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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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POWER UPRATES SUBCOMMITTEE

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OPEN SESSION

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WEDNESDAY

DECEMBER 2, 2015

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ROCKVILLE, MARYLAND

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The Subcommittee met at the Nuclear Regulatory Commission, Two White Flint North, Room T2B1, 11545 Rockville Pike, at 8:31 a.m., Joy Rempe, Chairman, presiding.

COMMITTEE MEMBERS:

JOY REMPE, Chairman

JOHN W. STETKAR, Member

RONALD G. BALLINGER, Member

DENNIS C. BLEY, Member

MICHAEL L. CORRADINI, Member

DANA A. POWERS, Member

PETER C. RICCARDELLA, Member

STEPHEN P. SCHULTZ, Member

GORDON R. SKILLMAN, Member

ACRS CONSULTANT:

KORD SMITH*

DESIGNATED FEDERAL OFFICIAL:

WEIDONG WANG

ALSO PRESENT:

KEVIN BORTON, Exelon

DOUG BROADDUS, NRR

ANTHONY HIGHTOWER, Exelon

MOLLY KEEFE, NRR

JIM KOVALCHICK, Exelon

MARVIN LEWIS, Public Participant*

JOSE MARCH-LEUBA, ORNL

JOHN McCLINTOCK, Exelon

PAT NAVIN, Exelon

ANDREW OLSON, Exelon

ALEX PSAROS, Exelon

DIEGO SAENZ, NRR

*Present via telephone

C O N T E N T S

P R O C E E D I N G S

8:31 a.m.

CHAIRMAN REMPE: This meeting will now come to order. Thank you. This is a meeting of the Power Uprates Subcommittee, a standing Subcommittee of the Advisory Committee on Reactor Safeguards.

I'm Joy Rempe, the Chairman of the Subcommittee. ACRS Members in attendance are Pete Riccardella, Ron Ballinger, John Stetkar, Dana Powers, Stephen Schultz and Gordan Skillman and Sanjoy Banerjee.

We also will be joined shortly, we hope by Mike Corradini and our consultant, Professor Kord Smith, who will come in through a phone line. Weidong Wang of the ACRS Staff is the designed Federal Official for this meeting.

In this meeting, the Subcommittee will review the Peach Bottom Atomic Power Station Units Two and Three Operating License Amendment Request or LAR, to allow plant operation in the expanded maximum extended load light limit analysis plus or MELLLA+ domain.

We're going to hear presentations from the NRC Staff and representatives from the licensee, Exelon Generation Company, LLC. We did not receive

written comments and requests for time to make oral statements from a member of the public regarding today's meeting.

Part of the presentations by the licensee and the NRC Staff will be closed in order to discuss information that's proprietary to the licensee and its contractors, pursuant to 5 USC 55(2)(b)(c)(4).

Attendance at these portions of the meeting that deals with such information will be limited to the NRC Staff, the NRC consultants, Exelon Generation Company, LLC, and those individuals and organizations who have entered into appropriate confidentiality agreements with them.

Consequently, we'll need to confirm that we have only eligible observers and participants in the room for the closed portions of this meeting.

This is the fourth LAR that our Subcommittee has had the opportunity to review related to the MELLLA+ applications. And today we're going to gather information, analyze relevant issues and facts, and formulate proposed positions and actions as appropriate for this LAR.

As a heads up to my colleagues participating in this Subcommittee meeting, I'm

going to be requesting at the end of our meeting, that each of you provide your opinion on whether this fourth LAR warrants deliberation by the full Committee at a future meeting.

The rules for participation in today's meeting have been announced as part of the notice that was previously published in the Federal Register. A transcript of the meeting is being kept and will be made available as stated in the Federal Register Notice.

Therefore, we request that participants in this meeting use the microphones located throughout the meeting when addressing the Subcommittee. The participants should first identify themselves and speak with sufficient clarity and volume so they may be readily heard and recorded on this transcript.

And we'll now proceed with the meeting. And I'd like to start by calling up the NRR Staff. And Doug Broaddus will start us, right?

MR. BROADDUS: Thank you. And good morning. I am Doug Broaddus. I am the Chief of the Plant Licensing Branch 1-2, and the Division of Operating Reactor Licensing in NRR.

The NRC staff appreciates the

opportunity to brief the ACRS Subcommittee today on the LAR for Peach Bottom Units Two and Three to operate in the MELLLA+ domain.

The request would change the Peach Bottom technical specifications from the currently licensed MELLLA domain to allow operation in an expanded MELLLA+ domain under the previously approved extended power uprate, or EPU, conditions of 3,951 megawatts thermal ready core power.

The expanded MELLLA+ operating domain is intended to increase operating flexibility by allowing control of reactivity at maximum power by changing flow rather then by control rod insertion and control.

The proposed amendment would allow recirculation of core flow to operate within a wider window then under the current MELLLA conditions to a core flow as low as 83 percent under MELLLA+.

At this meeting, Exelon, who owns and operates the Peach Bottom Boiling Water Reactor Units, will provide a presentation on their application. And the NRC Staff will present the results of our review and assessment of the application. Next slide.

I want to take this opportunity to

recognize and thank the NRC Technical Staff, who are here today. For their support and for performing a thorough review of Exelon's application.

Which is, as you said, the fourth of such reviews involving the implementation of MELLLA+. Staff's previously reviewed and presented to ACRS on MELLLA+, amendments from Monticello, Grand Gulf and Nine Mile Point Unit 2.

Consistent with these previous applications, Exelon defined the scope of the evaluations required to support operation at Peach Bottom in the MELLLA+ domain based upon the NRC approved GE-Hitachi MELLLA+ topical report. Next slide.

So the Peach Bottom application as well as the results of the NRC Staff's review is similar in many respects to the prior MELLLA+ applications. The NRC Staff presentations today will provide comparisons between Peach Bottom and these other plants for some of the key parameters associated with MELLLA+ implementation.

And we appreciate the Subcommittee considering whether continued ACRS review of these MELLLA+ applications is warranted. And we look forward to your feedback on that.

CHAIRMAN REMPE: Just to be clear, the discussion will focus on whether we will want to bring this one, not in general all MELLLA+ applications today. Okay?

MR. BROADDUS: Sorry. All right, yes. The NRC Staff's safety evaluation that was previously provided to ACRS documents are a re -- the documents are a review of the Peach Bottom application. And contains no open items.

Based on a thorough technical review, the NRC Staff has determined that operation of Peach Bottom Units Two and Three in the MELLLA+ domain as proposed in Exelon's application, maintains compliant safety while providing additional operational flexibility. And satisfies all regulatory criteria.

This concludes my opening remarks. Unless there are any questions, I would like to turn it over to Rick Ennis, the NRC Senior Project Manager for Peach Bottom Units Two and Three, who will provide some additional details on the MELLLA+ LAR as well as the presentations you'll hear today.

MEMBER POWERS: I perhaps have, or ask a question that may not be very clear, or may be for Rick rather then you. But, I'll pose it to both.

And you can sit -- both can answer it. You can answer it perhaps when we meet with the full Committee.

The depth is -- these MELLLA+ reviews have taken some substantial amount of time to do. And they've been done very well. I have -- I make no fault on the work that the Staff or either the work of the licensee.

But my question is, do you in the course of this work identify tools or technology that would substantially facilitate the review if you added available? And I think that's a hard question to ask because I'm asking you for, is there something that doesn't exist that should exist.

But, I'm wondering if you could speak to that issue of is the Staff -- could the Staff be aided substantially by any technology improvements available to it?

MR. ENNIS: My name is Rick Ennis. I'm the Project Manager for Peach Bottom.

As far as the -- at the time of the review, had this review not had to go through ACRS, it would have been about a year review. Maybe a little bit longer which is typical of some of the normal license amendments we've had.

So, it's not as extensive as like an extended power uprates.

MEMBER POWERS: Yes.

MR. ENNIS: With that being said, in putting together the safety evaluation, we've had some discussions with NRR that it might be advantageous to have some sort of review standards similar to the extended power uprates. So, I'll talk about a little bit of that during the -- my opening remarks.

But, I think that would help facilitate the review. And I think had the safety evaluation been formatted so it was more consistent with the GE-Hitachi topical report that it would have been easier to get through and maybe done a little bit quicker.

MEMBER POWERS: Yes, that is -- this is worthwhile things to bring up in the full Committee by the way. And I would be explicit in that when you talk to the full Committee.

But I'm mostly interested in the technologies, which include computer codes, expertise, any range of things that would be of assistance. And now that you've gone through four and each had its own peculiarities and methodologies

and whatnot, I would appreciate it if you'd give that some thought.

MR. ENNIS: Okay.

MEMBER POWERS: And if you could comment perhaps when you meet the full Committee, on are there technological improvements? For the technology available to the Agency and I interpret that very broadly.

Computer codes, computational platforms, expertise, whatever you think, that would facilitate the review. Now I don't discount the things that you bring up. Those are very important.

And I would bring those up explicitly. But I would very much appreciate because it seems to me that a year is bit long for this kind of thing.

If we could use technology to reduce that down to a few months, we should leap at the opportunity to do that. Now, maybe we can't. Maybe you can't identify anything.

But I would appreciate your thoughts.

MR. ENNIS: I think we have a comment from the Technical Staff.

MR. SAENZ: This is Diego Saenz from the Reactor Systems Branch. So what the -- at the September 21 Thermohydraulic Subcommittee meeting,

we talked about some of the challenges we had.

And there some -- quite frankly, some of it is understanding the phenomena.

MEMBER POWERS: Um-hum.

MR. SAENZ: So, we have a user need to get testing data that would aid us in truly understanding the phenomena. So, that's part of what we're doing going forward.

And we think that will aid these reviews. There's also an effort that we're undertaking to develop the capability to do trace confirmatory calculations as these reviews go forward.

So, we think that those will aid these reviews.

MEMBER POWERS: I would really like to see you comment on that explicitly at some point. I don't know whether it's this meeting, which is kind of fixed in its end time, or the full Committee meeting, or even privately.

Because I think it's important for us to understand that.

MR. BROADDUS: Thank you, Dr. Powers.

