Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

Title:	Advisory Committee on Reactor Safeguards Plant License Renewal Subcommittee
Docket Number:	(n/a)
Location:	Rockville, Maryland
Date:	Tuesday, November 5, 2019

Work Order No.: NRC-0676 Pages 1-133

NEAL R. GROSS AND CO., INC.
Court Reporters and Transcribers
1323 Rhode Island Avenue, N.W.
Washington, D.C. 20005
(202) 234-4433

DISCLAIMER

UNITED STATES NUCLEAR REGULATORY COMMISSION'S

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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

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

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

+ + + + +

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

+ + + + +

PLANT LICENSE RENEWAL SUBCOMMITTEE

+ + + + +

TUESDAY

NOVEMBER 5, 2019

+ + + + +

ROCKVILLE, MARYLAND

+ + + + +

The Subcommittee met at the Nuclear Regulatory Commission, Two White Flint North, Room T2B2, 11545 Rockville Pike, at 8:30 a.m., Matthew W. Sunseri, Chairman, presiding.

COMMITTEE MEMBERS:

MATTHEW W. SUNSERI, Chairman

PETER RICCARDELLA, ACRS Chairman

RONALD G. BALLINGER, Member

CHARLES H. BROWN, JR., Member

VESNA B. DIMITRIJEVIC, Member

JOSE MARCH-LEUBA, Member

WALTER L. KIRCHNER, Member

ACRS CONSULTANT:

STEPHEN SCHULTZ

DESIGNATED FEDERAL OFFICIAL:

KENT HOWARD

STAFF PRESENT:

BENNETT BRADY

LAUREN GIBSON

MEL GREY

JUSTIN HEINLY*

ALLEN HISER

JOEL JENKINS

MEENA KHANNA

SCOTT KREPEL

KEVIN MANGAN

ERIC OESTERLE

BILL ROGERS

MO SADOLLAH

ALSO PRESENT:

JAMES BROWN, Exelon

RON DiSABATINO, Exelon

DAVID DISTEL, Exelon

MICHAEL GALLAGHER, Exelon

ANNA KRAUSE, Exelon

JULIAN LAVERDE, Exelon

ALEX PSAROS, Exelon

PAUL WEYHMULLER, Exelon

*Present via telephone

A-G-E-N-D-A

P R O C E E D I N G S

8:30 a.m.

CHAIR SUNSERI: Good morning. The meeting will now come to order.

This is a meeting of the Plant License Renewal Subcommittee. I am Matthew Sunseri, chairman of the subcommittee. ACRS members in attendance are Vesna Dimitrijevic, Jose March-Leuba, Pete Riccardella, Walt Kirchner, Ron Ballinger and myself. We are expecting Charles Brown to come. He's held up in traffic but he should be here by a quarter till.

Stephen Schultz is our consultant for this meeting. Stephen's over here. And Kent Howard of the ACRS staff is our Designated Federal Official for the meeting.

The purpose of this subcommittee meeting is for Exelon Generation Company and NRC staff to brief the subcommittee on the subsequent license renewal application and SER for Peach Bottom Atomic Power Station Units 2 and 3.

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

The ACRS was established by statute and

governed by the Federal Advisory Committee Act. That means that our committee can only speak through its published letter reports.

As this is a subcommittee meeting any views or opinion expressed today will be individual member comments and not official ACRS positions.

The ACRS section of U.S. NRC public website provides our charter, bylaws, letters and full transcript of all full and subcommittee meetings including slides presented at the meetings.

The rules for participation in today's meeting were announced in the Federal Register and we have not received any written comments or requests for time to make oral statements from members of the public regarding today's meeting.

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 room when addressing the subcommittee.

Participants should first identify themselves and speak with sufficient clarity and volume so that they can be readily heard.

If you have a name tag you don't have to state your name over and over again.

A public telephone bridge line has been established for this meeting. We also have a separate bridge line for the regional inspectors to call in.

To preclude interruption of the meeting please mute your individual lines during the presentation and committee discussions.

Also, for members, people participating in the room please silence all your cell phones and electric devices.

Based on separate affiliations with Structural Integrity Associates, Member Riccardella and myself are recusing ourselves from any assessment of metal and environmental fatigue and reactor pressure vessel and sacrificial shield wall irradiation and embrittlement issues presented in section 4 of the Peach Bottom SLRA.

We will now proceed with the meeting and I call upon Meena Khanna to make any introductory remarks. Meena?

MS. KHANNA: Good morning. Thank you, Chairman Sunseri and members of the ACRS Subcommittee on Plant License Renewal.

I am Meena Khanna, acting deputy director of the Division of New and Renewed Licenses.

We sincerely appreciate the opportunity today to present to the ACRS Subcommittee on License Renewal the results of the staff's review of the second application for subsequent license renewal and the first application for a boiling water reactor.

The application was submitted by Exelon Generation Company LLC for the Peach Bottom Atomic Power Station Units 2 and 3 located near Delta, Pennsylvania.

By way of background Peach Bottom Units 2 and 3 received approval for their initial renewed licenses from the NRC on May 7, 2003.

The NRC review at that time was performed using guidance developed prior to the issuance of the Generic Aging Lessons Learned Report, or the GALL Report.

The NRC guidance for license renewal over the years has evolved through enhancements and improvements based on lessons learned from NRC reviews and from both domestic and international industry operating experience.

The GALL Report went through two revisions and additional interim staff guidance was issued following revision 2.

The guidance for subsequent license

renewals contained in GALL SLR built upon the previous guidance and included additional focus and enhancements where necessary on aging management and the time-limited aging analyses for operation in the 60- to 80-year period.

In the staff's presentation today you will hear about some of these specific SLR issues as applied to the Peach Bottom review.

The NRC project manager for the Peach Bottom subsequent license renewal application review is Ms. Bennett Brady.

Bennett will introduce the staff seated at the table who will be presenting or addressing questions regarding the staff's review of the Peach Bottom subsequent license renewal application.

Part of the management team that are here with me today are Eric Oesterle who's seated to the right of me, chief of the License Renewal Projects Branch.

And in the audience are DNRL management and other technical review branch chiefs including Steve Bloom, Hipolito Gonzalez, Matt Mitchell, Tania Martinez Navedo, and a few others as well that I won't name.

We also have with us regional

representatives from Region 1. Behind me, Mr. Mel Grey, chief of the engineering branch.

We also have Kevin Mangan who's also seated behind me, senior reactor inspector from Mr. Grey's branch.

And we also are pleased to indicate that we have Justin Heinly who's a senior resident inspector who will be on the phone later today.

I'd like to note that during its review the staff identified one confirmatory item in the safety evaluation report for this review associated with the core plate rim hold-down bolts.

The staff will present today how this item has been resolved since we issued the SER.

In addition, the staff will provide an overview of its safety review and highlight a few technical areas that may be of interest to the subcommittee members and we will address any questions on these reviews that you may have.

I would like to also take this opportunity to thank the staff and the management for all their wonderful support with respect to this review of the Peach Bottom subsequent license renewal application and this obviously includes all the inspectors' support with the audits and inspections.

We look forward to a productive discussion today with the ACRS subcommittee. At this time I'd like to turn the presentation over to Mr. Michael Gallagher, Exelon Nuclear vice president for license renewal and decommissioning to introduce his team and commence their presentation. Thank you.

MR. GALLAGHER: Okay. Thank you, Meena. Good morning. My name is Mike Gallagher and I am the vice president of license renewal at Exelon.

I have 38 years of nuclear power plant experience, all at Exelon and I've been working on our license renewal project since 2006.

Slide 1, please. Before we get into today's presentation I would like to introduce our presenters.

To my right is Anna Krause and Anna is our senior manager of design engineering at Peach Bottom. And Anna has 14 years of nuclear power plant experience.

To Anna's right is Paul Weyhmuller and Paul is our license renewal technical manager for the Peach Bottom project.

Paul has 37 years of nuclear power plant experience including working on Exelon's license renewal applications since 2011.

To Paul's right is Julian Laverde and Julian is our mechanical design manager for Peach Bottom. Julian has nine years of nuclear power plant experience.

And then to my left is Dave Distel. Dave is our project licensing lead. Dave has 39 years of nuclear power plant experience.

In addition to our technical support which you see scattered through the room here we do have with us our site vice president Pat Navin. So, slide 2, please.

CHAIR SUNSERI: Michael, while you're changing slides there and to Pat also, we appreciate the support that you're showing this process by having such a large number of technical staff here in light of the fact that you all are in the middle of an outage at your station.

So we really appreciate that commitment to address our questions. Thank you very much for that.

MR. GALLAGHER: Thank you, Chairman. Outages are always challenging for us and we have great people there and we have great people here. So, we can do both.

CHAIR SUNSERI: Appreciate it.

MR. GALLAGHER: Thank you. So slide 2,

please.

This slide shows our agenda for the presentation. We will be presenting to you some background information about the station and then the highlights of our subsequent license renewal application, and also how we closed the one confirmatory item.

Then we will present to you some important technical topics related to subsequent license renewal and how we address them in our application.

We believe we've developed a robust, high-quality subsequent license renewal application. We also have effective aging management programs to ensure the continued safe operation of Peach Bottom.

We appreciate the opportunity to make this presentation and look forward to answering any questions you may have.

