.

CHAIRMAN BANERJEE: Well, I -- also, you covered the topical report content summary in this or you --

MR. CASILLAS: Right.

CHAIRMAN BANERJEE: -- have something more

to say about that?

Okay. So, then, thanks very much, and I will ask the NRC staff, then, to come. And we get back into a discussion of this as a closed session, then --

MS. CAMPBELL: Yes.

CHAIRMAN BANERJEE: -- after the break.

MS. ABDULLAHI: Maybe I can sit here, so --

CHAIRMAN BANERJEE: We would rather look at you than Corradini.

(Laughter.)

MR. CARUSO: We can't hear you, Mike.

MEMBER WALLIS: Could you please get Mike Corradini on the phone properly? We can't hear him. Don't make it deafening.

MEMBER CORRADINI: I was following most of this, trying to be quiet since we're in open session, but then somehow I went totally dark.

CHAIRMAN BANERJEE: Oh. You didn't hear the last part of it, or what happened?

MEMBER CORRADINI: The last few minutes, but that's all right. Ignore that. Just -- I'm following.

CHAIRMAN BANERJEE: All right. So we'll

be back into closed session after the break, so --

MR. CARUSO: We're still in open session.

CHAIRMAN BANERJEE: We're still in open session. Okay. Please. I'm noticing we're running half an hour behind. We're running a little bit behind time, so --

MEMBER WALLIS: We've seen that before.

CHAIRMAN BANERJEE: Yes. It will just mean that we go up to 7:00 this evening rather than 6:00.

MS. ABDULLAHI: Hi. I'm Zena Abdullahi. I'm the lead reviewer for MELLLA+ and methods. This review was done with a lot of ORNL staff and also BNL staff. There have been also many NRC staff that are not presenting today that have contributed to it, and I just want to mention that some of the staff members are Tony Nakanishi, Len Ward contributed some work to it, Paul Clifford, and I just want to say that the work -- the fact that we are presenting these things doesn't mean that we are the only people who worked on it.

CHAIRMAN BANERJEE: Are some of them here?

MS. ABDULLAHI: Tony Nakanishi is right --

CHAIRMAN BANERJEE: I don't see Len Ward. Is he here?

MS. ABDULLAHI: No, he is not. He will be here tomorrow for the methods.

CHAIRMAN BANERJEE: Okay.

MS. ABDULLAHI: And Paul Clifford, who helped with the thermal mechanical. Plus, we had ORNL and BNL.

I would like to start out in this opening session that the NRC staff did find the steady progression of BWR operating conditions, or we were cognizant of that, and with the MELLLA+ we were worried and spent a lot of energy and time trying to assure ourselves that it is feasible and possible to operate under these conditions.

What we also did is we tried to do confirmatory analysis. Now, I'm not talking on the slide yet, so I'm just giving you an overview of the issues that I heard you discussing with GE. We try to do confirmatory analyses, and now what we are approving is Rev 2.

Now, we were not reviewing these topical reports since 2002 steadily, but there has been a progression of times where things had to be done and it was put on hold until something is done, plus the 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

where we are -- their information that we would like -- like margins, what we call the adders or the penalties some people call it, that you add, and those you want to document it right there also for your users as well as make it clear this is what needs to be done. And it's sort of a legal way of making it done.

The third aspect is -- and which is what you're asking me is, well, why don't you wait until you finish -- they finish all the work. Well, if you really look at it, we also looked at this topical report and the methods. And the methods is actually applicable to EPUs, and plants with EPUs are operating today with EPUs.

So when you review something, you basically look at it, see the safety significance of it, and then you come to a conclusion on what -- would this additional change make it more acceptable? We call it reasonable assurance. Well, give me the reasonable assurance.

Now, it doesn't mean that the GE, if we -- we have to have a commitment, we won't let them -- they would have to meet those commitments as well.

Okay. I just -- because of that discussion, I felt I had to say this.

Now, this is the power flow map, and you already saw it. Now, the difference between this one -- where are you? You don't have that one? Okay. Again, this is the two LTRs and the EPU and how they interconnect together. The MELLLA+ topical report is interconnected by the state -- supported by the stability topical report, which is supported by the DSS-CD topical report.