MR. ENNIS: Good morning, my name is Rick Ennis. And I'm the NRC Project Manager for

Peach Bottom in the Office of NRR in the --

MEMBER BANERJEE: It's so difficult. Are you thinking of presenting to either the full Committee, or to one of the Subcommittees the program that you envision going forward to deal with some of the issues that have recently arisen with regard to say FSI, things like that?

We hear about it, but we don't sort of have any -- anything on record, you know, like explicitly what you're doing. I know for example you're planning some tests in the Call Sign facility, right?

What is the scope of those tests? And then are we doing any fundamental work to try to understand these very complicated phenomena and simpler geometries and things?

How is this program all being put together? It would be very helpful to know that.

MR. SAENZ: So, again, this is Diego Saenz. At this time we have no plan to present today here to ACRS.

But if requested, we've always been happy to present information today here as ACRS requested.

CHAIRMAN REMPE: I think actually that

that's something that let's save until the end of the day about what to do in moving forward. Because I read through the transcript.

Unfortunately I missed the September Subcommittee meeting where you did discuss those tests.

MR. SAENZ: Um-hum.

CHAIRMAN REMPE: And I think that that is a very good topic that should be brought. The test program, some of the insights, there's different vendor methodologies.

And so it's a thermohydraulic's type of discussion. And I think that would be very good for a full Committee meeting.

And maybe whether there needs to be a Subcommittee meeting again before that or not, is something that we can discuss later.

But, to make sure that we cover the topics relevant to Peach Bottom, let's --

MEMBER BANERJEE: Yes, just let's table it now and we'll bring it up.

CHAIRMAN REMPE: Right.

MR. SAENZ: Okay.

MEMBER BANERJEE: Because some of your sensitivity studies here depend on the discussions

we've had in the Thermohydraulics Subcommittee meeting.

MR. SAENZ: Absolutely.

MR. ENNIS: Today you'll hear presentations from the NRC Staff and Exelon regarding proposed MELLLA+ for Peach Bottom Units Two and Three. I'll present some background information regarding the Staff's review and then I'll discuss the agenda for today's meeting.

Throughout the meeting, you may hear references to the SAR. The SAR is a Safety Analysis Report which summarizes the results of the evaluations performed by GE-Hitachi for Exelon to justify the proposed MELLLA+.

A proprietary version of the SAR is included as Attachment Four to the application dated September 4, 2014. And a nonproprietary version is included as Attachment Five to the application.

The format of the SAR closely follows the format of the NRC approved GE-Hitachi MELLLA+ topic report. And the SAR provides the Peach Bottom disposition of the MELLLA+ topical report technical review areas either by confirming the applicability of the generic assessments or providing plant specific evaluations.

With respect to the format of the NRC Staff's draft Safety Evaluation, Section 3.2 provides a review of the technical review areas that were generically dispositioned. And Section 3.3 provides the review of the areas that were dispositioned on a plant specific basis.

As I had mentioned in the discussion with Dr. Powers, we did use the Review Standard 001. Which NRC uses for extended power uprates.

And although the MELLLA+ amendment is not an EPU, we have found in the past that some topics lend themselves to using that review standard. And Section 3.4 of the SE provides our review of various topics using the Review Standard.

There are also a number of NRC approved topical reports that support the proposed MELLLA+. And Section 3.5 of the Safety Evaluation provides our evaluations against the limitations and conditions in those topical reports.

Section 3.6 of the Safety Evaluation talks about the NRC Staff's evaluation of guarding the TRACG Code Models for ATWS instability events. Section 4 talks about the license and tech spec changes as part of the requested license amendment.

And in addition Appendix 8 to the Safety

Evaluation, talks about the licensees response to Reactor Systems Branch request for additional information questions. And the Staff's evaluation of the licensee's response.

Some of the details of the Staff's review are, well, after the application was submitted in September 2014, consistent with what we normally do for a licensed member request, we perform an acceptance review.

And mid-October 2014, the Staff accepted the application for review. Determining that it provided sufficient detail to provide the technical review.

The key technical areas during this review consistent with some of the previous MELLLA+ license member requests were in the reactor systems and human factors branches reviews. This particular review was pretty straightforward.

We had 40 requests for additional information, RAI questions that were asked. These questions resulted in seven supplements to the application being submitted.

To give you some perspective on the request for information questions we asked, this graphic -- what happened here? Okay, we lost

something in the translation.

Okay. Anyway, about half the questions were in the reactor systems part of the review. But a third of the questions were in human factors. And the rest were from the other branches that were involved.

Consistent with the focus areas of our review, the Staff performed two audits. The first audit in May 2015 was at the Peach Bottom site.

And that focused on the time critical operator actions. Details of the issues that were discussed during the audit are contained in Section 3.310 if the Staff Safety Evaluation.

The second audit was August 31 to September 2, 2015 at GE-Hitachi in Wilmington, North Carolina. And that audit focused on sensitivity calcs and methodologies for ATWS with instability events using TRACG.

Those issues are discussed in Appendix A under RAI, SRXB RAI-18. And our presentations today will closely align with the technical focus areas discussed by the RAIs and the audits.

MEMBER SCHULTZ: Rick, before you go forward. Could you describe qualitatively if you would, the -- some comparison of this review versus

the other three that have been done?

You've gone through quickly. And you did indicate that this was a straightforward review.

MR. ENNIS: Right.

MEMBER SCHULTZ: Some of the previous ones were not so straightforward. So, could you provide a qualitative comparison on that?

Thinking about the RAIs in particular. And the Staff's interaction with the licensee?

MR. ENNIS: Okay. As I mentioned for Peach Bottom, the RAIs resulted in seven supplements. Nine Mile Point had nine supplements. Monticello had 16. And Grand Gulf had 20.

So, I think we're learning from our reviews as well as our discussions with ACRS. And we're focusing areas on some of these technical areas that we know that are a concern.

So, I think we're getting better at these reviews. And when we do get into the technical area in the closed session, we will have some side by side comparisons on some of the parameters for each of the reviews.

MEMBER SCHULTZ: Okay. Thanks.

MR. ENNIS: With respect to the agenda for today, during the open session, Exelon is going

to provide an overview of the MELLLA+. This discussion will include an overview and history of some of the key design issues pertaining to Peach Bottom.

An overview of the MELLLA+, the design and analysis supporting the proposed change. And a discussion on operating reactor procedures and operating training, including time critical operator actions.

Following the break, we'll have to go into a closed session due to the proprietary nature of the information that will be discussed. During the closed session, Exelon will start out with a presentation regarding the MELLLA+ analysis.

And then the Staff and one of our contractors will give a presentation that will focus on the reactor systems and human factors reviews. And unless there are any questions, I would like to turn it over to Exelon.

MEMBER BANERJEE: Was the minimum set at 83 percent flow?

MR. ENNIS: I think we'll get into that during the technical discussion.

MEMBER BANERJEE: Okay. It wasn't by accident?

MR. ENNIS: I think Exelon will discuss that during their discussion.

MEMBER BANERJEE: Okay.

CHAIRMAN REMPE: While we're transitioning, I want to check again. Kord, are you able to speak on -- are you on the line? And it's open so you can actually talk?

MR. SMITH: It's the same as the speaker is actually they're not able to respond.

CHAIRMAN REMPE: Okay. Thank you. Kord, Mike wants me to remind you that it works better if you're on a land line versus a speaker phone or other options, okay?

MR. SMITH: Other option.

CHAIRMAN REMPE: Okay. Thank you.

MR. SMITH: I'm on a land line. I just have to take it off speaker. Is that better?

CHAIRMAN REMPE: Yes.

MR. SMITH: Okay.

MR. BORTON: Good morning. My name is Kevin Borton. I'm the Licensing Manager for Power Uprates.

What I'll do, is I'll do a quick introduction of our team so we'll get that out of the way. Here at the head table we have Pat Navin,

which is our Plant Manager at Peach Bottom.

Andy Olson, who is from Corporate Fuels. And Jim Kovalchick to my far right, which is our Peach Bottom Operations Manager.

Moving to slide four, on the side table, we have with us today John Rommel, the Engineering Director for Exelon Power Uprates. Jim Armstrong, Reg Assurance Manager from Peach Bottom.

James Tusar, Nuclear Fuels Manager at corporate. Alex Psaros who is our Reactor Engineering Manager at Peach Bottom.

And John McClintock from Operations Training. We also had Tony Hightower, which is an Operator that had worked on the project and has since moved onto a new -- a job up at Limerick.

And from GE in our audience here, we have Bruce Hagemeir, a Project Manager for MELLLA+ from GE-Hitachi. Sean Lamb and Mike Cook, who are the Technical Leads from GEH as well.

So, the next slide is our presentation objectives. The objectives here to is to present our need for MELLLA+. Provide the key aspects of our submittal and demonstrate our readiness.

We've added the last bullet there. And asking for support for that January 2016

implementation which we spoke about at the beginning of the meeting.

CHAIRMAN REMPE: Elaborate a little bit about that. Because all I mentioned is what we -- I didn't really elaborate on it.

I just mentioned that we need to decide what we want to do to go forward.

MR. BORTON: Okay. So first of all, I appreciate you making the accommodations for us to present this week. I know it had to be shifted around in order to do that.

Because you're considering a need for a full Committee review based on the previous reviews, what I found at our Peach Bottom review, I want to expand a little bit on the impact specific to Peach Bottom.

We asked for the approval from the NRC to be --

MEMBER CORRADINI: Your things not on. You need the little green light or else the recorder is going to go crazy.

MR. BORTON: Got it. Okay. Much better?

CHAIRMAN REMPE: I was going to tell you I present the update to technology. I'm sorry.

MEMBER CORRADINI: Well, we've changed it. Let's not say update.

CHAIRMAN REMPE: Okay.

MR. BORTON: All right. So, is this better?

CHAIRMAN REMPE: Yes.

MR. BORTON: Okay. What we did was we asked for a September 2015 approval from the NRC when we put our submittal in back in 2014. And as such, our current Unit Two Core was designed for MELLLA+.

And at this point, we're a little bit more then halfway through our cycle. So, there are some impacts in loss benefits that would impact us if we would go beyond January with our implementation.

Those impacts are because of the low core flows and high power, it makes testing difficult due to the thermal margins at this point. Anything past January.

Our small operations window increases the rod pattern adjustments that are necessary. Which also puts a reactivity management challenge for our operators.