I now turn the presentation over to Anna. Anna?

MS. KRAUSE: Thank you, Mike. Slide 3, please.

Good morning. My name is Anna Krause and I'm the senior manager of design engineering at Peach Bottom.

Peach Bottom Units 2 and 3 are GE boiling water reactors with Mark I containments that are jointly owned by Exelon and PSE&G and are operated by Exelon.

The Peach Bottom Station is located in the Commonwealth of Pennsylvania, approximately 40 miles northeast of Baltimore, Maryland, and 60 miles southwest of Philadelphia, Pennsylvania.

Slide 4, please. This slide shows an aerial view of Peach Bottom. On the slide you can see the power block, the independent spent fuel storage pad or ISFSI pad, the north and south substations, the plant intake and discharge canal which is the normal heat sink for the station, and the emergency cooling tower which comprises the emergency heat sink in the event that the normal heat sink is not available. Slide 5, please.

Peach Bottom operates on a 24-month refuel cycle. Plant capacity factor for 2018 was 94.2 percent. For 2019 year to date capacity factor as of September 30 is 98.6 percent. And as Mike mentioned that will be impacted based on our Unit 3 refuel outage that we are just concluding this week.

Our regulatory performance has Peach Bottom in action matrix column 1 and all ROP indicators are green.

MR. SCHULTZ: Anna, just before you leave that slide, can you give us a perspective of the recent historical operation of the facility? You've got capacity factors for '18 and '19. Over the last five years how has the performance of the facility been?

MS. KRAUSE: I would say over the last five years performance of the facility has been very strong.

We did have one scram in 2018 associated with two condensate pumps that had tripped. That was a result of improper maintenance practices that had been performed on cable.

But overall, plant performance has been very strong. We have a focus on equipment reliability for our station that is very pervasive through our culture. And that's how I would answer that question.

MR. GALLAGHER: Anna is being a little humble here. Prior to that one reactor scram we had a run of both units of 11 years without a scram. So very high reliability at the site and a really good maintenance focus is what we have.

MR. SCHULTZ: Thanks to both of you. So that demonstrates your age-related performance is excellent as well.

MR. GALLAGHER: I think so, yes, because the plant runs better and better every year that we keep on top of it.

MR. SCHULTZ: Thank you.

MS. KRAUSE: Okay. Slide 6, please. This slide provides an overview of Peach Bottom history.

Peach Bottom was initially licensed in 1973 for Unit 2 and 1974 for Unit 3. Each unit was initially licensed for a rated power of 3,293 megawatts thermal.

A 5 percent increase in rated power was performed in 1994 for Unit 2 and 1995 for Unit 3. The independent spent fuel storage installation was installed in 2000.

In 2014 a 15 percent extended power uprate increase was approved which increased the rating on each unit to 3,951 megawatts thermal.

In 2017 both Units 2 and 3, we performed a measurement uncertainty recapture of 1.66 percent which increased the rating on each unit to their current rating of 4,016 megawatts thermal.

The current license expiration dates are August 8, 2033 for Unit 2, and July 2, 2034 for Unit 3.

MEMBER MARCH-LEUBA: Anna, in 15 seconds

or less can you educate us on the status and history of Unit 1? You understand the question?

MS. KRAUSE: Right. Unit 1.

MR. GALLAGHER: I think I can probably address this. So Unit 1 was a high-temperature gas-cooled reactor. It was built by a consortium of utilities, that was actually about 40 utilities that were involved in the development of that. It went online in 1967 and we took it offline in '78, I believe.

It's in decommissioning. It's in a safe-store condition. There's no fuel at that facility. It's all been removed.

MEMBER MARCH-LEUBA: I said 15 seconds or less. Just for the record.

MR. GALLAGHER: It's a neat facility.

MEMBER MARCH-LEUBA: It begs to talk about Unit 1.

MR. GALLAGHER: Thank you.

MS. KRAUSE: Okay. Slide 7, please. This slide provides an overview of significant plant modifications implemented at Peach Bottom that address component aging and long-term operations.

Modifications included main condenser upgrades utilizing titanium tubes, hydrogen water chemistry and noble metal chemical addition for reactor vessel internal protection.

Additional modifications include the replacement of our main power transformers, reactor pressure vessel core spray piping upgrade on Unit 3 as well as torus recoating for both units.

Supporting extended power uprate operation are the RHR cross-tie modifications, steam dryer replacements and turbine generator set upgrades.

The station also upgraded to digital control systems for EHC and feedwater. Fuel pool cooling heat exchangers were recently replaced. And we expanded our independent fuel storage installation pad and it's in progress for use in 2020.

MEMBER MARCH-LEUBA: Again, for education we spend a lot of time reviewing digital upgrades. And I'm sure you'll understand how great the digital way is and the operators love it.

How much work was it with this? We would like to get your perspective, was it worth it.

MR. GALLAGHER: Maybe Ron can answer that question.

MEMBER MARCH-LEUBA: And again, I'm looking for a 15-second.

MR. DISABATINO: Sure. My name's Ron

DiSabatino from Peach Bottom's engineering department. We did significant upgrades for our EHC system from the original GE system up to a Westinghouse engagement system. So it was a complete wholesale replacement all the way out to the sensors that control the system.

Our feedwater system is also on that same platform. So over the years when we retrofitted both of those systems we have to bring them both to the same platform as well. So it's considerable effort and work. In-field wiring, computer system development and testing.

But having them both on the same platform addressed significant obsolescence issues with those.

MEMBER MARCH-LEUBA: So, order of magnitude, factor of 10 is okay. How many man-year or person-years were involved in that operation, and what fraction of that was regulatory reviews?

MR. DISABATINO: We had probably dozens of engineers on teams, greater teams involving operations personnel and contractors as well supporting those modifications.

I do not believe they had significant regulatory impacts from a review perspective.

MEMBER MARCH-LEUBA: So it was mostly

engineering work.

MR. DISABATINO: That was our non-safety related.

MR. GALLAGHER: Non-safety related systems. I mean, in general we're pretty careful about doing complete system upgrades, particularly with replacing analog to digital.

There's a lot of testing that needs to be done. All the way from the factory, the cybersecurity issues are pretty extensive. So there's a lot of work.

I think Ron was getting into, okay, once we get it onsite we can get the job done. But there's a lot of work involved in getting to that point.

MEMBER MARCH-LEUBA: But the operators love it, right?

MR. GALLAGHER: We have an operator here. James?

MR. BROWN: James Brown, Peach Bottom, currently licensed SRO. In the control room digital EHC, digital feedwater has taken the -- it's been fantastic for us. All the operators really, really love it.

MEMBER MARCH-LEUBA: Thank you.

MS. KRAUSE: Okay. I will now turn it

over to Paul Weyhmuller who will present to you the highlights of our subsequent license renewal application.

MEMBER KIRCHNER: May I ask a question on this slide that's in front of us?

And that is as you were making these modifications did you see with your step-wise increase in power, did you see any -- how shall I describe it -- wear or erosion in components?

I see you replaced the steam dryer as an example. Did you see wear in any of the main steam piping and such as a result of higher flow rates and higher power rating?

MS. KRAUSE: We did perform extensive testing post-EPU to look for any indications of additional vibrations in the systems, particularly around the OE for steam dryers.

We did a number of special tests and monitoring too to ensure it was not negatively impacted.

MR. GALLAGHER: But one thing, we do have -- we have a commitment, one of our commitments in our application to do an EPU assessment prior to entering the second period of extended operation.

So we would gather any effects to that

point and any lessons learned from other stations. And that's a specific commitment that we have to do that.

MEMBER KIRCHNER: Thank you.

CHAIR SUNSERI: And that would include flow accelerated corrosion evaluations?

MR. GALLAGHER: Yes. FAC is one of the programs that would have to be reviewed.

MR. WEYHMULLER: All right. Slide 8, please.

Good morning. My name is Paul Weyhmuller. I'm the technical manager for Peach Bottom license renewal project.

I will discuss the highlights of our subsequent license renewal application focusing on application development, new time-limited aging analyses, overall GALL SLR consistency, review of the aging management programs, the exceptions we have taken, a summary of the first license renewal aging management program effectiveness reviews that have been conducted, and a status of open and confirmatory items. Slide 9, please.

Exelon used industry and NRC guidance to make our application as consistent with GALL SLR as possible.

Our submittal was based on the guidance provided in both NUREG-2191 and 2192.

In developing the Peach Bottom subsequent license renewal application changes noted from first license renewal include for scoping and screening we have updated our packages for plant modifications as well as to address NEI 17-01 guidance.

For aging management reviews the first license renewal was pre-GALL so additional aging effects required assessment based on NUREG-2191 GALL SLR.

For aging management programs we have 47 programs for subsequent license renewal utilizing the GALL SLR guidance.

Activities from first license renewal have been addressed in subsequent license renewal programs.

Our aging management programs were developed incorporating lessons learned from previous Exelon projects as well as from benchmarking current industry applications.

The aging management programs were also developed using insights from industry RAIs.

For time-limited aging analyses the Peach Bottom subsequent license renewal application has reassessed the existing current licensing basis TLAAs.

Additional TLAAs from repair or replacement activities not part of the first license renewal application have been added.