For instance, some of the improvements or worries that people had about MELLLA+ is the reason that DSS-CD is being used to support it. Okay? So MELLLA+ -- for instance, you cannot use option 3 as of now, as it stands. Okay? So these are some of the improvements that have gone into it.

The interim method goes into -- it supports the EPU and MELLLA+ plant-specific applications.

MEMBER ABDEL-KHALIK: So let me just try to understand this process. As a part of this review, did you go back and look at the TRACG report, that 33147P?

MS. ABDULLAHI: This is a specific application that came in and was reviewed and approved by the staff. And I will let Jose explain it. It is only for DSS-CD.

MR. MARCHE-LUEBA: The answer is yes. Yes, that report was reviewed and approved.

MEMBER ABDEL-KHALIK: Previously.

MR. MARCHE-LUEBA: During the DSS-CD review, as part of the DSS-CD review, which has already been completed and issued, the application -- for the DSS-CD application, we needed to approve some calculations performed by TRACG to demonstrate that the DSS-CD performs. And we found out TRACG had -- was not approved for that application, so we required them to submit a qualification report for that application.

CHAIRMAN BANERJEE: So it's a specific application approval, correct?

MR. MARCHE-LUEBA: Correct.

CHAIRMAN BANERJEE: It's not a blanket approval.

MR. MARCHE-LUEBA: It's not a blanket approval, and you will see in the closed session a slide that has all of the specific applications where TRACG is allowed to be used, and there is more than you probably know. These are --

CHAIRMAN BANERJEE: Well, you are saying it's acceptable, but it's not approved.

MR. MARCHE-LUEBA: Approved. It's

approved.

CHAIRMAN BANERJEE: Approved.

MR. MARCHE-LUEBA: Approved.

MS. ABDULLAHI: This one.

MR. MARCHE-LUEBA: There are at least five different TRACG SERs for specific applications like this one.

CHAIRMAN BANERJEE: Okay.

MEMBER WALLIS: Would you say what you mean by the word "interim" in there or what you understand by the word "interim" in that --

MS. ABDULLAHI: Yes, that's a good question.

MEMBER WALLIS: -- right-hand side there?

MS. ABDULLAHI: Yes. The term -- we have reviewed what was generally called at the time generic topical -- generic methods, referred to as generic methods, and at that time we reached the conclusion that additional validation data would be useful and good to -- we would need additional validation data.

So this interim method stems from the fact that in order to -- in lieu of those additional validation data, they will take a penalty, or they will take additional uncertainty increases. And that is the difference between interim and generic.

MEMBER WALLIS: Have you spelled out --

MS. ABDULLAHI: Let me ask -- hold on. Am I going into proprietary?

MEMBER WALLIS: Have you spelled out what they need to do in order to move from interim to final? Have you spelled out the requirement in some way?

MS. ABDULLAHI: Well, this is one of the things that the interim will -- the limitation do is they tell you -- in the SE it explains what is missing and what we expect to achieve. Now, have we sat down and wrote to them exactly the details? We have not in this case. But it's very apparent. It is known what needs to be done. And they are in progress, and they have given us a presentation of where they are.

MEMBER WALLIS: A draft of a thesis where you say it looks okay but you've got to do all of these various things before we'll sign it?

MS. ABDULLAHI: No. It's different. It's basically data that they are in progress of doing it. They made a commitment, an official letter commitment that they will do those datas, and they are providing those information.

Now, I do not know if I'm crossing the line into proprietary and non-proprietary.

CHAIRMAN BANERJEE: Well, let's take a broader question here, then. But look at it this way. I guess you are -- you want an ACRS letter at the end of the day, right?

MS. ABDULLAHI: Yes.

CHAIRMAN BANERJEE: Which will come in front of the full committee in June and --

MS. ABDULLAHI: Right.

CHAIRMAN BANERJEE: -- we will report to the subcommittee, of course, but the reason this is happening is for Hope Creek, I presume, at this time, right? So have things been resolved sufficiently that the staff now feels that this method is -- I mean, I want a broad view of this -- to be taken forward to the full committee for approval and then to apply it to Hope Creek? Or at least so that we can consider Hope Creek under this methodology?

MS. ABDULLAHI: I think that I do believe that, yes, there is a sufficient understanding in which now we can go forward with the methods and apply it to Hope Creek.