And operating without MELLLA+ in the

higher core flows results in increased APRN noise as well. And of course frequent low drops decreases our capacity factor as well.

So, those are some of the things that we've a little anxious about with the reviews. And because of the type of reviews and some of the other audits that we had to perform, has pushed us up against this window.

So, we'll have to also consider, at this point, whether or not we would pursue implementing Unit Two in 2015 or early 2016. Rather, we may feel it necessary to delay this until 2016, after our refueling outage in the fall.

So, there are some loss benefits here and some impacts to our operators. And I just wanted to let the Committee also weigh that in with the other factors.

The fact that we put our application in. We met the limits and conditions of the topical report.

And we feel that the previous reviews do bound the review necessary for Peach Bottom as well. Okay. We can move onto the next slide.

As Rick stated earlier, our agenda today is to give a history of the plant that brings us up

to MELLLA+ with a project overview. We'll touch on that design and analysis that we've heard from the previous submittals that we think that you're interested in, including the operator reactions and training.

So, we'll start with Pat Navin, with the station overview.

MR. NAVIN: Good morning. My name is Pat Navin. I am the Plant Manager at Peach Bottom.

I started my career at Peach Bottom 31 years ago after receiving an Engineering Degree from Drexel University. And had various aspects of the operation at Peach Bottom in the course of my career in engineering.

Extensive time in operations and work management, including operations experience as a -- four years on shift as a Shift Technical Advisor. Ten years on shift as a Senior Reactor Operator, and three years as the Site Operations Director.

And then also had a place and one year assignment as the Corporate Operations Director for the Exelon Fleet. And following that, became the Peach Bottom Plant Manager just over three years ago.

So, seen a -- been again, seen a lot of

changes over the course of my time at Peach Bottom. And very proud of a lot -- the number of accomplishments we've accomplished at Peach Bottom.

We'll talk a little bit about that around extended power uprate, which we recently completed. First of all, I want to say thank you for the opportunity to per -- for our team to present and answer any questions you may have regarding the Peach Bottom MELLLA+ LAR.

Kevin will discuss during his portion of the presentation how important this change is to us. Especially the flexibility and procession it will provide for the Operators.

Especially, we're talking about the timing here, as we move into the second half of the operating cycle for Unit Two. Which just completed its first year of operation after our completion of the power uprate project for the Units.

In order to provide the foundation for the rest of the presentation and your questions, I'd like to provide a brief overview of the plant's history leading up to this change. So, the station overview, it's a duel unit, the General Electric BWR-4, Mark I containment.

The containment design pressure is 56

psig. Did begin commercial operation in 1974. The original licensed thermal power radial was three times -- I'm sorry? Excuse me?

CHAIRMAN REMPE: Just a second. The noise from the phone lines is a bit loud. Could everyone please put their phones on mute?

I apologize, but I think it will make your life better. Thank you.

MR. NAVIN: Okay. Okay, very good. Okay. Again commercial operation in 1974. Again, original license thermal power was 3,293 megawatts thermal.

With the extended power uprate --

MEMBER STETKAR: Excuse me, sir?

MR. NAVIN: Yes?

MEMBER STETKAR: If you're out there on the line, put your phone on mute. It's star six. Just please do it.

We're hearing background talk coming in. And it's really disrupting our meeting here.

So, if you're out there, put your phone on mute please.

MR. NAVIN: Okay. All right. Thank you. Okay. So, we did just complete, we had the license amendment approval for extended power

operation that has raised our licensed thermal power to 3,951 megawatts thermal. That was approved in 2014.

Unit Two, we completed the modifications on Unit Two in the fall of last year. Actually a year ago today, Unit Two came online following the completion of those modifications.

And it's been running safely and reliably for 365 days since we've completed those activities on Unit Two. Unit Three, those modifications also are complete.

We currently are in power ascension. The testing associated with the extended power uprate modifications at 96 percent power currently.

So, we are going through the final reviews and approvals to continue to operate. To move up to 100 percent power on Unit Three. And we expect to achieve that most likely in the next two weeks.

MEMBER CORRADINI: So, just a question about kind of performance statistics. So, I was reading, I want to make sure I understand.

It's only at the end of life can you achieve that high flow rate because of change in flux shape and pressure drop? And an early -- or a

beginning of cycle, you can't get to 110. What can you get to?

MR. NAVIN: For a core flow?

MEMBER CORRADINI: Yes.

MR. OLSON: Actually, I'll be discussion that shortly.

MEMBER CORRADINI: Okay fine. All right, fine. Thank you, thank you.

MR. NAVIN: Okay. With the extended power uprate, there were significant upgrades to the plant. Which I believe this Committee had an opportunity to go through some of that previously.

It includes an improved steam dryer design, significant modifications to the generation balance of plant equipment. And also of note for this discussion today, enriched boron.

That significantly has improved our standby liquid control system response for an ATWS condition. And the ability to more promptly suppress power and mitigate the potential implications of an ATWS event.

Additionally, we put significant effort into the elimination of the containment over pressure credit. This was a very significant modification for the station to undertake.

And it has improved notable margin improvement in our ability to remove heat from the containment. It also provides and allows an additional flexibility for the Operators with the changes reimplemented associated with that.

Both Units are on a 24-month operating cycle. Both Units are now 100 percent GNF2 fuel in the cores.

We have three steam-drive reactor feed pumps on each Unit. And we are licensed for an increased core flow up to 110 percent.

MEMBER STETKAR: Well, just out of curiosity. I unfortunately have to plead ignorance because I didn't read all of the material.

What did you do to eliminate the cap credit?

MR. NAVIN: Well, we put in a -- say a very extensive -- Peach Bottom design has four RHR residual heat removal pumps per Unit. Each one has a dedicated heat exchanger associated with it.

We put in cross side pipes to allow us to cross connect. One RHR pump can go into essentially two heat exchangers.

MEMBER STETKAR: Okay. Good.

MR. NAVIN: To improve heat removal

capability without impacting diesel generator loading.

MEMBER STETKAR: So it's hardware modifications, --

MR. NAVIN: That's correct.

MEMBER STETKAR: Not just pencil sharpening.

MR. NAVIN: Yes.

MEMBER STETKAR: Thank you.

MR. NAVIN: That's right.

MEMBER BANERJEE: And this was done during your EPU, right?

MR. NAVIN: That's correct. Right.

MEMBER BANERJEE: I remember that.

MR. NAVIN: And it was a very extensive amount of work. We put in single failure criteria and a lot of the different things that we had to do with redundant power supplies and et cetera.

So, it was a very extensive amount of work. Okay, next slide.

Peach Bottom history. Again, the original license power as I mentioned, 3,293. There were two previous uprates.

A stretch power uprate, which was a 5 percent uprate in the 1994/1995. And then also an

MUR uprate, was a 1.6 percent increase in 2002 on each Unit.

We did get the licensing amendment for MELLLA operating domain, operations in MELLLA operating domain back in 1995. That was associated with our stretch power uprate project.

And also received a renewed operating license back in 2003. And we did enter into the extended operation on both units. And currently licensed to operate through 2034.

We did implement the Option Three Stability Solution. Which is the auto suppression trip back in 2005. As I mentioned, GNF2 first introduced in 2010.

And now all -- both all cores -- both cores are fully implemented with GNF2. And the extended power uprate project again, license amendment approvals and, you know, currently in power ascension as I discussed on Unit Three.

And I will say, additional history, you know, at Peach Bottom, very focused on operating the power plant safely, precisely. INPO ratings we have four consecutive INPO One ratings.

We have not had an automatic scram at Peach Bottom either Unit in over ten years. So,

we've taken a lot of efforts to make sure the plant is running reliably, safely and an extensive amount of work put into this extended power uprate to ensure that we'll maintain that.

Before I turn it over to Kevin and the rest of the team, I just want to leave you with our goal today. Which is to make sure all your questions are answered regarding the MELLLA+ application.

And ensure that you have the sense of confidence that we will implement this change very safely, very precisely. And I'll point to our extended power uprate project that we just completed.

It was done with a very strong engineering design basis. A very strong alliance with operations and our training departments to make sure that that project was done very well, very high quality, and implemented with absolute safety.

And we're seeing results of that today at Peach Bottom.

MEMBER SKILLMAN: Pat, let me ask this. You mentioned the benefit of the enriched boron for the power uprate. In making that comment, were you referring to the analytical benefit?

Or were you referring to actually testing and demonstrating the benefit?

MR. NAVIN: Well, it's tested on our simulator. I mean, we did not inject it into the reactor. I mean, it's analytical.

But the Operators can attest to the simulator -- changes on the simulator, ATWS response, and how that affects their response in an ATWS event.

MEMBER SKILLMAN: Simulator and analytical?

MR. NAVIN: Correct. Yes, sir.

MEMBER SKILLMAN: Okay. Thank you.

MR. NAVIN: Okay.

CHAIRMAN REMPE: Because we weren't given the slides in advance, I may be asking this out of order. But at some point will you discuss when you did the EPUs and what happened with the measurements on the steam dryer? And how things compared to what was predicted?

MR. BORTON: We could probably touch on that at the end.

CHAIRMAN REMPE: Okay. Thank you.

MR. BORTON: Yes. Okay, Kevin Borton again here. I want to go over the benefits starting

on slide 10, gained from this change.

And the major benefit is to provide the Peach Bottom Operators with the ability to control power using core flow versus moving rods. This is -- reduces the number of times that are required to maneuver the reactor, especially during end of cycle.

And the DSS-CD also provides for earlier detection in instability due to its sensitivity speed and the alarms that we're installing. And finally, the station capacity factor will increase due to the reduced number of down powers that we anticipate with this as well. Next slide.

And just to expand on this a little bit more, slide 11 is our proposed power to flow map. As you can see, the blue dotted line at 3,514 megawatt thermal, was our pre-EPU operating window at 100 percent.

You could also see that the window was reduced at EPU represented five points D to F at 3,951 megawatt thermal. So the new MELLLA boundary is showing in the highlighted green lines where the 100 percent window now is expanded once again from J to F right above it.

MEMBER CORRADINI: So, just for my

understanding, when you were at your EPU condition, but not using MELLLA+, what would be the path you trace on this power flow map to make a maneuver?

I think I know. But I'm not really sure. So, I'm curious. You come down at Point D to a lower power and then come over? Or do you actually follow the old MELLLA line down?