Examples of new TLAAs which involve replacement or repair activities include jet pump repair components to address vibration or wear that require assessment for loss of pre-load, replacement steam dryer stress report and fatigue evaluation, replacement core plate plug stress relaxation analysis, and the Unit 3 core plate replacement piping fatigue and leakage assessment, and loss of pre-load evaluation for bolted connections.

There are a total of 35 TLAAs found in the subsequent license renewal application.

MEMBER KIRCHNER: For the record could you explain what loss of pre-load is?

MR. WEYHMULLER: For certain hardware they either have bolts or springs, in particular for bolting with the fluence field that they sit in and the thermal changes in the reactor.

We reassess that to make sure that either the initial assessment made is bounding to take you all the way out to the new fluence estimates at 80 years, or in some cases we've actually gone back and reviewed the analysis with the OEM that supplied the part and had a new calculation performed to assure that it would make it, or to ascertain what is the actual life of that part. Slide 10, please.

As stated earlier, Peach Bottom subsequent license renewal application is based on GALL SLR.

Peach Bottom aging management review achieves significant consistency with the GALL SLR as reflected by the fact that 98.6 percent of AMR line items were covered by notes A through E.

There are 50 commitments for the implementation of subsequent license renewal for Peach Bottom consisting of 47 commitments for the implementation of individual aging management programs and 3 additional commitments to assure that the use of ongoing operating experience is utilized to update aging management programs during the subsequent period of extended operation.

As Mike had said earlier, a review of operating experience is performed to assess the impact of EPU on aging management programs prior to entering the subsequent period of extended operation.

And the last commitment is the continued use of FERC inspections for aging management of the Conowingo Dam as is done for the first license renewal period as the dam is the power source to Peach Bottom during a station blackout.

These commitments will be captured within subsequent license renewal UFSAR statement which is contained in Appendix A of the subsequent license renewal application.

These commitments are managed in accordance with Exelon's commitment tracking program which is based on the NRC endorsed NEI 99-04 Guidelines for Managing NRC Commitment Changes process.

The table shown on the slide provides a breakdown of aging management programs in regards to consistency with GALL SLR.

The summary table also provides a numerical breakdown for existing and new AMPs. There are only 11 programs with exception which will be shown on the following slides. Slide 11, please.

This and the next two slides show a summary of the exceptions taken as part of Peach Bottom's SLRA identifying the program, the exception taken and the justification for the difference.

For each exception we have provided an alternative to the recommendation found in GALL SLR. Supporting technical justification has been provided and has been found acceptable as identified in the

SER.

As the slides are displayed I can cover any questions on specific programs as requested by the ACRS members. Slide 12, please. And slide 13, please.

CHAIR SUNSERI: What has your experience been with the below-ground cables? I mean, I know you put this water monitoring system, but are they prone to flooding the vaults where they run?

MR. WEYHMULLER: There are instances where cables have been wetted and the station is continuing to improve dewatering activities.

Ultimately testing is the tool used to assure the health of the cables because in some cases during storms, certain conditions, manholes may accumulate some water.

CHAIR SUNSERI: And do you know whether the cables are continuous run, or are there splices in some of those cables that are below?

MR. WEYHMULLER: I'd like to call on Pierre Simo to answer that question, please.

MR. SIMO: Pierre Simo, Peach Bottom design engineering.

Yes, we have developed ways that track all the cable installation within those manholes. And there is no splice in all the cable license renewal, and also for all the overall -- the cable that's in the station.

We have testing that is done on cable with or without splice to understand the cable aging process.

CHAIR SUNSERI: Okay, all right. Thank you.

MEMBER BALLINGER: Back to slide 11. A little slow on the uptake. The stud issue. How many studs are required to be operable?

In other words, if you have a cracked one that's in service, does it affect operation?

MR. GALLAGHER: Pete, do you have the answer to that question? I don't know if we have an analysis -- because what we do is we inspect them beforehand and verify they're not cracked.

MEMBER BALLINGER: Yes, but that doesn't help because they would crack in service.

MR. GALLAGHER: After the fact.

MEMBER BALLINGER: They would crack in service.

MR. GALLAGHER: Pete, do you know the answer to that question? Oh, Ron? Okay.

MR. DISABATINO: We do -- in addition to

the ultrasonic examination program we do have the leak protection monitoring, so the double O-ring design would -- if a bolt did fail, if there was leakage it would be immediately detected by the operators.

MR. GALLAGHER: Give him a sense for how many studs do we have on the reactor head?

MR. DISABATINO: It's a lot. I believe it's 98.

(Simultaneous speaking.)

MR. GALLAGHER: So, there's a large number of studs.

MEMBER BALLINGER: If I recall, the deviation was not very large.

MR. GALLAGHER: Right. It essentially is a few material certs are slightly over a few heats.

MEMBER BALLINGER: Yes.

MR. GALLAGHER: But it was enough that we had to call it an exception.

And just, I mean you all know this. Generally exceptions is something different than -- it's in the GALL and we have to point it out to the staff so the staff can review it.

And that was a little bit -- the difference we have.

MR. DISABATINO: I apologize. For the

record, my name's Ron DiSabatino from Peach Bottom engineering for the transcript.

MEMBER BALLINGER: Thank you.

MR. SCHULTZ: Follow-up question on slide 12. On internal coatings, the discussion indicates the fire header piping is buried. The inspection was performed in 2014 of that piping.

What was the basis for the inspection that was performed at that time? Were there issues or was this --

MR. WEYHMULLER: My understanding was it was to get to a valve that was in the ground that was not performing tight shutoff.

So when the valve was removed it allowed the station's personnel access to the interior of the pipe at the connection point and that's when the inspection was done in each direction of the concrete lining.

That's where they got the observation. So we have an opportunistic plan right now.

MR. SCHULTZ: Okay. Can you characterize the extent of inspection there? Trying to get an appreciation for what an opportunistic inspection entails.

MR. WEYHMULLER: Mike Baker.

MR. BAKER: Good morning. Mike Baker, Peach Bottom license renewal team.

So we did actually cut out a section of that piping in the concrete. We sent it to our lab, our Valley Forge labs. They did an analysis of it.

They found that the concrete was in excellent condition, adhered tightly. The piping itself was in very good condition. So that was part of our discussion with our exception, the fact that we have good operating experience with that piping.

We also do a lot of fire system flushes and testing to make sure that we don't have any debris breaking off potentially and blocking downstream systems.

MR. SCHULTZ: Thank you.

MR. GALLAGHER: Thanks, Mike. Any other questions on the exceptions? We didn't want to go through each one by one, but left it open for any questions. Okay.

MR. WEYHMULLER: All right. Slide 14, please.

The Peach Bottom aging management program effectiveness reviews assessed first license renewal activities and included a detailed review of inspection schedules, results in data as well as relevant operating experience within the corrective action program.

All first license renewal programs were determined to be effectively implemented.

A summary of each review is found in each AMP in element 10 operating experience under item number 1 and in Appendix B of the subsequent license renewal application.

In November of 2018 the NRC staff conducted an IP 71003 phase 4 inspection post approval site inspection for license renewal at Peach Bottom. This inspection found no issues. Slide 15, please.

There are no open items from the review of Peach Bottom subsequent license renewal application.

There is one confirmatory item involving a commitment for the BWR vessel internals aging management program.

Additional information was required by the NRC staff to complete the assessment of the proposed enhancement for core plate rim hold-down bolts.

This was addressed by revising the enhancement to provide the source document, BWRVIP-25, rev 1, which is used to determine the appropriate actions to be taken to address stress corrosion tracking of core plate rim hold-down bolts.

This issue has been resolved with the submittal of a supplement to the NRC staff on November -- or October 9 of 2019.

I will now turn the presentation over to Julian Laverde who will discuss specific technical topics involving subsequent license renewal.

CHAIR SUNSERI: Paul, before you do that I have one question about the confirmatory item.

As this is the front end of a whole series of subsequent license renewals that are coming down the pike here I think there's probably a lesson learned in here for others that are downstream.

Can you -- if appropriate, could you expand on why this became a confirmatory action, or what was missed as far as the initial submittal so that others may learn from that?

MR. GALLAGHER: I mean, we -- we had the -- a similar enhancement, actually the identical enhancement in our LaSalle application.

And there is discussions in the SRP that have this particular enhancement wording.

So we think we followed the guidance to be consistent with GALL. I think there were some changes in thinking that came up, and I'm sure the staff can talk about that at their point.

It really comes into play, I think that we were -- the BWRVIP-25, rev 1 is imminent, coming out for the industry.

And we had provided enough information to the staff that showed that we were -- we could support the implementation of BWRVIP-25, rev 1.

So I think it's a timing issue for the rest of the industry. I think after this point for any BWR that goes in now it should be -- it would be one of the things you assess in the application, in like Appendix C of how you address the rim hold-down bolts.

And you would use the 25 rev 1. Because it should be out momentarily.

CHAIR SUNSERI: Okay, thank you.

MEMBER KIRCHNER: Mike, could you expand a little just for the record again. The slide says additional information was required. Was there design changes for the bolts or any technical modifications, or just lack of information in the application?

MR. GALLAGHER: Yes. If you look at the original commitment it had two elements to it. One was to install the wedges, or to provide an analysis that you didn't -- basically didn't need to install the wedges. And we provided that to the staff at least two years before PEO.