MEMBER WALLIS: There's an assumption that this additional data which GE is going to acquire is going to validate these interim methods. That seems to be an assumption.

MS. ABDULLAHI: Well, it's really -- the way I look at it it's slightly different. It's saying, okay, we will put an additional margin on these safety limits, regulatory limits. What matters down the stream and make sure that you meet, you know, GDC-10, okay? On the other hand, the vendor, or GE in this case, will be getting additional data. They are of an opinion that they are fine, that they are -- you know, that they have good enough methods. So this is part of the review process that you go through.

So if we give them back -- if they will -- they send us a commitment, they said they will do it. Now, they have started it. They have put in a -- given us several presentations in which they have shown us that data. And so it's not something that is actually long-term, and I think you can look at it from another side. It's some --

MEMBER WALLIS: It seems like he was talking, but we can't hear him. Is that right?

MR. CRANSTON: This is Greg Cranston. I want to just interrupt for a second in conjunction with Hope Creek. Hope Creek is proceeding along for EPU and the MELLLA+, but it is not contingent upon approval of anything that is happening here today.

We are moving in a parallel path, and we

are approaching this on a plant-specific basis at the same time using the methods that are described in these topicals. But if for some reason there are still some open items or issues of concern, Hope Creek will still proceed and we'll be reviewing it on a plant-specific basis.

So, and we have alerted them to that fact, so that they are not held up schedule-wise should there be any issues that we need to further pursue.

CHAIRMAN BANERJEE: Right, because I think you can't assume that there won't be some issues.

MR. CRANSTON: Yes. Correct.

CHAIRMAN BANERJEE: Right.

Can we continue on approval of everything?

MS. ABDULLAHI: No. No, we -- Vermont was the case -- Vermont was a case of --

CHAIRMAN BANERJEE: Vermont was just an EPU.

MS. ABDULLAHI: Right.

CHAIRMAN BANERJEE: It was not MELLLA+.

MS. ABDULLAHI: No, no. Vermont EPU had a method. It was a plant-specific method. The interim method is sort of a parallel of Vermont Yankee. Now, I don't know what -- exactly where I was in the question you asked, but if I can proceed --

CHAIRMAN BANERJEE: When is the Hope Creek power uprate subcommittee meeting set for, then, right now?

MR. CARUSO: August.

CHAIRMAN BANERJEE: August?

MR. CARUSO: August. It has moved to August.

CHAIRMAN BANERJEE: Okay. Carry on.

MS. ABDULLAHI: I don't know if I answered the last question, but what --

CHAIRMAN BANERJEE: I think it's sufficient.

MS. ABDULLAHI: Yes, okay. Yes, there is an incentive. When you put a margin uncertainty -- when you put a margin on certain parameters, nobody wants to keep that extra margin, so there is incentive to get the data and move forward.

If we go to slide I guess 3, what we intended to do is define what MELLLA+ operation entails, establish some of what we consider to be significant impacts on fuel-dependent analyses, and present some of our bases for safety finding. And tomorrow what we want to do is support EPU and MELLLA+ application, discussing significant methodology topics reviewed, and present bases for the staff safety

findings.

Of course, you saw this power flow map, and --

MEMBER WALLIS: I haven't seen this. But I haven't seen this red point before.

MR. MARCHE-LUEBA: Yes, that's right.

MEMBER WALLIS: What is that red point up there?

MR. MARCHE-LUEBA: This is Jose Marche-Lueba. Develop -- we've talked in previous meetings about the rod lines. This is the 100 percent rod line, which approximates what the reactor will do when you change the flow. If you start on 100 percent power, 100 percent flow, and you change the circulation flow slowly so that you maintain the equilibrium, you will follow this line approximately, because every day -- on Tuesday you have a different coefficient than on Wednesday. So there is a margin around it.

The MELLLA+ line, it was called now, if you extrapolate it to 100 percent flow it will heat 132 -- 138 percent power. So MELLLA+ operation is at the 138 percent rod line.

CHAIRMAN BANERJEE: So, Jose, can we expect with further subdivision that one day they will

come to 138, and then they will go this way?

(Laughter.)

And then, drop off?

MR. MARCHE-LUEBA: That's for the industry to say, but I think it would be very expensive to get there.