MR. BORTON: For rod pattern adjustment? Do you want --

MEMBER CORRADINI: Well, on this plot, how does power and flow change with rod manipulations?

MR. BORTON: Okay. We'll call on our Reactor Engineer.

MEMBER CORRADINI: I'm not enough of a BWR person to appreciate this.

MR. PSAROS: I'm Alex Psaros, Reactor Engineering Manager. Is this on?

MEMBER CORRADINI: Okay, you have to be closer. Get closer. Have a seat.

CHAIRMAN REMPE: And say your name again, please.

MR. PSAROS: Alex Psaros, Reactor Engineering Manager. For maneuver from 100 percent, we'd insert rods first and come straight down.

MEMBER CORRADINI: Okay.

MR. PSAROS: And then maneuver.

MEMBER CORRADINI: And then you'd come down to lower flow or do whatever you have to do?

MR. PSAROS: That's correct. That's correct, lower flow. By inserting rods, we're giving ourselves margin to the MELLLA boundary.

MEMBER CORRADINI: You don't ever -- we'll take it whatever time of life you can do. You don't ever go to increase flow and come down that way?

MR. PSAROS: Within the cycle we would run up core flow.

MEMBER CORRADINI: Okay. So you would have that extra margin at end of cycle to maneuver through?

MR. PSAROS: That's correct.

MEMBER CORRADINI: Okay. Thank you.

MR. NAVIN: But for full power, we would not be able to raise core flow. Because we'd already be in a situation where by raising core flow, it would raise power.

So, you would have to insert core rods --

MEMBER CORRADINI: You would have to

come down and then come over to create mar -- or create flexibility on both sides. Okay.

MR. NAVIN: That's correct.

MR. PSAROS: That's right. You have to insert rods and come straight down.

MEMBER CORRADINI: Got it. Okay, thank you.

CHAIRMAN REMPE: So this slide is a good place, I think answer Sanjoy's question about why you picked your particular MELLLA+ region, because we do see differences in what comes before us. And if you -- why'd you pick 83 percent?

MR. BORTON: So, we're actually going to have Tony Hightower discuss that.

CHAIRMAN REMPE: Oh, later? All right.

MR. BORTON: No, right now.

MR. HIGHTOWER: So, this is Tony Hightower, Peach Bottom Operations. The 83 percent as the lower limit of our envelope restores the envelope that we have prior to the changes for EPU.

If -- this graphic shows it pretty clearly. If you look at the point labeled J and take a line straight down to where that blue dotted line intersects, that's -- that is essentially the same point. So, 83 percent.

MEMBER CORRADINI: So, can I say it to you differently? There wasn't a technical reason on fun multi-phase flow stuff. It was just that from a procedural standpoint, if you stayed graphically the same way, a lot of your procedures would just naturally translate up.

MR. HIGHTOWER: Correct.

MEMBER CORRADINI: Or actually both.

MR. HIGHTOWER: Yes.

MEMBER CORRADINI: Both.

MR. BORTON: That won't go to into our fuel's person, it's on the other side.

MEMBER CORRADINI: Okay. Fine.

MR. HIGHTOWER: So, yes, from an operations perspective, it was similar.

MEMBER CORRADINI: Okay.

MR. OLSON: Andy Olson, Nuclear Fuel Safety Analysis. So, the selection of the point is a balance between operational considerations and analytical considerations.

The MELLLA+ LTR genetically allows the values as low as 80 percent flow. Our vendor initially proposed a value of 85 percent flow to us.

To take into consideration the impact of the lower flow rates on the rod line and the

implications to ATWS results. There is a balance.

The lower you come in flow, the higher rod line that you're on. And it's more challenging with respect to ATWS response and ATWS results.

When they proposed 85 percent to us, it was based on that consideration. We evaluated the preliminary analysis that they had performed for us and concluded that we believed there was some additional margin available.

And we kind of proposed the 83 percent value in part because it did coincide with where we were previously. And would make operations basically take them back to where they were prior to EPU.

And --

MEMBER BANERJEE: Why were you there previously?

MR. OLSON: The --

MEMBER BANERJEE: Pre EPU.

Mr. Olson: Pre EPU. So, MELLLA implemented prior to power uprate provided for a lower flow value of 75 percent. The stretch uprate and the MUR uprate is performed preserving the MELLLA line.

And so, in order to increase power, you

are forced to slide up the line. And as you slide up the line, you come further to the right higher in core flow.

So, as you increase licensed power under MELLLA operation, you slowly constrain your flow window because the lower end of the window becomes higher in flow rate.

So, we started at 75 percent. We did stretch uprate that took us to 81 percent. We then did the MUR and that took us to essentially 83 percent.

And that's where we were prior to EPU.

MEMBER BANERJEE: I understand.

MR. OLSON: Does that answer your questions?

CHAIRMAN REMPE: Yes. Thank you.

MR. BORTON: All right, we're on slide 12. Peach Bottom is based on the GE approved topicals as were the previous industry applications. So, therefore pressure, max thermal power, max core flow and feed water rates and temperatures do not change with MELLLA+.

Also, balance of plant equipment is not required to be modified is per --

MEMBER BANERJEE: So, just going back to

the point you were making. If you did take it to 80 percent, would that have substantially impacted the operator action time for at risk?

MR. OLSON: We just --

MEMBER BANERJEE: Did you do a sensitivity analysis of that?

MR. OLSON: No. We took a very critical look at the core flow rate we wanted to use for the analysis. We knew 80 percent was available.

Upon the recommendation of the vendor, we did not pursue that because it was felt that we would not meet the ATWS criteria. Not just ATWS-I, but ATWS itself in terms of pressure response and other characteristics.

And so, we chose to go with 83. And we didn't investigate any further beyond that.

MEMBER BANERJEE: Did they give you any evidence to that effect? Or to that concept?

MR. OLSON: We had some basic sensitivity studies that they had performed. We had calculations at 85 percent flow that showed sufficient margin available to allow us to go down in flow and achieve a higher rod line.

And but based on their past experience, they recommended no lower then that. So, we worked

back and forth with the vendor to conclude that 83 was supportable and provided assurance that we wouldn't have to redo the work and reconsider a different value.

MEMBER BANERJEE: Okay. So it was a judgment call?

MR. OLSON: Yes.

MR. BORTON: So, moving from slide 13 onto slide 14. This talks about what changes are required for MELLLA+. It does require some physical changes at set point changes.

However, the majority of changes listed here are related to operator aids, tech spec changes and reporting. So, this is something I think is familiar to the Committee.

Moving onto the next slide, implementation. The installation of DSS-CD firmware and testing is now completed on both Units. At both Unit Two and Three at Peach Bottom.

After NRC approval, tech specs will be implemented and the DSS-CD will be enabled and tested at that point. Procedures and updating the 3D Monicore Databank and COLR will also be performed during implementation.

So this really ends our quick overview

of the scope of our implementation. So, if there's no questions, I'd like to turn this over to Andy.

MEMBER BANERJEE: You have no plans to change to type of fuel?

MR. BORTON: I'm sorry?

MEMBER BANERJEE: You have no plans to --

MR. BORTON: Not at this time. No. We're going to stay with the fuel that we have in both Units.

So, I'd like to turn it over to Andy.

CHAIRMAN REMPE: Actually, I do have a question. And again, I didn't -- I don't know if I'm doing this out of order because I didn't see the slides until this morning.

But, in the last couple of these, we've had an issue of -- or a discussion about the safety relief valves and their propensity for drifting. The statement that's in the actual document that you have is almost identical to one we've seen before.

But it doesn't actually cite what the tolerances are when you test the relief valves. And do you have that information?

The statement is something about a propensity to drift more then 3 percent. But it

doesn't state that they don't have a propensity to draft more then 3 percent.

MR. BORTON: Yes, it's 3 percent is what we have.

CHAIRMAN REMPE: But what is the actual test data? Is what I want to know. And is this the good place to -- if there's another place where you're planning to talk about that?

MR. NAVIN: Well, Peach Bottom used to have a tighter tech spec requirement, it was plus or minus 1 percent.

CHAIRMAN REMPE: Um-hum.

MR. NAVIN: We recently implemented the change. We did our challenges maintaining the 1 percent criteria.

CHAIRMAN REMPE: Okay.

MR. NAVIN: We did a tech spec change to support the plus or minus 3 percent, which is the industry standard.

CHAIRMAN REMPE: Okay.

MR. NAVIN: And with that 3 percent change, we have not had historically problems maintaining that 3 percent margin to set point. Is what you're referring to?

CHAIRMAN REMPE: Right.

MR. NAVIN: Yes. That has not been a problem at Peach Bottom.

CHAIRMAN REMPE: And what is the actual data? I guess it says here, as found SRV left set point tests do not show a propensity for set point drift higher then the 3 percent drift tolerance.

So, what is the value? Is it around 1 percent? Two percent? Less then 2 percent?

MR. BORTON: We could call that up from the station and have that to you before we close.

CHAIRMAN REMPE: That's fine. It's something I would like to check if you don't mind.

MR. BORTON: Yes.

MR. NAVIN: Based on our previous tech spec requirement of 1 percent, normally they were in with 1 percent. But we did have, it was not usual to have one or two SRVs test outside the 1 percent, but within 3.

CHAIRMAN REMPE: Okay.

MR. NAVIN: So I think 2 would normally be probably a boundary number for where we normally sit.

CHAIRMAN REMPE: Less then 2 percent would be nice to hear. Thank you.

MEMBER BALLINGER: Are these two or

three staged target rocks?

MR. NAVIN: These are I believe two staged. Three? Ours are three? Thanks.

MEMBER BALLINGER: Three staged? Okay.

MR. OLSON: Good morning. My name is Andy Olson. I am a Safety Analysis Engineer in the Nuclear Fields Department at Exelon.

I have been supporting Peach Bottom station as a Safety Analysis Engineer for over 30 years now. I'm going to provide some general information about our MELLLA+ application.

Including our experience with increased core flow. Which was a question raised a little earlier.

Peach Bottom is licensed for a maximum core flow of 110 percent. We actually licensed to 110 percent core flow back in 1995 in conjunction with the stretch up rate. And at the time we were able to achieve 110 percent core flow.