The thinking was that since the VIP-25 rev 1 is imminent they really didn't want that kind of open-ended commitment.

We didn't feel it was open-ended because -- you know, if you didn't do the analysis you have to install the wedges, and that's a hardware fix.

So, we think we had it covered. And again I think the timing issue because the VIP-25 rev 1 allows you to either install the wedges, or to do some inspections if the technique is developed, or to do an analysis in accordance with the VIP. So it's an approved methodology now.

MEMBER KIRCHNER: Thank you.

MR. SCHULTZ: Paul, one general question associated with implementation of the overall program.

The aging management programs under GALL, there's many of them, some existing now with enhancements and as you've shown some new with enhancements.

The question I have is most of these say that they're going to be in place six months prior to the implementation of the SLR.

The general question is how is this managed so that six months prior to all of these programs are going to be in place?

MR. WEYHMULLER: So, part of our project, once we get approval, our plan is tight. We actually go redo the station's procedures to make commitments, modify plant reoccurring work orders, modify procedures.

Those changes that we made for license renewal are annotated to assure they can't be changed without the proper process to make those changes.

And they get put in place, they'll be in place within a year of conclusion of our project.

They'll go into the work order process. In most cases they'll start with the next occurrence of an item. Because they're typically good practices.

Many of our enhancements are minor refinements where we failed to say and put it in CAP, but it's a station expectation for anything that's found to be deficient or not as expected that goes into the CAP process.

But all that wording is put into the various implementing documents and will be in place within, say, a year of conclusion of the project.

If they have a certain specific time date to start, no sooner than or prior to, the work management process allows us to put the actual calendar date on them so they do occur at the proper times.

So that will all be in place as part of our closure of this project, that the work will be already scheduled and organized for the station and it will be a seamless transition as they move into the subsequent period of extended operation.

MR. SCHULTZ: Thank you.

MR. OESTERLE: Chairman Sunseri, this is Eric Oesterle from the NRC staff. Just wanted to point out that the staff also plans to provide its perspectives when discussing the confirmatory item during its presentation.

CHAIR SUNSERI: Yes, I just didn't want to miss the opportunity to talk to them before they get off the floor.

MR. LAVERDE: Thanks, Paul. Slide 16, please.

Good morning. My name is Julian Laverde and I'm the design mechanical engineering manager of Peach Bottom Station.

In this section I will present how the Peach Bottom subsequent license renewal application has addressed the four technical topics related to SLR that were of interest to the NRC commissioners during the NRC staff preparations for SLR.

These topics were discussed in the staff requirement memo for SECY-14-0016. Slide 17, please.

The first technical topic is related to reactor pressure vessel embrittlement due to neutron fluence.

The Peach Bottom fluence projections for 70 effective full power years which is through the subsequent period of extended operation were performed for neutron embrittlement analysis using our current licensing basis methodology.

The analysis of upper shelf energy, adjusted reference temperature, axial and circumferential weld failure probability, and reflood thermal shock for belt line materials have been satisfactorily evaluated using the 70 effective full power year fluence projections.

Peach Bottom will manage fluence projections consistent with the GALL SLR neutron fluence monitoring program.

Peach Bottom fluence projections will be validated by reactor vessel material surveillance program.

Peach Bottom submitted an enhanced SLR program to manage reactor pressure vessel embrittlement consistent with GALL SLR reactor vessel material surveillance program.

This program ensures that sufficient capsules are contained within each vessel to support the required testing intervals through the subsequent period of extended operation and recommends that one capsule be removed from each reactor vessel with exposures between one and two times the peak neutron fluence of interest projected at the end of the subsequent period of extended operation.

MEMBER MARCH-LEUBA: What's the peak fluence you're expecting? What's the number?

MR. GALLAGHER: Alex.

MEMBER MARCH-LEUBA: We don't need significant digits.

MR. PSAROS: Peak fluence for the reactor is 2.23 10^{18} and then 2.14 --

MEMBER MARCH-LEUBA: 10^{18}?

MEMBER BALLINGER: It's a BWR.

MEMBER MARCH-LEUBA: Oh, it's a BWR.

MEMBER BALLINGER: It's a BWR.

MEMBER MARCH-LEUBA: We'll have an open session on this topic later this week. So you can read the transcript.

MR. GALLAGHER: Okay.

MR. LAVERDE: So one capsule will be withdrawn from each unit during the subsequent period of extended operation at 60 to 62 effective full power years.

Upon removal per schedule capsules will have an exposure of 1.2 times that event of subsequent period of extended operations for the vessel at quarter-T which satisfies the GALL SLR criteria. Slide 18, please.

MEMBER RICCARDELLA: Excuse me, that number that you just quoted, that was quarter-T number or inside surface?

MR. PSAROS: Alex Psaros, Exelon license renewal. That was a zero T number.

MEMBER RICCARDELLA: Inside surface.

MR. PSAROS: That's correct.

MR. GALLAGHER: Yes, quarter-T is about 1.5 e^{18}.

MR. LAVERDE: Slide 18, please. The second technical topic is related to irradiation assisted stress corrosion cracking, or IASCC of reactor vessel internals.

The BWR vessel internals aging management program is used to manage age-related degradation of stainless steel and nickel alloy reactor vessel internal components and welds that are susceptible to cracking due to IASCC to ensure aging management of reactor vessel internals is consistent with GALL SLR.

The BWR vessel internals program is based on recommendations provided in GALL SLR BWR vessel internals program and implements the reference BWRVIP guidelines.

BWRVIP guidance addresses IASCC through, one, periodic inspection using techniques capable of detecting cracking due to stress corrosion cracking, and two, the use of flow tolerance guidance that considers the effect of neutrons fluence on material properties and stress corrosion crack growth rates.

BWRVIP guidelines are adequate for use to determine the proper reinspection interval and are not time-dependent, but rather are based on neutrons fluence values.

Reactor vessel internals for Peach Bottom have been assessed using governing BWRVIP inspection guidelines and existing program requirements were determined to be acceptable.

Peach Bottom will manage reactor vessel internal components and welds that are susceptible to IASCC consistent with GALL SLR BWR vessel internals program.

MR. SCHULTZ: You mention here again the neutron fluence evaluation program. You've enhanced that program as I understand it to be more cognizant of changes in fluence that may result from different loading patterns within the reactor core cycle to cycle.

Could you describe a bit more about what you've learned and how you've improved your program?

MR. PSAROS: Alex Psaros, Exelon license renewal. We do -- in our process for modification, whether it's in the core, core reload, fuel type changes, all those kinds of things that can actually impact the fluence calculations. We have a step power process that that's evaluated every time so if there is any impact we'll go ahead and recalculate fluence numbers.

MR. SCHULTZ: Thank you.

MEMBER MARCH-LEUBA: This might not be your area expertise but I'm sure somebody here. You talk about internals and one issue with BWRs is fouling of the jet pumps and such so you cannot really reach proper flow. What's the highest flow you can reach today?

MR. PSAROS: It depends. Alex Psaros, Exelon license renewal. It depends where you are in the cycle and what your core DP is.

Typically we can reach about 106 mid-cycle.

MEMBER MARCH-LEUBA: Okay, so you're pretty clean right now. You're really clean right now. You can do 106, you're good.

MR. PSAROS: That's correct. Yes, towards the end of the cycle DP drops a little bit, we can get up to 110.

MEMBER MARCH-LEUBA: So the expectation for 70 years there won't be any problem.

MR. PSAROS: We don't foresee a problem.

MR. LAVERDE: Slide 19, please. The third technical topic is related to concrete and containment degradation.

Overall, the concrete used at Peach Bottom buildings and structures is in good condition.

All concrete aging effects and mechanisms identified in GALL SLR have been appropriately evaluated and dispositioned.

The aging effects due to alkali-silica reaction known as ASR has not been identified in performing inspections for Peach Bottom concrete structures.

Monitoring programs manage concrete aging due to ASR consistent with GALL SLR.

Peach Bottom will manage concrete structures consistent with GALL SLR programs structures monitoring and inspection of water control structures associated with nuclear power plants.

Peach Bottom's Unit 2 and Unit 3 are a GE Mark I steel primary containments that are completely enclosed and shielded within each reactor building, and are supported on steel members that extend into the concrete foundation.

The sand pocket regions are constructed with metal covers and drain lines to prevent water intrusion.

Drain lines which are periodically checked for flow blockage have been observed to be free of water leakage each refueling outage.

Also, the reactor vessel sacrificial shield wall, gamma and neutron irradiation values remain within established radiation exposure levels through the subsequent period of extended operation consistent with GALL SLR.

And Peach Bottom will manage each containment consistent with GALL SLR IWE and Appendix J programs. Slide 20, please.

And the fourth technical topic is related to environmental qualification of electrical cables and cable condition assessments.

The environmental qualification analysis are updated for the subsequent period of extended operation.

The current licensing basis design ambient temperatures and accident profiles are utilized for environmental qualification analysis of electrical equipment.

Conservatism is maintained by making bounding assumptions for environmental conditions.

Cable qualified life depends on material and service environment. The analysis has determined that the qualified life of Peach Bottom EQ cables are at least 80 years.

The EQ cable analysis and the EQ program are consistent with GALL SLR recommendations.