MEMBER WALLIS: But not only that, Jose, they have a higher flow. I mean, they showed us a yellow region, which went to 110 percent flow or something. Now we're going to be up to 150 percent power or something. I mean, why did you show this? They are not going to operate at the red point, are they?

MR. MARCHE-LUEBA: Your concern was power to flow ratio.

MEMBER WALLIS: Yes. But they're not going to operate at the red point.

MR. MARCHE-LUEBA: No. But is the power to flow consistent with operation of 138 percent power. So that's -- so you have a mental picture in your mind, this is a power to flow ratio consistent with operation of 138 percent.

MS. ABDULLAHI: So when we discuss later on some of the safety analyses, and we say certain statements, this line will sort of give you an

understanding of why.

MR. MARCHE-LUEBA: My concern when we worry about obvious instability is you're operating at the core, and then you will --

MEMBER WALLIS: So if the operator is on this rod line, and he somehow or other mistakenly increases his flow rate, he will go up to that -- towards that red point.

MR. MARCHE-LUEBA: If you were to have a pump uprate, whatever it's called -- upshift -- no, it is not upshift -- increase of pump speed you will hit the scram setpoint of --

MEMBER WALLIS: Scram would not let you get up there.

MR. MARCHE-LUEBA: Yes. Your APRM scram will hit you before that.

MEMBER WALLIS: Do you have any idea of where the boundary is outside which you can't operate this thing? We asked that in --

MR. MARCHE-LUEBA: No. And nobody does, because you -- during -- I've been quiet for the last hour, and I wanted to champion -- you got into the line power to flow ratio, and what counts is what power to flow ratio has the hot channel. Okay? Your limit is set by the hottest channel, not by the core

average.

And the way these plans that are here -- I want to be able to operate these by spending a lot of money, buying a lot of fuel during the reload, and being able to redesign their core so that they flatten the power distribution and they are able to keep the hot channel where it was and bring more channels close to --

MEMBER WALLIS: So that means that the -- yes, I'm sorry.

MEMBER KRESS: Yes. That brings to question the idea of reduced margins. It appears like the hot channel has the same margin, but we're bringing a lot more of the fuel a lot closer to these margins, so you actually do reduce margins.

MR. MARCHE-LUEBA: You do reduce the core margin, correct.

MEMBER KRESS: Yes, the core margin.

MR. MARCHE-LUEBA: Correct.

MEMBER KRESS: We need to make that point, because we've seen --

MEMBER CORRADINI: May I --

MEMBER KRESS: -- keeping the same margin.

MEMBER CORRADINI: May I ask a question that follows on Tom's question? So when you said the

hot channel, we're talking the hot assembly.

MR. MARCHE-LUEBA: That is correct.

MEMBER CORRADINI: Okay. And so just to give me a rule of thumb, we're talking, what, 300 assemblies?

MR. MARCHE-LUEBA: Up to 800 assemblies in the core.

MEMBER CORRADINI: Okay. I'm sorry, 800, excuse me. So just to follow Tom's point, if what you're saying is the case, that now we're -- by flattening the power, and having more channels operating near the limit, then it's going to be a combination of three things -- knowing how your fuel behaves, knowing to monitor, and then, finally, a reduction in the margin simply because they are all operating closer to it.

So have you -- I guess I will repeat my question to you that I asked earlier, which is the partitioning between essentially more surface area, fuel pins going from 7x7 to 10x10, which essentially then changes one of your limits, to better monitoring to essentially -- I'll use Sanjoy's words -- sharpening your pencil and doing a better analysis. I'm trying to get a feeling for which of these is dominant, or they're all equally causing you to have

this ability to move into that trapezoid MELLLA+.

MR. MARCHE-LUEBA: The number one item was -- that you said before was the change from fuel from 7x7 to 10x10. That allows you to --

MEMBER CORRADINI: Right. It essentially increases by a factor of two your surface area.

MR. MARCHE-LUEBA: Yes. The other item which was not discussed previously is our ability to analyze core, core reloads, with faster computers.

MEMBER CORRADINI: Right.

MR. MARCHE-LUEBA: In the 1970s, it had to be done by hand, and it was a black art to be able to know where to put the new assemblies. Now they are able to iterate and optimize the assembly reloading, so that they can get these flat power distributions that they need for operation in that core.