With the various uprates and over time, our ability to achieve 110 percent core flow has become somewhat constrained. We can achieve approximately 109.5 percent core flow at end of cycle conditions.

However, earlier in the operating cycle,

particularly near the beginning of cycle when axial power shape is strongly bottom peaked and core flow resistence is high, we can achieve about 104 percent.

As we proceed through the cycle, for the majority of the cycle, that core flow capability increases slightly. And we see roughly 105.5 percent maximum core flow capability through most of the operating cycle.

And then as we proceed towards the end of the operating cycle and the power shape begins to move towards the top of the reactor core, core pressure drop is reduced and flow capability increases naturally.

And we can achieve higher core flows as we implement end of cycle extension strategies like feed water temperature reduction and coast down. The core flow capability increases. And we can again, achieve roughly 109.5 percent.

In practical operation, that results in a flow operating window at Peach Bottom of approximately 101 percent to 105.5 percent. The 101 percent limitation is driven by our requirement to maintain operational margin to the MELLLA boundary.

Which under EPU conditions begins at 99

percent core flow. And of course, we do use higher core flows as we approach the end of cycle.

So, you can see the practical flow window currently without MELLLA+ on the order of 4 to 5 percent. It's fairly tight.

MEMBER SKILLMAN: Andy is that one half percent between 109.5 to 110 an issue or a problem?

MR. OLSON: I'm sorry, repeat the question please?

MEMBER SKILLMAN: Is that half a percent, EPU allows 110, you can achieve 109.5 at end of cycle. Is that half a percent important?

MR. OLSON: A problem? No. It has a very modest impact on overall fuel cycle economy. But operationally it's not a problem or a concern, no.

MEMBER SKILLMAN: Thank you.

MR. OLSON: Okay. So, for Peach Bottom we have produced MELLLA+ supplemental licensing report. And that has been previously submitted to the NRC as supplemental information to the license amendment request.

The current core design for Unit Two and Unit Three as well, is based on the presumption that we will utilize MELLLA+ during the cycle. MELLLA+

does introduce some modest thermal limit increases.

In particular SLMCPR for operation. That's as a result of the increase in the safety limit MCPR that occurs with MELLLA+ due to limitations and conditions.

There's a safety limit adder that we have to consider as well as the implementation of a larger uncertainties for core flow conditions. And we'll discuss that in a little more detail during the closed session.

There is no impact on the linear heat generation rate limits. Nor the --

MEMBER BANERJEE: Isn't that just based on the conditions that took place on the LTR, right?

MR. OLSON: That's correct.

MEMBER BANERJEE: Yes.

MR. OLSON: It's based on the conditions placed on the LTR. Otherwise, there would be very little change --

MEMBER BANERJEE: Right.

MR. OLSON: or none. And yes, that -- and no change in our map or hydro limits as well.

The new supplemental relo licensing report also reflects the transition to the new DSS-CD stability solution. That section of the SLAR

previously addressed the utilization of the option three detect and suppress solution.

It now provides generic confirmation of our DSS-CD set points. As well as provides the manual backup stability protection and automated backup stability protection limits and information.

The SLAR also includes Appendix F, which provides and address the limitations and conditions from the interim methods licensing topical report that apply to the core. And a new Appendix G has been added that does the same for the applicable limitations and conditions from the MELLLA+ LTR.

So, that's the changes that we see in the SLAR as a result of the implementation of MELLLA+. And that's the end of my presentation if there's any questions.

MR. KOVALCHICK: Yes, good morning, I'm Jim Kovalchick. To discuss my background, I started at Peach Bottom, like Pat, 31 years ago.

And most of my time has been in Operations. And 15 years of that time as a Senior Reactor Operator.

And my latest assignment as a Senior Manager in Operations has been to focus on our power uprate. And also a subset of that, the MELLLA+, in

particular operations and training.

And that's what I'll be discussing this morning. Starting with slide 21, I can discuss license conditions.

So, operations in the MELLLA+ domain will be prohibited when we have either of the following plant conditions occur. One is that when we're in single loop operation, we'll not be in MELLLA+.

And the other is when we have a feed water heater out of service. Now, I'll define feed water heater out of service a little bit.

Because we wanted to make sure that we didn't have minor equipment malfunctions limit us unnecessarily. But also, we wanted to make sure that that is a term that the operators would be able to easily recognize and understand.

And so we determined that a 10-degree reduction in feed water temperature below our design would be appropriate. So, that's something that we know that we'll be able to see both in power and in feed water temperature.

And then we'll be able to implement operations appropriate for that out of our already existing positive reactivity insertion procedure.

Next slide please.

For our tech specs, to accommodate changes for our OPRM upscale function, we'll revise the required operability threshold and set points for the enabled region to make them a larger region.

We'll have new conditions, required actions and completion times do to the addition of the automated backup stability protection for when the OPRM upscale function is inoperable.

And we'll eliminate a surveillance requirement that's no longer necessary because the DSS-CD implementation specifically on that, DSS-CD automatically arms. And so we no longer need to verify that the OPRM is not bypassed.

We'll change the allowable value of the APRM simulated thermal power and high trip function to preserve the margin to trip. And then we'll revise our single loop operations at LCO to make sure that we're exiting the MELLLA+ region immediately if that occurs.

And then finally, our tech spec administration section will include changes that will specify what kind of items are required each time that we make our quota operating limit report.

Next slide please.

Okay. Now I'd like to discuss the time critical operator actions. I've already mentioned these a couple of different times.

And an important part of our implementation, three time critical operator actions for ATWS and stability One, that we initiate reactor water level reduction in 120 seconds.

We'll initiate poison injection in 120 seconds. And initiate suppression pool cooling in 660 seconds. The new one in that trio is the reactor water level reduction.

So, examining implementation of that, the coincidence of that new one, with the existing one for standby liquid control injection, we wanted to make sure that number one, we would maintain our existing EOP strategy. But also make sure that each time we have an ATWS, that the steps will be executed in that timely way.

So, we implemented new rapid response cards for ATWSs. We already have rapid response cards to help the operators and other transient and emergency operation situations.

But we've added new ones for the ATWS. And what --

MEMBER STETKAR: Jim, before we get too

much in details there. You had feed water run back under just plain MELLLA before or not?

You never had feed water run back? So this is a brand -- you say it's changed for MELLLA+. You mean that's a new action? You never had feed --

MR. KOVALCHICK: The new time critical action. So, for ATWSs, it was not -- it wasn't a required in 120 seconds for previous ATWS analysis.

MEMBER STETKAR: Okay. Was it --

MR. KOVALCHICK: It was already an action inside of our EOPs if that's your question.

MEMBER STETKAR: Yes. But it was expected to be taken some time -- some time.

MR. KOVALCHICK: We never put a timeliness on it within the generic aspects. So, remember, we have symptom days procedures.

MEMBER STETKAR: Yes.

MR. KOVALCHICK: So, the supervisor is going to make decisions on how he goes through it each time. And you know, we wanted to make sure that we expeditiously got to that set of instructions each time we do an ATWS anytime moving forward.

That's the only difference. The actual EOP strategy of if we have a power ATWS, we are

taking the mode switch to shut down. We are injecting poison.

And we are going to go reduce level to limit the possibility of cold water injection.

MEMBER STETKAR: That's -- that's -- but, what you were just getting to, is what I wanted to hear from you. The operators until this point in time thought, were trained in that sequence.

Mode switch to shut down. Shoot the boron and then -- and then run back feed water.

MR. KOVALCHICK: Yes. And some other little things in there.

MEMBER STETKAR: Yes, yes.

MR. KOVALCHICK: For example, we're going to do ARI --

MEMBER STETKAR: Sure, sure. But I'm taking big picture steps here. That's right. Okay.

MR. KOVALCHICK: Big picture. That's what we're going to do.

MEMBER STETKAR: Okay. Okay.

MR. KOVALCHICK: And that's not going to change. But what's going --

MEMBER STETKAR: It's only going to change in the sense that now you have made the feed water run back equally critical with injection --

with water injection.

MR. KOVALCHICK: We have developed a pattern in our rapid response cards that it's going to happen the same way every time to make sure that the timeliness is there.

MEMBER STETKAR: Okay. I'll let you consider on -- continue now on the rapid response card.

MR. KOVALCHICK: Okay. Okay, thanks.

MEMBER STETKAR: Thank you.

MR. KOVALCHICK: Okay. All right. Moving on, I think we can go to, let's see, we're up to slide 24.

The talk a little bit more about the rapid response cards. I did mention the content of them. One thing I want to do, reinforce that with respect to the supervisor command and control.

One of the things that we've done is to make sure that the supervisor does not lose command and control by just issuing a set of instructions and isn't in the decision making process during certain critical times.

So, even within the implementation of the rapid response cards, we have built in at decision points where their communications must

happen. For example, immediately prior to injection of poison, the reactor operator will report that I'm ready to inject.

And then he will get a final -- he or she will get a final command from the shift supervisor, inject poison or not to do so. The same with a reduction of reactor level.

So, within the packaging of instructions that we have, we've made sure that we aren't taking command and control away from the senior reactor operator.

MEMBER SKILLMAN: Jim, how formally is the instruction that you just described, codified? And how often are the crews trained to do this?

MR. KOVALCHICK: The formality is as formal as instructions you will see in the control room. They're all three-parted. And the step itself is listed for that communication in the rapid response card.

Now, as far as ATWS training, John McClintock, one of our training leads can discuss how often we train on ATWSs. It's a good question. And I think he can speak to it.

MR. McCLINTOCK: Hi, my name is John McClintock. I am the License Operator Requal

Training Lead at Peach Bottom. I'm also a former Licensed Senior Reactor Operator for many years at Peach Bottom and Shift Manager.

As far as the training goes, the operators receive routine rigorous training obviously on all aspects of, you know, power plant operation. Which includes all of the normal accident and transient sequences.

Of which failure scram is, you know, one of the more significant. So, they receive training on a routine basis every five weeks they're over in training.

And a training week typically always includes some training in failure to scram. I don't know if that answered your question. It's --

MEMBER SKILLMAN: Every five weeks you run an at risk?

MR. McCLINTOCK: No.

MEMBER SKILLMAN: No?

MR. McCLINTOCK: No. They are in training every five weeks.

MEMBER SKILLMAN: Okay.