Cable condition assessment aging management programs are currently in place for cabling connections in adverse localized environments, cabling connections in instrument circuits and inaccessible power cables potentially subject to wetting or submergence.

These programs will be enhanced for the subsequent period of extended operations. Most notably, there will be an additional 27 inaccessible medium voltage cables added to the cable testing population as well as a new commitment for at least once every six years testing frequency.

The resulting aging management programs for cable and connection installation materials for subsequent license renewal will be consistent with GALL SLR with only one exception for manhole inspection frequency based on the installed water level monitor.

MEMBER BROWN: Could I ask a question before you go on? In the overall history of the plants as they've operated up till today and you talk about the cable condition assessments do you have a feel for how many of the -- I'll take the medium voltage cables, for instance, or even the instrumentation cables.

Have you had to replace many? Is it like 30 percent of them have had to be, 50 percent? Is it a result of inspections, or is it a result of --

MR. GALLAGHER: There was actually a wave in the nineteen nineties or late eighties, nineteen nineties, we replaced a lot of cables because of water treeing. And that was taken care of.

And then, you want to give the assessment

-- are you going to talk about it? Pierre? Is it Pierre? Okay. He's asking about medium voltage cables, so E3.

MEMBER BROWN: My interest is like you all -- the plant started around, was it '73, '74? I'm trying to remember the first slide.

MR. GALLAGHER: Yes.

MEMBER BROWN: You were going to be potentially operating out to 2053.

MR. GALLAGHER: Yes.

MEMBER BROWN: And that period you're talking about is roughly 17 or 18 years. So I was kind of interested as to how many cables had to be replaced, pulled out, new ones put in.

Is there an expectation of having to do that or similar type operations over the next 50 years?

MR. GALLAGHER: Like I said, in the late eighties, nineties, there was a lot because of the water treeing.

But Anna, maybe you can talk about our recent -- we've replaced a few recent cables.

MS. KRAUSE: We spoke a little bit about our cable program and having a requirement to test -- we have commitments for testing our license renewal cables to six years. And we've also applied that to other cables outside of that.

MEMBER BROWN: You said two six years?

MS. KRAUSE: Every six years.

MEMBER BROWN: Okay.

MS. KRAUSE: My apologies. And then based on our condition monitoring if our testing shows that we are required to replace it post testing we do that.

With regards to our subsequent license renewal -- I'm sorry, first license renewal testing we did find two cables that we called remediation required as a result of our testing. We performed TAN-DELTA testing on those cables.

One of those was our 3EA circuit which we are replacing this month. And the second was with our 3 startup circuit. We're in the design phase and then are intending or have a tentative schedule to replace that in 2021.

So as we do test we do potentially identify cables that have an aging management concern and we do go and replace those as required.

MEMBER BROWN: Is there a periodicity as you go through? I mean, say you had 200 cables. Just pick a number. Obviously you don't test all 200 cables every five years or something.

Is there a plan to ensure all cables get tested over a period of time, or is it strictly on a sample basis and you kind of pick and choose?

MS. KRAUSE: At this time we have all of our medium voltage cables in our cable program and intend to test those.

And Pierre Simo, did you want to add anything to that answer?

MR. SIMO: Yes, I can. Pierre Simo, Peach Bottom design engineering. We have a cable aging management program --

MEMBER BROWN: Say that again? I didn't hear you.

MR. SIMO: We have 100 circuits in the aging management program. And 51 of those circuits have been replaced since ---

MEMBER BROWN: You said 51?

MR. SIMO: Fifty-one.

MEMBER BROWN: That's roughly half.

(Off-microphone comments.)

MEMBER BROWN: Okay.

MR. GALLAGHER: And just so you know, Mr. Brown. So we did, you know, we have a pretty extensive program.

We did have one where we had a failure

recently before we could test it, before we did test it, and that was on our A1D so it happened in May.

But what we did is we went out and proactively replaced that circuit. And then the three other diesels that are there. So E2, E3 and E4 to get ahead of it.

But that was one that got us before we actually got around to testing it.

MEMBER BROWN: So in other words that would have put that diesel out -- effectively out of service?

MR. GALLAGHER: Yes, it failed --

MEMBER BROWN: Just trying to get a character --

MR. GALLAGHER: It failed during test. We were doing a surveillance test, just a normal run, it failed.

We did the root cause on it and found that, you know, there was water intrusion in that cable. So we replaced it and then the three corresponding ones. We just did that in July and August.

MEMBER MARCH-LEUBA: Just the whole periodicity. The failure is typically on the insulation, right? Is this a failure to provide continuity, or is it a ground?

MR. GALLAGHER: We had an overcurrent trip. We had a trip of the diesel. So the actual cable.

MEMBER MARCH-LEUBA: So the cable was --

(Simultaneous speaking.)

MR. GALLAGHER: Yes. But again, so we replaced it and then the other three similar ones just to make sure we would get ahead of it.

MEMBER DIMITRIJEVIC: Did Anna say also the trip in 2018 was the cable maintenance related on the --

MR. GALLAGHER: Yes, on the condensate.

MEMBER DIMITRIJEVIC: What was that issue?

MS. KRAUSE: That was where we had replaced the cable and had not properly performed that cable replacement. That was not aged cable failure.

MR. GALLAGHER: It was a new cable.

MS. KRAUSE: It was a new cable that was not installed properly.

MEMBER BROWN: Is that procedure issue or training issue? Cable replacement, hooking up lugs. It's not rocket science. Excuse my characterization.

MS. KRAUSE: I agree. There was some water evident in a conduit and they did not properly seal the ends of the cable.

MEMBER BROWN: All right, thank you.

MR. LAVERDE: So, GALL SLR cables for inaccessible instrument and control cables known as E3B and inaccessible low voltage power cables known as E3C will be implemented as new programs prior to the subsequent period of extended operation.

These two new programs which are consistent with GALL SLR recommendations with one exception for manhole inspection frequency because of the installed water level monitoring will implement one time testing of a sample of cables.

I will now turn the presentation over to Mike Gallagher for closing remarks.

MR. GALLAGHER: Okay. Thanks, Julian. So, as I had stated earlier we've developed a comprehensive high-quality subsequent license renewal application along with robust aging management programs that will ensure the continued safe operation of Peach Bottom Units 2 and 3 during the subsequent period of extended operations.

Pending any questions you may have this concludes our presentation.

MEMBER BROWN: So, members, any additional questions for the Exelon team before we release them?

Go ahead, Charlie.

MEMBER BROWN: So you've had first license renewals you've been through. On how many plants?

MR. GALLAGHER: We've renewed -- we have 23 units. We've renewed all except one.

MEMBER BROWN: And is this the first SLR for you all?

MR. GALLAGHER: Yes.

(Simultaneous speaking.)

MR. GALLAGHER: We're the lead BWR plant for SLR in the industry.

MEMBER BROWN: That's what I thought. Okay. I guess my question was, was there any -- during all your first license renewals and your run-up to this were there any things you found that you needed to address that weren't covered under our GALL? The aging license renewal program that's been in place.

I'm trying to just assess how good -- do we need to do anything? Do we need to assess anything else? Should the staff be asking some other questions? That's what I'm looking for. Did we miss something.

MR. GALLAGHER: Well, as you know, Mr. Brown, so we've been involved in license renewal for a long time and we also were involved as an industry with Dominion commenting and giving input on the GALL SLR.

I think the staff had like nine public meetings and we participated in all those.

So the way I would look at it is -- I've been through all the revisions. So pre GALL, GALL 0, GALL 1, GALL 2 and now GALL SLR. It truly is a continuum.

So I think the staff learns and the industry learns each time and there's improvements that are done.

If you compared this application with our LaSalle application which we were in to talk to you about in 2016 it's very similar.

So there's an incremental improvement in it. So I think it's pretty solid. The aging management is a continuum and we're always learning and factoring in those changes.

MEMBER BROWN: Okay. So you think the lessons learned are being cranked in as we go along?

MR. GALLAGHER: Absolutely.

MEMBER BROWN: Okay, thank you.

MR. GALLAGHER: And I know the staff is already calling for a lessons learned meeting on this process. I think we're going to have something in a month or two.

And we'll give input to that and I'm sure the staff will have input on that.

MEMBER BROWN: I have an interest in it. I give a presentation to high school students on nuclear engineering a couple of times a year for trying to encourage people, these young kids to go into engineering.

And when you talk about 60, 70, 80 years they start -- their eyeballs start rolling back in their heads in terms of you're going to operate these plants for that long.

So I was just trying to get a feel for what you've found and how we've gone long-term. Kind of a parochial interest on my part. Thank you very much.

MR. GALLAGHER: Okay.

MR. SCHULTZ: Mike, if we can flip that question around, or your discussion around a bit.

As you've gone through this process are there things that you have found that have caused you to improve your current program with regard to your 40- to 60-year time frame program?

MR. GALLAGHER: Yes. I mean, we use

operating experience for all of it.

I mean, if you looked at, say, buried pipe program from the early days it was more of an opportunistic type look.

The NSIAC initiative was developed and there's extensive buried pipe program now. And it's not just for license renewal systems because it's really trying to minimize any hazardous material leakage. It could be oil, it could be tritium, whatever. So things like that are done.