And as I said before, that cost them a lot of money, because you flatten this core by throwing away fuel that you could have still used and putting brand-new fuel in there. So it is a lot of money. The utilities are spending money to get there.

CHAIRMAN BANERJEE: But all this means that the fuel is faster, because the diameter is --

MR. MARCHE-LUEBA: That is correct.

CHAIRMAN BANERJEE: -- smaller. There is

going to be more plute in the core because it's flattened. So the delayed neutron fractions also change, so the whole thing is becoming much less stable core. It's a flatter core.

MR. MARCHE-LUEBA: The stability is really bad for -- there's a big impact on the instability. You will see that on --

MEMBER CORRADINI: Can you repeat that, please?

MR. MARCHE-LUEBA: There is a big impact on the thermal hydraulic instability, the stability of the core. You will see that on the presentations we will give in the closed session -- tremendous impact.

MS. ABDULLAHI: If I go back on the -- look at slide 5 --

MEMBER WALLIS: Can I go back to something he said, though?

MS. ABDULLAHI: Sure.

MEMBER WALLIS: I mean, do you say now it's not just one assembly which is the hottest channel. They're sort of spreading it out, so there are now lots of hottest channels.

MR. MARCHE-LUEBA: Yes.

MEMBER WALLIS: So if you were wrong in some way, instead of having one channel have fuel

damage, you might have many channels have fuel damage, if you were somehow wrong in your prediction of the limit.

MR. MARCHE-LUEBA: That is correct.

MEMBER WALLIS: So there is something really lost here in margin that -- it's not sort of margin to an accident, it's in a margin to an event which might somehow be more extensive in the core.

MR. MARCHE-LUEBA: Somehow that is built somehow into the safety limit, that that --

MEMBER WALLIS: But that's not the same thing. I'm just having a safety limit for the hottest channel. Doesn't say how many are allowed to get close to it.

MS. ABDULLAHI: Actually, if I may expand on this, there are different limits, right?

MEMBER WALLIS: Is there some core-wide limit?

MS. ABDULLAHI: There are different limits. Well, some of the limits are fixed, right? And those limits are the linear heat generation rate. Okay. For those particular limits, we require that, you know, they maintain the certain regulatory requirements that they have to meet, and that's where the limit is coming from.

In those cases, the bundles will be operating. We have to operate within the limit, basically. The fixed power -- the fixed kilowatt flow to exposure line, okay, now if they're going to tell me that's -- it's proprietary, I don't know. I don't think it is proprietary.

The second thing is the SLMCPR requires that 99 -- according to NRC requirements, 99.9 percent of the fuel rods avoid boiling transition.

MEMBER WALLIS: According to some prediction.

MS. ABDULLAHI: According to some prediction, some --

MEMBER WALLIS: 99.9 are just close to the limit.

MS. ABDULLAHI: -- experiment.

MEMBER WALLIS: Then, if your prediction is off, there is uncertainty in that prediction.

MS. ABDULLAHI: Exactly. And which is what we focus in the methodology, really, was trying to assure us, and, of course, we need to get the similar assurance, you know, through this process, that, in fact, that a slide underprediction or -- would not get us to a point where we may not --

MEMBER WALLIS: See, I think I read

something. I don't want to get into anything proprietary. I think I read something in your evaluation about the uncertainty in this prediction.

MS. ABDULLAHI: Yes.

MEMBER WALLIS: And it's not just a question of 99.9, but it is a flatter call -- you have to figure that in in figuring out how much of the core might -- did you -- I assume we are going to get into that.

MS. ABDULLAHI: We are going to get into that, and I guess for the public I want to add that when they do the -- when you calculate the SLMCPR, it would be -- since you only allow one out of the whole, you will make sure that the limit you come up with takes into account the number of --

MEMBER WALLIS: How do you allow one out of a whole if 99 percent are all the same, and they are close to the limit? How can you -- it's either 99 or nothing. It's not one.

MEMBER BONACA: The theory, I mean, it has a statistical basis in fact.

MS. ABDULLAHI: Right.

MEMBER BONACA: And so, therefore --

MS. ABDULLAHI: 95 --

MEMBER BONACA: -- the more pins you have

closer to the limit the more you are likely to have a certain amount of fuel damage, I mean, in transients.