MR. McCLINTOCK: The training, you know, is done through the systematic approach to training. ATWS, you know, encompasses --

MEMBER SKILLMAN: Once a year? Once every couple of years?

MR. McCLINTOCK: No. It would be more like several times a year.

MEMBER SKILLMAN: Okay. Thank you.

MR. KOVALCHICK: Does that answer your question?

MEMBER SKILLMAN: Answered my question. Thank you.

MR. KOVALCHICK: Okay. So, Mr. Ennis mentioned that they got a chance to look at the implementation of that in the audit of May 2015. So, all of our operating crews have been trained on the MELLLA+ ATWS instability time critical actions.

We did our latest initial license training class in March 2015. And our license operator requal training all of the crews have received that now as of August 2015.

And all of the operating crews demonstrated satisfactory completion within the time critical actions that we have. Next slide please.

So, in discussing the time critical actions, you know, I can present some data. And I think there's some interest here.

For the audit crew, I want to make sure

we understand that the audit crew's purpose was to demonstrate our ability to do it. So this is in the initial generation of our rapid response cards.

We had incentive to demonstrate to ourselves. But also to the audit team that this was something that could be accomplished.

So, we had hand-picked reactor operators and supervisors that had some level of training and proficiency at the time that it was demonstrated. And very clearly, we demonstrated that it was a feasible strategy.

Now getting into the operating crews --

MEMBER SKILLMAN: Well, just before you go ahead.

MR. KOVALCHICK: Sure.

MEMBER SKILLMAN: Hand-picked individuals is what you just said.

MR. KOVALCHICK: Yes, sir.

MEMBER SKILLMAN: Does that mean you chose the best of the best? The sharpest knives in the box?

MR. KOVALCHICK: Not necessarily. They were picked specifically because of their availability within -- outside of crews. They were working with me.

And one of them was on the shift that we managed to use. But the other two were working with me on the uprate stuff.

They were very good operators.

MEMBER SKILLMAN: Let me ask the question a little bit differently. Why should we believe that an audit crew is representative of an operating crew?

MR. KOVALCHICK: And that's why I'm going to present to you the operating crew data. So remember, the first part was to go show that the strategy works.

So, you know, the 120 second time is a viable time. So, it's not wiped out with respect to the analysis. So, it can be accomplished.

So -- but, your question with the operating crews is very relevant. And that's why we're presenting both sets of data.

So, the operating crews, the data is there. It also shows that they meet the time.

Now, each of those crews received what is more -- what I would call more traditional training with respect to an introduction to the rapid response cards in a cycle. And in the next cycle after that, we had them demonstrate the times.

Each of the crews was able to demonstrate the times. The difference between the audit and the operating crew, you know, is important.

And I agree with you, that why, you know, I need to be able to go demonstrate that.

MEMBER SKILLMAN: Um-hum.

MR. KOVALCHICK: So, that's why the operating crew is there.

MEMBER SKILLMAN: I understand what you did with the audit crew. The operating crews on this graphic, did they know they were going to have an ATWS event?

MR. KOVALCHICK: They do -- they did.

MEMBER SKILLMAN: So this was not 3:00 in the morning on a Monday morning?

MR. KOVALCHICK: It was not.

MEMBER SKILLMAN: After how many years have you operated without an automatic scram?

MR. NAVIN: Ten years.

MEMBER SKILLMAN: Ten years on each Unit.

MR. KOVALCHICK: Yes, and that's --

MEMBER SKILLMAN: Okay.

MR. KOVALCHICK: That's a -- I'll take

the fact that we don't have ten year, you know, we have ten years without a scram. I'll take that any day.

But it does present a challenge in making sure that your operating crews are not complacent. And actually can, you know, implement the training in the field.

For example, we did have a recert pump trip this year. In early was it, Pat? It was like in?

MR. NAVIN: Yes, earlier this year, yes.

MR. KOVALCHICK: Yes. Earlier this year. The crews -- the crew, you know, implemented that perfectly in the field.

So, we have evidence that shows that our training is effective in doing that. I expect that in a -- I can go ahead and if you go back to the slide.

MEMBER SCHULTZ: Jim, before you go forward.

MR. KOVALCHICK: Sure.

MEMBER SCHULTZ: Either for you or for John. What is the average deviation represented here? That you're showing for the crew response?

MR. KOVALCHICK: You mean what is it

probably telling us?

MEMBER SCHULTZ: How is it evaluated? What's it -- how is it determined?

MR. KOVALCHICK: The deviation was determined simply by time, you know, from one crew to the next, the deviation.

MEMBER SCHULTZ: How many -- the average of how many crews? You mentioned that --

MR. KOVALCHICK: There's five crews.

MEMBER SCHULTZ: Five crews.

MR. KOVALCHICK: Five crews.

MEMBER SCHULTZ: For the operating crews and for the audit crew the same?

MR. KOVALCHICK: The audit crew was just one.

MEMBER SCHULTZ: That was just one.

MR. KOVALCHICK: And their deviation was on multiple occasions to do it during the audit. We tested --

MEMBER SCHULTZ: Several opportunities.

MR. KOVALCHICK: Yes. We did several scenarios for the audit demonstration.

MEMBER SCHULTZ: Okay. And the other was the average of five crews?

MR. KOVALCHICK: That's right.

MEMBER SCHULTZ: Thank you.

MR. KOVALCHICK: Yes.

CHAIRMAN REMPE: Somewhere I thought I read in some of the information that we were given that the maximum time that they took was 105 seconds. Am I misreading something?

There was no place that they ever came out to 120 or anything like that. Is that true?

MR. KOVALCHICK: That's correct.

CHAIRMAN REMPE: Okay.

MR. KOVALCHICK: Correct. I also expect that the times will improve. As John mentioned, ATWSs are something that we do with frequency in the simulator.

And I expect that these times will start to come closer to what you saw the audit crew do. You know, with the familiarity of it.

The operators are -- actually like these rapid response cards very much. They have in the past always executed ATWS strategies the way we expect.

And they've developed a very good understanding of what they wanted to do. This actually gives them a more expeditious path to where they wanted to go in the first place.

So, they're responding to it very well. And they're actually, you know, they like this change.

MEMBER STETKAR: Jim, who does each of these actions? Initiates standby local control and runs back feed water?

MR. KOVALCHICK: The supervisor will direct the reactor operator to inject poison.

MEMBER STETKAR: Um-hum.

MR. KOVALCHICK: So that's all at the controls right there. I call it the five panel. So, all your attitude is controlled there.

Reactor operator is mostly stationed there anyway. He'll do it. The second reactor operator, the plant reactor operator we call him, will be assigned to level reduction.

MEMBER STETKAR: Remedy that. Thank you.

MR. KOVALCHICK: You're welcome.

MEMBER SKILLMAN: Jim, let me ask this. For the average completion time for reactor water level reduction is a minute and a half.

MR. KOVALCHICK: Um-hum.

MEMBER SKILLMAN: Is there data from crew debriefs of why that isn't faster? For

example, is it because there is a lack of recognition?

Is it because there isn't sufficient instrumentation to tell them what to do? Or is it because they chose to have another two or three sips of coffee and finish their sea story before they take action?

MR. KOVALCHICK: I don't think it's any of those. And what I'd like to do is turn this over to some of the folks that watched a lot of that.

Tony or John, do you guys have any thoughts on that?

MR. HIGHTOWER: Jim, this is Tony Hightower, Peach Bottom Operations. I have some insights.

One of the factors in the time are the other actions, the other ATWS actions that need to be performed. The plant reactor operator has an action to inhibit ADS prior to initiating the water level reduction.

So that does take a finite amount of time. There's also the shear mechanics of the communications. So, a few seconds are used in recognizing the ATWSs.

And few seconds are used in the

supervisor providing the direction to the team to enter the appropriate procedures. And to perform the rapid response cards.

So, that time is there. That will improve with proficiency as we use these rapid response cards more. There will still be a finite amount of time required to get there.

The use of the rapid response cards eliminates a substantial amount of the communication. It allows us to perform ATWS required steps without the same number of three-part communications prior to initiating that level reduction.

That's where we've gained an advantage.

MR. KOVALCHICK: And I think the variance that you asked about, I think is somewhat related to individual skill level to the new communications that came in.

In part, which I would just point out that there is -- initiating standby liquid is a single switch the operators operate to make that happen. Terminating the level injection or it takes multiple actions.

There are three steam driven feed pump turbines. Each need to be secured individually.

The high pressure injection cooling system also needs to be secured.

So there are more actions that the operator needs to take that will inherently take more time. Then if you look at the times for the audit team to the operating crews on that, that's actually a fairly small delta from 79 seconds to 84 seconds.

MEMBER SKILLMAN: Okay. Thank you.

MEMBER STETKAR: The first -- I'll call them the person on the standby liquid control, the first operator -- the first operator is the person that throws the mode switch also?

MR. KOVALCHICK: That's correct.

MEMBER STETKAR: Because they're sitting at the --

MR. KOVALCHICK: That's correct.

MEMBER STETKAR: Okay. And all they do basically in an ATWS is mode switch to shut down. And wait for a command --

MR. KOVALCHICK: They'll load for standby.

MEMBER STETKAR: For standby control? They have other --

MR. KOVALCHICK: They'll attempt a

manual scram.

MEMBER STETKAR: Yes. Okay. They're going to do all of that stuff.

MR. KOVALCHICK: They'll also be, you know, reporting out on power pressure level. And also initiating our ARI system, the alternate rod insertion system.

MEMBER STETKAR: Okay. And then the second operator, as you said, they've got to inhibit ADS and then do everything to run back feed -- do they have -- does that person have any other things that they need to do?

MR. KOVALCHICK: Depending on what power is doing, they maybe responsible to go and make sure the electrical plant is being taken care of.

MEMBER STETKAR: Oh. That's interesting.

MR. KOVALCHICK: In other words, do we need to trip the main turbine yet?

MEMBER STETKAR: So, do you run these guys through a loss of offsite ATWS?

MR. KOVALCHICK: No. I don't know that we've done that then.

MEMBER STETKAR: Okey dokey then.

MR. KOVALCHICK: With the rapid -- did

we do it with the rapid response cards yet?

MR. HIGHTOWER: So, we didn't do a loss of offsite power ATWS. But if it -- with the loss of offsite power ATWS, the actions to stabilize the plant would take priority over dealing with the loss of offsite power.