As Pierre had mentioned we -- in license renewal, the scope of subsequent license renewal is 39 circuits for cable testing. But we do much, much more than that because we want our plants to run reliably.

So we've factored in that. That was pre -- that was after GALL. There was a generic letter came out on cables, and water intrusion and cables.

And so as a fleet we developed corporate programs to be implemented. So there's always those kinds of lessons learned that go on. And we factor them in as appropriate.

MR. SCHULTZ: Good, thank you.

MEMBER KIRCHNER: Mike, this is kind of a difficult question. And with the chairman's caveat that it might be one person's opinion.

But could you just because of public interest describe briefly post Fukushima actions and is there anything from that program that influenced your GALL kind of approach to the SLR renewal? That's kind of a complicated question.

Is there any overlap between post Fukushima I'll call them backfits, but that's not correct. What was done after Fukushima and what you're doing in the GALL SLR areas.

MR. GALLAGHER: Technically the Fukushima activities is well beyond design basis --

MEMBER KIRCHNER: Right.

MR. GALLAGHER: -- and the license renewal is more on the design basis itself and maintaining safe shutdown conditions. So what scope of equipment do you need.

There is some overlap to that because for like flooding protection.

MEMBER KIRCHNER: I'm looking at your picture behind you. It shows a rather high water table so to speak. And so flooding.

And you mentioned earlier with your manhole program looking for water intrusion into your cable ducts and raceways and such.

I'm just trying to think are there things that are overlap between what you've done post Fukushima and what you're doing for SLR, and any lessons learned in that area.

I know embellishing Charlie's question about what you've learned going through the GALL process and are there things that you've had to respond to.

MR. GALLAGHER: So, I would think -- the only overlap really is in the structural monitoring areas. So all the flood protection is in the structural monitoring program. So that's all looked at and made sure we have it and it's maintained.

But the big response for Fukushima, we can have James Brown talk to you about -- I mean, there was an extensive response where we could -- we have equipment onsite in a hardened building. We cannot rely on any plant equipment at all basically, any active plant equipment. We have pumps and power supplies and everything like that.

MEMBER KIRCHNER: You're mentioning the FERC inspection of the dam versus your onsite equipment.

MR. GALLAGHER: Yes. Yes. The FERC inspection of the dam is for the aging management of the Conowingo Dam to ensure you maintain that -- the

Conowingo pond and our station blackout power source.

So, I mean that's an extensive program that's done down there and it's all done under FERC supervision. I mean, they actually have FERC engineers involved in those inspections.

So that's the only overlap I could offer. But the whole Fukushima response is very extensive as you know.

MEMBER KIRCHNER: Out of bounds here, but I was just looking to see if there was any overlap and influence on your SLR.

CHAIR SUNSERI: Any other questions from the members? All right, well I appreciate that.

I did not record any open items or follow-up items I should say. We will discuss the confirmatory item further with the staff when they're up there.

As far as I think our discussion goes we don't have anything else.

MR. SCHULTZ: I've got one more question. We talked about it a bit and the staff is going to perhaps address it as well.

But we noted that the operating experience associated with the extended power uprate levels, that was going to be focused on for SLR.

My question is aren't we doing that already? Shouldn't we be doing that already? Why was it that this came up, that for the SLR program we're going to make sure we look at impacts of extended power uprates?

Aren't you doing that in any case?

MR. GALLAGHER: Yes.

MR. SCHULTZ: And isn't it well documented not only within your organization, but within the industry?

MR. GALLAGHER: Yes, we are. But the point was is to have a backstop so that we have a commitment to look at the plant-specific effects.

So we just put the EPU in place a couple of years ago. So what it would like 5 years, 10 years, 15 years. And so there's a backstop commitment that ensures that that's done if you go to the period of extended operation.

But it is done in conjunction with operating experience and our corrective action program now.

MR. SCHULTZ: Understood. Thank you.

CHAIR SUNSERI: All right. We've made good progress through this first part of the meeting today.

I would normally like to press on, but our phone line has gone down so we're going to need to take a 15-minute break to reestablish the phone line so we can at least cut in the people that need to talk on that.

So we will take a break here until five till on this clock up here.

(Whereupon, the above-entitled matter went off the record at 9:40 a.m. and resumed at 9:56 a.m.)

CHAIR SUNSERI: All right, we are reconvening the ACRS meeting to discuss the Peach Bottom SER.

And we have the staff on the stage here and I'll turn it over to Meena.

MS. KHANNA: Yes. I'm going to just turn the presentation right over to Bennett Brady. She'll be leading the discussion for us today. Thank you so much.

CHAIR SUNSERI: Thank you, Meena.

MS. BRADY: Good morning, Chairman, and members of the subsequent license renewal review. My name is Bennett Brady. I am the senior project manager for the safety review of the Peach Bottom Atomic Station Units 2 and 3 subsequent license renewal application.

As you heard from Meena earlier we're here today to discuss the NRC staff's safety review of the Peach Bottom SLRA as documented in our safety evaluation report, or SER.

Joining me at the table today are Dr. Allen Hiser, senior technical advisor for License Renewal Aging Management Division of the New and Renewed Licenses, our new division name.

Also here are Bill Rogers, senior project manager also in the division of DNRL, Mo Sadollah, electrical engineer from the Division of Engineering, and joining us from Region 1 are Kevin Mangan, senior reactor inspector, and Justin Heinly who will be on the phone later, the senior resident inspector.

Laura Gibson here will be manning or womaning the slides.

Seated in the audience and joining us on the phone are members of the technical staff who participated in the review of the SLRA and conducted their audits. Next slide, please.

This slide just gives a brief overview of our presentation today. We will be talking about SER section 2 which covers scoping and screening, SER section 3, aging management review, SER section 4, the time-limited aging analysis.

And then we will also talk about the confirmatory item and like the applicant we did we were going to take the four technical issues that the Commission recommended we address and give you some examples of that from the application.

Then the region will give a discussion and a presentation on their inspections and lastly on the material plant condition. Next slide, please.

Peach Bottom Units 2 and 3 were initially licensed in October 1973 and July 1974 respectively.

The licensee, Exelon Generation Company, LLC, or Exelon, submitted -- was issued an initial license renewal application were issued in May 2003 for Unit 2 and July 2003 extended the expiration dates to August 2033 for Unit 2 and July 2034 for Unit 3.

On July 10, 2018 Exelon submitted a subsequent license renewal application for Peach Bottom Units 2 and 3. Next slide, please.

The Peach Bottom review is the second safety review performed by the staff using the GALL SLR and SRP SLR guidance that was issued in 2017.

The staff's Peach Bottom SLRA review process was the same as that followed during the review of the Turkey Point subsequent license renewal review.

The staff identified and implemented several efficiencies as compared to the process that we used for initial license renewal.

And one of these efficiencies dealt with the conduct of audits. Instead of one large and lengthy onsite audit the staff conducted two standard audits, an operating experience audit and an in-office audit.

The majority of the audit activities and breakout discussions were conducted here in this office with the use of portals and telecommunications.

The first audit was the operating experience audit which was conducted a couple of blocks north of here.

The applicant provided computers that we could use to access their record actions database.

During this, the Peach Bottom operating experience audit, the staff performed an independent review of the plant-specific operating experience to identify any age-related events and degradation as documented in the applicant's corrective action program database.

The second audit was the in-office audit. The team focused on two areas. First, the scoping and screening review, and second, the review of aging management programs, or AMPs, aging management review items and time-limited aging analyses.

For Peach Bottom the staff's review was also informed by the results of the Region 1 initial license renewal inspection, the IP 71003 phase 4 inspection performed in November of 2018.

However, it should be noted that these two activities were going on at the same time, but the inspection was related to the applicant's first license renewal.

The inspection is intended to review the implementation of the AMP elements during the period of extended operation and their ability to perform their intended function and also provide an assessment of plant material conditions.

Later in this presentation Kevin Mangan, Region 1, senior reactor inspector, will discuss the results of the IP 71003 phase 4 inspection and Justin Heinly, senior resident inspector, will talk about the plant material conditions. Next slide, please.

The Peach Bottom SER with one confirmatory item was issued on October 7, 2019 with one confirmatory item as you know related to the core plate rim hold-down bolts.

Since issuing of the -- during the staff's in-depth technical review of SLRA it issued 48 RAIs, 4 of which were follow-up RAIs.

One might have expected that this is a new program covering 60 to 80 years that there would be a lot of significant increase in RAIs. However, this was not the case. Forty-eight RAIs was a significant decrease in RAIs from those that we issued during the initial license renewal.

The staff believes that this was due to the high quality of the subsequent license renewal application. Next slide, please.

In the next few slides I will present the results of the staff safety review as described in the SER.

SER section 2 includes the scoping and screening of structures and components subject to an aging management review.

The staff reviewed the applicant's scoping and screening methodology, procedures and their results.

The staff also reviewed the various summaries of the safety-related SSCs, the non-safety related SSCs affecting safety functions, and the SSCs relied upon to perform functions in compliance with the Commission's regulations for fire protection, environmental qualification, station blackout and anticipated transients without a scram.

Based on the results from the in-office audits, the additional information provided by the applicant on the portal and our meetings the staff concluded that the applicant's scoping and screening methodology and implementation were consistent with the SRP SLR and the requirements of 10 CFR Part 54. Next slide, please.