MS. ABDULLAHI: Right.

MEMBER BONACA: So, but you considered that.

CHAIRMAN BANERJEE: So I think the issue that --

MS. ABDULLAHI: GE has -- wants to make a statement here.

MR. COLEMAN: I'm Mark Coleman from GE. The statistical limits are what are making the sense at the moment. We have conditions such that we are not going to let any more than .1 percent of the fuel rods, the entire core, no matter how they spread out among the bundles are going to go into volume transition.

And then, if you have more bundles and more rods near this limit, then statistically we have to show that we are still going to have .1 percent, which means that you would have a higher safety limit then. So you'd have more margin built in by way of the changing of the actual safety limit, which assures that no matter what the condition is, the core condition, that if you do have an accident -- not an accident, but a transient occur, then you would not

have any more than .1 percent of the fuel rods actually reaching that limit. So it is all taken into account in the safety limit methodology.

MEMBER WALLIS: Now, in the closed session, are you going to show us --

MEMBER BONACA: That is applied to the individual cores.

MR. COLEMAN: Yes. Yes, and we will go over that --

MEMBER BONACA: The global limit that -- you are assuming that.

MR. COLEMAN: Yes. So, really, there is no degradation in the overall margin to that .1 percent.

MEMBER WALLIS: So in the closed session, you are going to show us how you get this -- this assurance and you're going to show us data on volume transition at the conditions that you're going to have?

MR. COLEMAN: Yes, we will.

MEMBER WALLIS: Because it's rather remarkable to get such a good prediction of volume transition.

MR. COLEMAN: We will show that, and we will have the appropriate discussion of the

uncertainties.

MEMBER WALLIS: Okay. Thank you.

MEMBER ABDEL-KHALIK: Let me ask another sort of big picture question. What sets the knee of the curve?

MR. MARCHE-LUEBA: The 55 percent hot?

MEMBER ABDEL-KHALIK: Right.

MR. MARCHE-LUEBA: You may need to ask GE. It's an arbitrary number, just by the fact that it is now 52.1.

MEMBER ABDEL-KHALIK: Right.

MR. MARCHE-LUEBA: And I've heard it was -- the stability region is somewhere out here, and it was picked high enough so it wouldn't cross it. The other thing -- well, you have to ask GE why they picked an arbitrary number.

MR. CASILLAS: This is Jose Casillas. That map represents the maximum boundary, but -- and it's selected -- it's balanced between safety margins and operational flexibilities. And so the studies that were performed to define that was to obtain a balance for that, and the specific application of the plant will select just what they will be using for that.

MEMBER WALLIS: Suppose you moved it down

to 40 percent core flow? Could you, in a public session, say what would happen? What would we -- what would happen if you removed that rod line down, that 138 power rod line down to 40 percent power?

MR. CASILLAS: Any expansion, either on the upper or lower boundary, will produce -- will create greater challenges on different aspects of the safety analysis or the operation.

MEMBER WALLIS: Well, this isn't stability which is limiting you, really?

MS. ABDULLAHI: Yes. It's --

MEMBER WALLIS: Can you be specific about what is --

CHAIRMAN BANERJEE: He said no, it's not stability.

MEMBER WALLIS: It's not stability.

MR. CASILLAS: No. No, there is --

MS. ABDULLAHI: Go ahead.

MR. CASILLAS: There is other considerations which will be discussed -- presented for that.

MEMBER WALLIS: But can you tell the public something about what you're avoiding by having the knee there? You can't?

MR. CASILLAS: Clearly, there are several

areas of the safety analysis that are impacted by having lower core flow. Stability is only one of those, and they will all be discussed and presented.

MR. MARCHE-LUEBA: In the closed session, you will see what happens to the critical power ratio as you treat the pumps, and then you see that as you reduce the flow you gain critical power ratio. So you gain margin at the lower flows, because you have lower power.

MS. ABDULLAHI: Let me try to slide in here and explain one thing. I'm going to give you your answer.

MEMBER ABDEL-KHALIK: Just to clarify things, at the end of the day, we'll understand why the knee is set where it's at.