I think what Jim's speaking to is actions to transfer house loads --

MR. KOVALCHICK: Yes.

MR. HIGHTOWER: With the electric plants.

MEMBER STETKAR: That's still -- I mean, I only have so many hands that I --

MR. KOVALCHICK: There -- it is --

MEMBER STETKAR: An electrical board is typically over there somewhere.

MR. KOVALCHICK: You're right. And -- you're right. So, you know, that will inherently add a -- there's like a finite time that --

MEMBER STETKAR: And don't -- I know you have turbine driven feed water pumps. So, don't get me into the full loss of offsite power. Because I'll walk you into the partial loss up front.

MR. HIGHTOWER: But I do have another piece of information to go to the transfer of house

loads that Jim's speaking of.

Initially, we had captured those actions in the rapid response cards --

MEMBER STETKAR: Um-hum.

MR. HIGHTOWER: As plant rapid -- plant reactor operator actions. Because that's part of their normal process for mitigating a scram event.

But we recognize the amount of time that that takes. Transferring house loads during an ATWS is not essential.

MEMBER STETKAR: Right.

MR. HIGHTOWER: And that's been removed from the procedures for the plant reactor operator to deal with an ATWS. Because it's recognized if the turbine is --

MEMBER STETKAR: Once you recognize you're in an ATWS. Once you recognize -- but their normal instinct if they had a, I'll call it the plain vanilla power failure would be to head for the electrical pump.

MR. KOVALCHICK: Yes. And this is one of the benefits of the rapid response cards.

MEMBER STETKAR: Yes. Yes.

MR. KOVALCHICK: Is it goes to streamline those activities to go make sure that

you're minimizing those other distractions and making sure you're setting the priorities.

MEMBER STETKAR: Okay. Thank you.

MR. KOVALCHICK: Okay. The next slide please?

So, this kind of sums up a little bit about some of what we've been talking about. About the -- we do have some margin demonstrated by even in the introductory phase, we know that we've done with the new, you know, procedures and rapid response cards.

It accounts for possible variation between training and actual ATWS events. In other words, you know if I -- I can accomplish this as you guys noted in about a minute and a half.

That's not the 30 seconds that I'm willing to go give to the analysis folks to go use. I want to maintain that margin. And we're pretty comfortable with that.

Comparing the audit and training crew results was useful with respecting -- with respect to some of that same uncertainty. You know, the -- what's the difference between a crew that, you know, knows everything about what's coming. Lots of practice versus maybe some crews that have a little

bit of extra to accomplish.

And we also discuss that this is going to be part of recurring training. And it will always be part of our ATWS strategy.

And then finally just summing this up. This couples together with the conservatisms that realistic inputs give us within the analysis piece. For example, what we know, and I think Andy will -- can talk to this later.

Things like realist inputs for feed water temperature reduction, et cetera. That all build together to what I know is a conservatism with respect to the critical time, critical actions.

Are there any questions before I turn it back over to Kevin? Okay, thanks. Go ahead Kevin.

MR. BORTON: Okay. And just a conclusion of our open session here. Just to touch on what we talked about is the significant benefits for the operators for flexibility and the finite adjustments that they have with core flow.

Increasing the station capacity factor during operating cycles. And of course are we gaining that margin that we lost with the EPU?

We're ready to implement MELLLA+, the license amendment. The installations in the firm

are in testing or completed.

Our training is completed. And our tech specs and procedure and the implementation testing is what's needed for us to go to that as well.

And just again, to touch on, thank you for the consideration for an early January 2016 implementation as well.

CHAIRMAN REMPE: Thank you. And I'm glad that you did complete the training on the operators. Thank you for reporting the results to us.

At this point, we're going to have public comments and going -- before we go into closed session and have a break.

So, if I could ask you to open up the public line, we'll first look around the room and see if anyone wants to come up to the mic and provide any comments? And then we'll just wait until the line is there.

The folks that are out on the licencing line like you Kord. Do you have any comments that you wanted to make at this time too? While we're waiting for the public line?

(No response)

CHAIRMAN REMPE: I guess it's a no. It

sounds like the public line is open. But the only way we can confirm it is to ask the --

MR. LEWIS: Marvin Lewis. Member of the public.

CHAIRMAN REMPE: Thank you, Marvin, for confirming the line is open. Do you or does anyone else on that line have any comments?

MR. LEWIS: Yes, I do. In fact some of my comments are positive.

CHAIRMAN REMPE: Okay. Actually we're getting a lot of noise. It sounds like heavy breathing.

I don't know if it's from you Marvin or someone else on the public line. But, could whoever it is step back away from your phone, okay?

And then go ahead and provide your comments Marvin.

MR. LEWIS: Okay. I hope that's better.

CHAIRMAN REMPE: That's much better.

MR. LEWIS: Okay. Well look, I am glad to hear that ATWS is back in the realm of interest in participated changing without scram.

I haven't heard that term I swear since the '60s. But, it also bothers me. Because I also heard the term WASH 1400 yesterday on another

meeting -- on another ACRS meeting.

And what I'm worried is, are you now taking the same positions that you took back 40 years ago that led us to Three Mile Island? I'm not liking that idea.

So, although I'm fairly pleased with what you're looking at. And fairly pleased at the things that you're bringing out, I'm a little worried that you're taking those old stances back that really kept a lot of people out of it. And a lot of say technology out of it.

My second point is this. I'm glad you're bringing the operators in. The reactor operators are the guys that actually will have to flip the switch.

I am worried that you're bringing them in in such a way that they cannot tell their full feelings about what the heck's going on. In other words, are -- is everything going to be traditionally blamed on the operator if something goes wrong?

And you know, look at the information, yes. In the past everything has been blamed on the operator rightly or wrongly.

So, maybe we ought to bring in Union

reps to explain some stuff that might have been given to them in confidence. Just an idea. Thank you.

CHAIRMAN REMPE: Thank you for your comment. Is there anyone else on the public line that would like to make their comment?

(No response)

CHAIRMAN REMPE: So, not hearing any other comments, let's close the public line. And we're going to take a break and go into closed session.

And let's come back at 10 after 10:00 with the closed session. Does that sound good? Thank you.

(Whereupon, the above-entitled matter went off the record at 9:53 a.m. and resumed at 10:18 a.m.)

Peach Bottom Atomic Power Station
Units 2 and 3

MELLLA+
Maximum Extended Load Line Limit Analysis Plus

Advisory Committee on Reactor Safeguards
Power Uprate Subcommittee Meeting
December 2, 2015

Exelon Generation®

Introductions

Kevin Borton
Licensing Manager, Power Uprates

Exelon Generation®

Licensee Presenters

• Pat Navin	Plant Manager	Exelon/PBAPS
• Kevin Borton	Licensing Manager	Exelon/PUR
• Andy Olson	Sr. Staff Engineer, Fuels	Exelon /Corp
• Jim Kovalchick	Operations Manager	Exelon/PBAPS

Licensee Support

• John Rommel	Engr. Director	Exelon/PUR
• Jim Armstrong	Reg. Assurance Mgr.	Exelon/PBAPS
• James Tusar	Nuclear Fuels Mgr.	Exelon /Corp
• Alex Psaros	Reactor Eng. Mgr.	Exelon/PBAPS
• John McClintock	Operations Training	Exelon/PBAPS
• Bruce Hagemeier	MELLLA+ Project Manager	GEH
• Shawn Lamb	GEH Technical Leader	GEH
• Mike Cook	GEH Technical Leader	GEH

Presentation Objectives

- Show the Need for MELLLA+
- Describe Key Aspects and Answer Questions
- Demonstrate Exelon Readiness
- Ask for Schedule that will Support Early January 2016 Implementation

Agenda

• PBAPS Station History / Overview	Pat Navin
• MELLLA+ Project Overview	Kevin Borton
• MELLLA+ Design and Analyses	Andy Olson
• Operator Actions, and Training	Jim Kovalchick

PBAPS Station Overview

Pat Navin
PBAPS Plant Manager

Exelon Generation®

Station Overview

- General Electric BWR-4, Mark I Containment
- Containment design pressure 56 psig
- Began commercial operation in 1974, OLTP 3293 MWt
- EPU 3951 MWt implemented U2 2014, in progress for U3
  - Enriched Boron – improves Standby Liquid Control system margin for ATWS
  - Elimination of CAP Credit
- 24 month operating cycle
- GNF2 full core
- Steam-driven feedwater pumps
- Licensed for Increased Core Flow (ICF) (110%)

PBAPS History

Key Milestones	Year	MWth
➢ Full Power Operating License (Original Licensed Thermal Power - OLTP)	1973 (U2) 1974 (U3)	3293 3293
➢ Stretch Power Uprate (105% OLTP)	1994 (U2) 1995 (U3)	3458 3458
➢ MUR Uprate (1.62% increase)	2002 (U2) 2002 (U3)	3514 3514
➢ MELLLA Operating Domain	1995	N/A
➢ Renewed Operating License	2003	N/A
➢ Option III Stability Solution	2005	N/A
➢ GNF2 Fuel Introduction	2010	N/A
➢ Extended Power Uprate (120% OLTP) (* Currently performing EPU Power Ascension)	2014 (U2) 2015 (U3)*	3951 3951