MEMBER KIRCHNER: May I interrupt you? Just from a process standpoint you mentioned I think if I heard you correctly the number of RAIs were much less than in the initial license extension application.

MS. BRADY: Yes. I'm not referring to Peach Bottom. I'm referring to all the first license renewals.

MEMBER KIRCHNER: So that's -- I don't want to lead the witness so to speak. The applicant supplied a much better application on the second -- on the SLR? Or the staff has learned a lot more since the first? Could you just elaborate?

MS. BRADY: It was a very good application.

MEMBER KIRCHNER: Okay.

MS. BRADY: Many of the technical reviewers came to me saying this is a good application.

We just, we did not have many questions from the application. Questions is what leads to RAIs that we were not able to answer.

So yes, it was a very thorough quality application. As I think Mike mentioned they participated in our thought when we were developing the GALL, they were at all our meetings usually sitting on the front row. And they have been preparing for this, well prepared.

MEMBER KIRCHNER: Thank you.

MR. SCHULTZ: Just to follow that up a moment. It seemed as if the in-office audit generated a number of opportunities for RAIs, that there were a number of issues that were identified through that audit where the staff felt additional information was required.

MS. BRADY: Yes. This was a very efficient process for us particularly in using portals.

We've used portals before, but I think that we used that quite extensively. We would have a question. We would present it to the applicant and they would have something on the portal that day or the next day giving us the information we needed.

Formerly you would have audits that went onsite for two weeks and that generated RAIs. But it was not as thorough as being able to have more sessions and discuss more.

Maybe it brought more RAIs, I don't know, but it certainly resolved more. Because the applicant was very active in -- when we proposed an issue they very quickly responded and said we will take care of it. We'll get you a supplement next week. And they did.

MR. SCHULTZ: So the efficiency of processing issues, questions was much improved given this approach.

MS. BRADY: Yes, that would be our opinion. We had what we call the optimization project. It's going on at the same time that we developed the guidance. That was one of the things that came out of that review was that we would try to do most of the auditing in the office and operating experience audit.

If these sources didn't resolve a problem then we would have an onsite audit. There were sort of two conditions that led us to an onsite audit.

One, there was a really significant area that we just could not resolve through RAIs. We needed to go to onsite, get on the table and talk face to face.

Or the second one that was really an issue that the staff needed to go take a look at the equipment, the configuration and then we would do an onsite audit.

For Peach Bottom all our RAIs were resolved before we needed to go to an onsite.

MR. SCHULTZ: And the applicant this morning mentioned briefly that in preparing their application they looked at the request for additional information that had been --

MS. BRADY: Yes.

MR. SCHULTZ: -- in other applications in order to improve their initial application.

MS. BRADY: And that would be a lesson learned that I would recommend to future applicants. Look at the RAIs from previous reviews.

MR. SCHULTZ: Thank you.

MS. BRADY: SER section 3 and its subsections cover the status review of the applicant's aging management programs for managing the effects of aging in accordance with 10 CFR 54.21(a)(3).

Sections 3.1 through 3.6 include the AMR items in each of the general systems areas within the scope of subsequent license renewal as shown on the slide here.

For a given AMR item the staff reviewed the item to determine whether it is consistent with the GALL SLR report.

For AMR items not consistent with the GALL SLR report the staff reviewed the applicant's evaluation to determine whether the applicant's results would be adequately managed so that the intended functions would be maintained consistent with the current licensing basis for the subsequent period of extended operation.

Based on the review, the results from the in-office audit and the additional information provided by the applicant the staff concluded that the applicant's aging management review activities and results were consistent with the SRP SLR and the requirements of 10 CFR Part 54. Next slide.

The SLRA described a total of 47 AMPs, 11 new and 36 existing. This slide here shows how these AMPs were distributed. This is the same distribution that you've seen from the applicant.

On the left side are the distribution

between existing, new and enhanced, and one plant-specific enhancement.

The column on the right side shows the distribution from the SER. As you will notice there is no change in the distribution of these AMPs.

There were a lot of changes within the AMPs, within the enhancements and exceptions, but the distribution stayed the same. Next slide, please.

Section 4.1 documents the staff evaluation of the applicant's identification of applicable TLAAs.

The staff evaluated the applicant's basis for identifying those plant-specific or generic analysis that needed to be identified as TLAAs and determined that the applicant has provided an accurate list of TLAAs.

Section 4.2 through 4.7 documents the staff review of the applicable Peach Bottom TLAAs for the areas that are shown on this slide.

Based on its review and the information provided by the applicant the staff concludes that either one of three things.

One, the analysis remains valid for the subsequent period of extended operation, two, the analysis has been projected to the end of the subsequent period of extended operation, or three, the effects of aging on the intended functions will be adequately mentioned in the subsequent period of extended operation as required by 10 CFR 54.21(c)(1).

Based on the review and the results from the in-office audit and additional information provided by the applicant the staff concluded that the applicant's TLAA activities and the results were consistent with the SRP SLR and the requirements of 10 CFR Part 54. Next slide, please.

We've talked before about the one confirmatory item. The staff identified one confirmatory item in the SER associated with the BWR vessel internals program AMP, B.2.1.7.

Specifically, the applicant had proposed an enhancement to perform one of two activities post licensing to address potential for mitigation of stress corrosion cracking at the core plate rim hold-down bolts.

The first option was to install wedges which the staff found acceptable.

The second option was to submit an inspection plan to the NRC for future review and approval.

This option did not satisfy the staff's need to complete its technical evaluation prior to granting a new license since the completed inspection plan was not currently available during the staff's SLRA review.

It would be delivered to us at some future time after licensing.

In response to the staff's concern the applicant submitted a supplement to the SLRA which modified the enhancement to AMP B.2.1.7 in accordance with the BWRVIP-25 revision 1.

There were three options. One, to install wedges, or two, inspect the core plate rim hold-down bolts, or three, demonstrate the analysis that the installation of wedges and inspections of the core plate rim hold-down bolts are not required.

The staff determined that each of these three options included in the supplement would be able to be confirmed by the oversight process and were therefore acceptable.

On the basis of this information the staff determined that its concerns related to this confirmatory item were resolved.

The staff will update the SER following this meeting in order to close this item.

I would mention that we also consider this a timing issue. It did not come up until very late in our review, about a week before we were to publish the SER.

The applicant very quickly proposed a solution which we accept, but that was not enough time to get it into the application.

Also, the applicant, what they proposed was consistent with GALL, but the GALL was developed back in -- the draft of 2016, published in 2017, and at that time we did not really have an acceptable issue for that item.

We will be issuing an interim staff guidance shortly that will correct this area. Any further questions on the confirmatory item?

MEMBER KIRCHNER: So, Bennett, on that question, on this issue rather. It says demonstrate instead via analysis.

So, what kind of margin do you look for in that analysis? I'm out of the thermal hydraulics world so we deal with uncertainties in calculations and so on, and usually we were calculating against a peak clad temperature or some figure of merit like that.

What figure of merit do you use here for something to decide you don't have to inspect?

MS. BRADY: There was one TLAA on the loss of pre-load for these bolts. And sorry, I don't remember the exact figures, but the margin for that was large.

MEMBER KIRCHNER: Okay.

MS. KHANNA: We have a staff member here that can address the question. Mr. Jim Madoff.

MR. MADOFF: This is Jim Madoff of the staff. I was part of the review. I was the peer reviewer for the vessel internals program including the aspects related to aging management of the core plate bolts. That included cracking and loss of pre-load effects.

The reason we have an AMR further evaluation on this is because we -- at the time of the GALL update we were doing a review of the VIP 25 revision 1 report including Part 50 aspects, inspection basis, the new generic analysis which would get them out of either installing wedges or even doing inspections because some plants have found the inspections to be infeasible.

We looked at mechanical loads, fluences, bolting patterns as part of that. I can't go into the details because it is a proprietary report, but we do have a non-public SE right now.

Everything has been approved. We're only ironing out the proprietary information with EPRI and the report is scheduled to be issued with the final SE and approved by February of this year.

So technically we've approved the report. We had Dr. Ianson (phonetic) look at the mechanical loads. Chris Sidler (phonetic) and I looked at the materials aspect. What happened is because, at the time of the GALL update, because we were in a pending review where Dr. Ianson was trying to iron out some of the mechanical loading issues with EPRI we couldn't reference it in the AMP.

So we had the confirmatory action to either install wedges or something in the future. What happened is when we looked at it a little further there were some aging management issues with having a future promissory note coming.

So we had them amend their enhancement to make it more consistent with VIP-25 rev 1 since it was technically approved.

We do have the non-public SE available to give to you if you want to look at it. But right now their amendment amends it to VIP-25 rev 1 and will be approved in winter of 2020. They'll be able to go ahead.

MR. OESTERLE: Excuse me, Jim. About the

question about margins. Can you address that or is that proprietary?

MR. METTA: The margins is proprietary, but they had sufficient margins on bolting patterns, on fluences and loading conditions. So we addressed that in the VIP-25 SE. But that's basically what happened.

So right now there's no technical issue with the way they're handling this.

MR. SCHULTZ: Bennett, before we go to the next section I had a question on slide 8. Just a general question.