MR. CASILLAS: At the end of the day, we'll see whether all of the areas that are impacted by where -- by setting that -- the knee where it's at, why it produces a reasonable compromise for all of the areas.

MEMBER WALLIS: So when my colleague at the university asked me why I approved this and says, "How did they justify this knee?" am I allowed to tell this colleague anything?

MR. CASILLAS: Yes.

MEMBER WALLIS: What am I allowed to say? I mean, you are just saying it is all kinds of considerations, but --

MR. CASILLAS: Yes.

MEMBER WALLIS: -- that's not a very reassuring --

MR. CASILLAS: It's a balance between the benefits of expanding the map and the penalties and the consequences of expanding the map.

MEMBER WALLIS: Yes.

MR. CASILLAS: And the benefits will be presented by the core performance, and the challenges will be presented by the safety analysis. It's --

MS. ABDULLAHI: Y.C. Jiu, did you want to say something as well? I saw you --

MR. JIU: Alan.

MS. ABDULLAHI: Alan, sorry. Alan, I just saw him there. Okay.

I will just add that although the details we cannot say right now, that there are specific safety analyses that will be affected at that point.

MR. CASILLAS: Yes.

MS. ABDULLAHI: And I believe that if we go through the list here, we could be able to tell you which one of these we think may be affected. Now,

ultimately, we only know why they did the cut according to what they told us. But as reviewers, all we can tell you is what we think it would -- as to have an effect on calculated there, and then tell you where they have calculated and that point was limiting.

MEMBER WALLIS: I am mulling over what I just heard from GE, though. They said there was a balance of safety challenges versus benefits. This is something that we don't usually get into, but presumably the benefits are to the utility, and the safety challenges are to the public in some way, right?

MS. ABDULLAHI: And the regulatory --

MEMBER WALLIS: So that GE is somehow making this balance? You must be making this balance in some way. Are you making this balance? Or who is making this balance between safety and benefits?

MS. ABDULLAHI: Between the benefit and the --

MEMBER WALLIS: Yes.

MS. ABDULLAHI: I do not consider the benefit in terms of -- in terms of --

MEMBER WALLIS: You don't consider benefit at all, do you, when you decide whether something is

okay?

MS. ABDULLAHI: I look only at, can the plant, with this particular change, meet the regulatory and safety requirement? Can the analyses used to perform this plant response in this condition acceptable enough that the prediction can be used to make a safety finding, a reasonable safety --

CHAIRMAN BANERJEE: Do you have the capability to do any confirmatory analysis?

MS. ABDULLAHI: We did a couple of them. We would need more, and maybe ACRS can help NRR get there.

CHAIRMAN BANERJEE: We are trying to.

MS. ABDULLAHI: I know. Mike Colby of GE wants to --

MR. COLBY: Yes, I just want to say in terms of where that would be -- where that line would be and how much of that region you want to get into, we are not necessarily threatening any safety limits, but what happens is is we will put so much constraints on ourselves for operation if we would expand that further that it would not be feasible for us to design core designs, which would be economic for the utilities to use.

And so when we're talking about

compromise, we're talking about compromises in terms of what the utilities are going to use in terms of their operations during -- and the core loadings and everything that entails the core operation. So we make it feasible for them to be able to use. If we expand it too much, then because of the limitations that we have to put on ourselves in order to preserve the same safety margins, as we have right now, would be too much for the core designs to handle.

MS. ABDULLAHI: If I may --

MEMBER BONACA: Just if I can suggest, this discussion will be much more effective after we hear the proprietary session than before, because we are all trying to figure things and, you know, in our mind, and so my suggestion would be to postpone this conversation until after we hear the proprietary presentation.

MS. ABDULLAHI: Okay.

CHAIRMAN BANERJEE: So if you would please exercise constraint.

MEMBER BONACA: No, just a suggestion that it seems to me that we are speculating and thinking in our mind about what could it be that this phrase -- because we are not --

CHAIRMAN BANERJEE: But I think it also

sets the tone for what we want answered in --

MEMBER WALLIS: At this moment, I am trying to behave like a member of the public, rather than --

MS. ABDULLAHI: I understand.

MEMBER BONACA: It's just simply that we will keep --

CHAIRMAN BANERJEE: I think we want to finish this. Is there anything else that --

MS. ABDULLAHI: I am finished and -- okay.