MELLLA+ Project Overview

Kevin Borton

Exelon Generation®

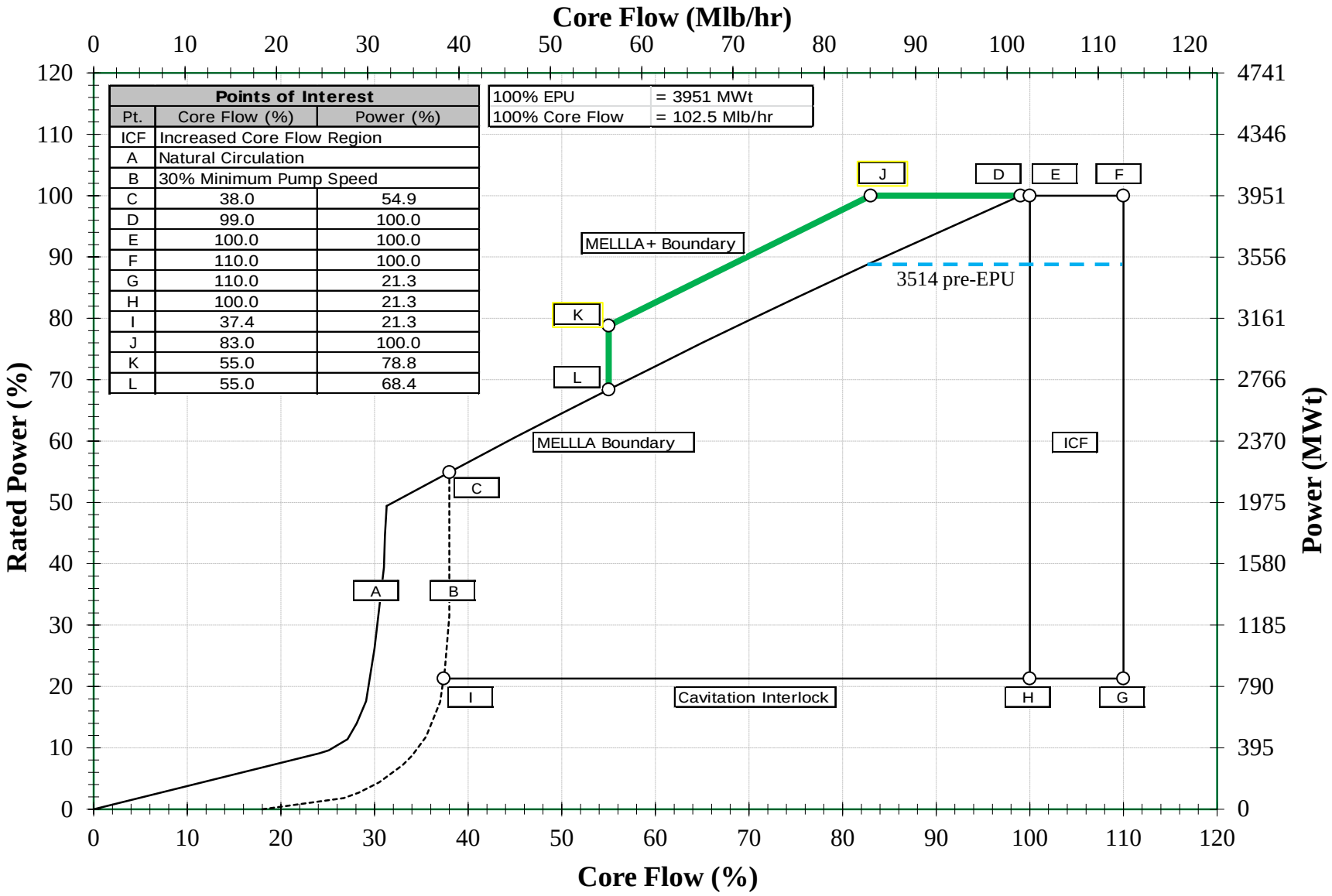
MELLLA+ Benefits

- Expands nominal core flow window at 100% EPU power by 16% of rated flow
  - Fewer control rod manipulations
  - Reduction in End-of-Cycle down-powers

- Detect and Suppress Solution - Confirmation Density (DSS-CD) provides improved core instability detection algorithm

- Will increase the station capacity factor during the operating cycle

MELLLA+ Power-to-Flow Map



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MELLLA+ Project Scope

- **MELLLA+ does not change:**
  - Operating Pressure
  - Maximum Licensed Thermal Power
  - Maximum Licensed Core Flow
  - Feedwater Flow Rate or Temperature

- **MELLLA+ does not require modifications to balance of plant equipment**

MELLLA+ Project Scope

- **MELLLA+ requires changes to:**
  - Operating Power/Flow Map
  - Stability Solution and associated Oscillation Power Range Monitor (OPRM) settings
  - Average Power Range Monitor - Simulated Thermal Power Flow Biased Set-points
  - Power Range Neutron Monitor (PRNM) Control Room Human-System interfaces
  - Core Operating Limits Report (COLR)
  - Technical Specifications

MELLLA+ Implementation Plan

- Phase 1 – Outage Related Plant Modifications (Prior to MELLLA+ Approval)
  - DSS-CD Installation (Complete)
    - Units 2 and 3 have operated with Option III since 2005
    - DSS-CD Firmware Installed and Functionally Tested on Unit 2 and Unit 3
    - Unit 2 and Unit 3 CDA RPS Trip Bypassed until MELLLA+ Approval / Implementation

- Phase 2 – On-line Installation / Testing (After MELLLA+ Approval)
  - MELLLA+ Technical Specifications Implementation
  - MELLLA+ Modification Implementation
  - Enable DSS-CD APRM/OPRM Settings
    - Remove Bypasses and Test
  - MELLLA+ Reload Analysis Updated
    - 3D Monicore Databank
    - COLR
  - Procedure Revisions
  - Perform MELLLA+ Operational Testing

MELLLA+ Design and Analyses

Andy Olson

Exelon Generation®

EPU Operating Experience

- **For EPU power the maximum licensed core flow is 110 %**
  - 105.5% core flow achievable during normal conditions (not EOC or BOC)
  - 109.5% core flow achievable at End-of-Cycle (EOC) conditions
  - 104% core flow achievable during Beginning-of-Cycle (BOC) conditions
- **The practical core flow operating window at EPU rated conditions is from 101.0% to 105.5%.**
  - Operational margin to the MELLLA boundary at 99.0% flow
  - Higher core flows used at EOC conditions.

MELLLA+ SRLR

- **MELLLA+ Supplemental Reload Licensing Report (SRLR) submitted to NRC as supplemental information to MELLLA+ License Amendment Request**
  - Reload analysis based on currently operating core design
  - Minor thermal limit increase reflects SLMCPR adder and additional uncertainty for Two Loop Operation (TLO) and small changes to limiting transients for MELLLA+
  - No impact on Linear Heat Generation Rate (LHGR), Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) limits

MELLLA+ SRLR (Continued)

- Stability section reflects move to DSS-CD solution
  - Manual Backup Stability Protection (BSP) and Automated Backup Stability Protection (ABSP) tables, information provided

- Appendix F addresses/updates applicable Limitations and Conditions (L&C) from NEDC-33173P- A Rev. 4 (Interim Methods Licensing Topical Report (LTR))

- New Appendix G addresses applicable L&C from NEDC-33006P-A Rev 3 (MELLLA + LTR)

MELLLA+ Operator Procedures and Training

Jim Kovalchick

Exelon Generation®

License Conditions

Operation in the MELLLA+ domain is prohibited when operating with one of the following plant configurations:

- Reactor Recirculation System Single Loop Operation
- Feedwater Heater Out of Service - A feedwater heater out of service resulting in more than a 10°F reduction in feedwater temperature below the design feedwater temperature
  - 10°F feedwater temperature reduction results in a recognizable change in reactor power
  - Allows operators to promptly recognize feedwater temperature change and reduce power to exit the MELLLA+ region
  - Uses existing “Positive Reactivity Insertion” abnormal operating procedure

Tech Spec Changes

- OPRM Upscale Function
  - Revise required operability threshold and set-points for OPRM enabled region (larger region)
  - New Conditions/Required Actions/Completion Times due to addition of Automated Backup Stability Protection (OPRM Upscale Function Inoperable)
  - Eliminate surveillance requirement that is no longer required due to DSS-CD implementation
- Change the Allowable Value for APRM Simulated Thermal Power – High trip function
- Revise Single Loop Operation LCO – Exit M+ Region Immediately
- Changes to TS Administrative Section

ATWS-I Time Critical Operator Actions

TCOA	MELLLA+
Initiate Reactor Water Level Reduction	120 seconds (change for MELLLA+)
Initiate Standby Liquid Control System (SLCS) Injection	120 seconds (unchanged for MELLLA+)
Initiate Suppression Pool Cooling	660 seconds (unchanged for MELLLA+)

- Existing EOP strategy retained
- Use of new ATWS Rapid Response Cards (RRC) to streamline communications
- Control Room Supervisor (CRS) retains Command and Control for EOP strategy

ATWS-I Time Critical Actions

- ATWS Rapid Response Cards - RRC directs:
  - SLCS injection
  - Reactor water level reduction
- NRC Audit observed use of RRC and time critical action in May 2015
- All operating crews have been trained on MELLLA+ ATWS-I time critical actions
  - Initial License Training Class completed in March 2015
  - Licensed Operator Requalification Training completed in August 2015
- All operating crews have demonstrated satisfactory completion of the ATWS-I time critical actions

ATWS-I Time Critical Actions

- Audit Crew

Action	Required Time (sec)	Average Completion Time (sec)	Average Deviation (sec)
SBLC Injection	120	54	2
Reactor Water Level Reduction	120	79	5

- Operating Crews

Action	Required Time (sec)	Average Completion Time (sec)	Average Deviation (sec)
SBLC Injection	120	73	12.9
Reactor Water Level Reduction	120	84	11.3

- The Audit crew and all operating crews have demonstrated ability to complete SBLC injection and water level reduction within required times
- 120 sec TCA Licensing Bases is practical and conservative

Conservatism of ATWS-I Time Critical Actions

- Ample Operator Action and Analytical Margin Exists

Actions

- Average training performance demonstrates 30% margin to action times assumed in licensing bases
  - Accounts for possible variation between training and during an actual ATWS event
    - Comparing the audit and training crew results useful when assessing uncertainty
  - Operator actions are similar for every ATWS
    - 5 week training cycle reinforces familiarity
- Systematic approach to ATWS-I is very well suited to repeatability

Analysis

- Analytical sensitivity runs indicate that assuming 120 seconds for SBLC injection and RPV water level reduction meet regulatory criteria.
- Realistic inputs demonstrates further conservatisms

Conclusions

- **Implementation of MELLLA+ will provide significant benefits:**
  - PBAPS operators will have greater flexibility in using core flow adjustments to control reactivity
  - Increasing the station capacity factor during the operating cycle
  - MELLLA+ will regain margin to the Load Line boundary
- **PBAPS is ready to implement the MELLLA+ License Amendment**
  - Completed installation of the DSS-CD, firmware and testing
  - Completed training on required operator actions
  - Technical Specification, procedure, and implementation testing ready
- **Ask for early January 2016 implementation**