CHAIRMAN BANERJEE: How much is important, and how much is not?

MS. ABDULLAHI: Okay. I think this slide is actually important, which says, "What are the impact of MELLLA+?" And this flowchart shows that what we consider to be the significant impacts, and this is only focusing on the fuel dependent analyses, and one of them is the stability, ATWS, ATWS instability, ECCS LOCA, and SLMCPR.

These are the few areas that we found or we think that you should in an overview be able to hear and understand more.

CHAIRMAN BANERJEE: Does ECCS LOCA also include issues related to containment and --

MS. ABDULLAHI: No. This review today is

really limited to reactor core and fuel performance and fuel-dependent analyses.

MEMBER WALLIS: Not suppression pool? Not suppression pool temperature or --

MS. ABDULLAHI: We did some suppression pool, but it's for the ATWS. There's another branch that does the -- we have some net positive suction head and suppression pool information, but that is from ATWS perspective.

Now, in terms of ECCS LOCA containment sites, there is a containment branch, and I --

MS. HONCHARIK: There aren't present here today. I'm trying to get someone here to address any questions that may come up later in the day during the closed session.

CHAIRMAN BANERJEE: That has always been one of our issues with these uprates.

MS. ABDULLAHI: And, again, as Dr. Wallis pointed out, that was one of the areas that is plant-specific, I believe.

To conclude, having looked at all of the safety analysis, and looked at some analysis brought that GE had provided, and done our own comprehensive review, we have concluded that MELLLA+ is not for every plant. MELLLA+, some plants will be able to

operate at it, some plants may not. Some plants may need modifications that they have to implement. This is not what I have in here. I decided to skip, since we are ending fast. And you will hear the reasoning behind that, so --

MEMBER WALLIS: It's a permission sometimes?

MS. ABDULLAHI: Excuse me?

MEMBER WALLIS: Is it sort of vague? Maybe you say because the conditions are really specific. It's clear what you're allowing.

MS. ABDULLAHI: Yes. What we are allowing is clear. The conditions that we specify says this, this, this, this. So if a plant wants to be able to meet all of these things, and make no plant mod, you know, like no increase in their volume or no -- they will hit a limit somewhere. And also, depending -- yes.

MEMBER WALLIS: I'm sorry. You said sometimes it will be okay, and sometimes it won't be, and I --

MS. ABDULLAHI: Per plant.

MEMBER WALLIS: And you have really specified what those times are.

MS. ABDULLAHI: Yes.

MEMBER WALLIS: Okay. That's all.

MS. ABDULLAHI: No. What we're basically saying is giving you an overview speculation that we don't -- we are not improving MELLLA+, and we are not asking you to approve MELLLA+, assuming every plant will be able to implement and be fine. They would have to demonstrate that, and we have our own little areas that we think may be where the breaks will be.

MEMBER BONACA: So this -- even assuming that they all will do modifications -- I'm trying to understand the context of your statement.

MS. ABDULLAHI: I understand. I'm sure it's vague. But what I'm saying, without plant mods --

MEMBER BONACA: Yes, without plant mods.

MS. ABDULLAHI: -- without plant mods --

MEMBER BONACA: Yes, all right.

MS. ABDULLAHI: -- some analyses you made need --

MEMBER BONACA: Yes.

MS. ABDULLAHI: -- to do some things. And we've done a thorough review, and we find it acceptable at this stage. And I think we'll stop right here, because you don't have time for the rest.

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

penalty in the operation. And they are able to do that by spending money and buying more fuels and getting a better power distribution from the core. So not everything is bad.

CHAIRMAN BANERJEE: Thanks, Jose.

I think we'll thank you for your presentation. We'll take a break now for -- until about 10:30.

MEMBER CORRADINI: Sanjoy?

CHAIRMAN BANERJEE: Yes.

MEMBER CORRADINI: Could Theron give me a call? Let me give him a number to call and -- to try to settle the uncertainty of the -- just the signal going in and out.

CHAIRMAN BANERJEE: All right. Theron, you can get that. We'll take a break in the meantime until 10:30.

(Whereupon, the proceedings in the foregoing matter went off the record at 10:17 a.m. and went back on the record at 10:31 a.m. in Closed Session.)