You're showing here the original disposition and the final disposition. And they're similar. And I can recall in many instances when we've done the extended license renewal overall approach that -- that is in the last sequence where we did the license renewals there were differences between the original disposition, final disposition.

In this case it's the same. So does that mean that the license application is in very good shape, or does it mean that the GALL program that was developed for SLR is in really good shape? Or is it some combination of the two? What do you conclude from this?

MS. BRADY: I would conclude this is rather fortuitous. There are a lot of changes within the AMPs, within the enhancements, within the exceptions. At the end of the day they were the same.

I would like to say this is a good GALL, but I can't say that.

MR. SCHULTZ: All right. All right. Just checking. Thank you.

MS. BRADY: Does anyone else?

MR. OESTERLE: Yes, this is Eric Oesterle from the staff and I would add, Committee Member Schultz, that I believe it's a combination of the two, that the guidance was very good and the application was very good.

And as you can see by Exelon's presentation their very high percentage consistency with the GALL SLR allowed them to achieve a high-quality application and resulted in few changes.

MR. SCHULTZ: That helps. Thank you. Thank you very much.

MS. BRADY: Next slide, please. This is similar to what the applicant did. Back in 2014 we went to the division with a SECY proposing changes for subsequent license renewal.

The Commission said no changes are needed in the rule. But go forth and work on these four top issues for subsequent license renewal. And these are the four issues.

At this point the next four slides are going to take examples of where we have addressed these issues and how they relate to the application from Peach Bottom. Allen Hiser will begin the discussion.

MR. HISER: Okay. Next slide. The technical issue on RPV neutron embrittlement at high fluence actually doesn't apply to BWRs. It really is applicable to PWRs where the fluences get up on the order of 10^{20}, not 10^{18}.

So this is not considered high fluence for BWR.

The reactor vessel material surveillance program as the applicant described this morning plans to withdraw one capsule from each unit and to test that capsule at approximately 60-62 EFPY.

Our conclusion was that the fluence levels for these capsules would encompass the fluences on the vessel at the quarter-T location for 80 years. And that's the vessel fluence of interest for BWRs is really relates to PT dimension in the quarter-T location.

And this is consistent with the GALL SLR guidance. I think a comment that you've heard and will continue to hear.

Now, there is -- the time-limited aging analyses are described in SLRA section 4.2 and these are things that relate to neutron embrittlement such as suggested reference temperature which is used for pressure temperature limits, Charpy upper shelf energy and things like that.

Those are evaluated in SLRA section 4.2. The way that neutron embrittlement is estimated in this section is consistent with our guidance in Regulatory Guide 199 revision 2 and it includes consideration of surveillance program data. Next slide.

Similar to the RPV fluence technical topic the technical issue related to IASCC reactor vessel internals for Peach Bottom is not significantly different between subsequent license renewal and the first license renewal.

IASCC of internals is managed by the vessel internals program B.2.1.7 using VT-1 and EVT-1 inspections to detect cracks.

A water chemistry program is also used to mitigate the effects of the water environment that could promote cracking.

There is a TLAA associated with IASCC which is addressed in SLRA section 4.2.14. This analysis actually was initiated in the original license renewal application and identified a fluence, a threshold value of 5 times 10^{20} neutrons per centimeter squared for IASCC and embrittlement of the internals.

Now, fluence for the core shroud and top guide are projected to exceed this value for 80 years.

So in the SLRA the applicant dispositioned its TLAA in accordance with 10 CFR 54.21(c)(1)(iii) by demonstrating the effects of aging will be managed during a subsequent period of extended operation.

And these will be managed using the AMPs that are listed in the last bullet there. Next slide.

MEMBER RICCARDELLA: Excuse me, Allen. Has there been any history of core shroud cracking at these units?

MR. HISER: I believe Peach Bottom does have core shroud cracking, yes.

MEMBER RICCARDELLA: But they continue to inspect.

MR. HISER: Yes, that's correct, consistent with the BWRVIP.

The next topic relates to irradiation of concrete and steel, SLRA section 3.5.2.2.2.6 addresses the aging effects of reduction of strength and loss of mechanical properties due to irradiation for structural concrete and loss of fracture toughness due to neutron irradiation embrittlement of structural steel in the locations that are listed there.

This figure illustrates the general configuration and location of the component supports that were reviewed for these aging effects.

Peach Bottom units are Mark I containments with a GE General Electric BWR 4 RPV design.

The staff noted for this design the concrete and steel structures that are exposed to the highest level of irradiation and may be susceptible to these aging effects are the sacrificial shield wall which is -- the RPV support skirt which is down below that, the reactor pedestal and lateral stabilizers as indicated on the figure. Next slide.

For the aging effects due to irradiation of concrete the components of interest are the concrete in the sacrificial shield wall and the support pedestal.

To address this potential aging effect the applicant performed analyses that estimated a peak neutron fluence of 1.9 times 10^{18} neutrons per centimeter squared and the gamma dose of 1 times 10^{10} rad at the inner concrete surface of the sacrificial shield wall.

The staff noted that the applicant's estimated neutron fluence is below the threshold given in the SRP SLR report of 1 times 10^{19} neutrons per centimeter squared beyond which degradation of the concrete due to irradiation may be significant.

Therefore a plant-specific program is not needed to manage the degradation of concrete due to neutron fluence.

The staff noted that the applicant's estimated gamma dose is at the SRP SLR threshold of 1 times 10^{10} rad.

The staff finds that a plant-specific program is not needed to manage degradation of concrete due to gamma dose because the irradiation peak location is typically located within 1 to 1.5 feet of the center line of the RPV belt line, and at that location the shield wall concrete does not perform a structural function.

In addition, the staff noted the fluence and dose levels estimated by the applicant are conservative because the applicant ignored the attenuation of the shielding provided by the quarter inch thick steel liner on the inner side of the shield wall.

Finally, the staff verified that the fluence and dose values at the structural portion of the sacrificial shield wall concrete and at the RPV pedestal are bounded by the applicant's estimated peak fluence values.

Based on its review of the SLRA, the UFSAR, and reference calculations reviewed during the audit the staff noted that the peak neutron fluence and gamma dose values will not exceed the SRP SLR thresholds at which significant degradation of concrete mechanical properties is expected, will not exceed the SRP SLR thresholds at areas where the shield wall and the RPV pedestal concrete do perform a structural function, and are conservatively below the SRP SLR thresholds.

Therefore the staff finds that the applicant's proposal to manage the effects of aging using the structures monitoring program is acceptable and a plant-specific program is not needed.

For the aging effects due to irradiation of structural steel the components of interest are the sacrificial shield wall, RPV skirt and RPV lateral stabilizers.

To address this potential aging effect the applicant used the transition temperature approach described in NUREG-1509 to assess whether radiation embrittlement of steel is a concern for the RPV skirt and sacrificial shield wall.

And using the transition temperature approach the applicant first of all identified the material composition, initialed nil-ductility transition temperature, or NDTT, and respective lowest service temperature, LST, of the shield wall and skirt.

Secondly, they calculated total fluence in DPA for these components for 80 years of operation and the corresponding expected shift in the NDTT and determined the 80-year NDTT of the components and compared it to the respective LST.

Based on its review of the SLRA, UFSAR and reference calculations reviewed during the audit the staff finds that the applicant's implementation of NUREG-1509 Transition Temperature Approach to be acceptable.

The staff finds that the 80-year maximum total fluence expected at the RPV skirt and sacrificial shield wall will result in 80-year NDTT values that are below the components LST of 100 degrees F and therefore there is sufficient margin between the 80-year NDTT and the lowest service temperature.

Additionally, staff finds that the applicant demonstrated that the aging effects due to radiation embrittlement for the steel sacrificial shield wall are more limiting than those for the other structural steel components including the welds of the sacrificial shield wall and the RPV lateral stabilizer at the top of the sacrificial shield wall.

For these reasons the staff finds that loss of fracture toughness due to irradiation embrittlement is not an aging effect that requires management for the RPV structural steel component supports at Peach Bottom.

MEMBER KIRCHNER: Allen, may I ask, I think you used the word "verified" when you were talking about the concrete irradiation.

Did the staff do independent calculations, or other kind of -- use other tables or benchmarks to just look at the applicant's estimates of fluence?

MR. HISER: I'm not sure about that. Yes. One of the reviewers.

MR. KREPEL: Scott Krepel here. I did the fluence review related to this. And no, we did not do any independent calculations for Peach Bottom specifically.

However, the results were consistent with some of the other independent calculations that we have done at other plants.

Also, the licensee provided data from several different reviews including plant-specific calculations that were used with NRC approved methods as well as calculations that EPRI had done that were independently confirmed.

Also, there were some reports that came from the Department of Energy's lab for reference to the nuclear power plants that have the same operations as Peach Bottom.

So we have a lot of information to be able to support those conclusions for fluence.

MR. HISER: Thanks, Scott.

MEMBER KIRCHNER: Okay, thank you.

MR. HISER: Okay. With that we'll go to the next slide and I'll turn the floor over to Mo Sadollah.

MR. SCHULTZ: Allen, before you leave just a side question. The capsules that are going to be tested as part of the program are reinserted capsules if I recall.

Are there any issues associated with that aspect of the program?

MR. HISER: If I remember one of them was a reconstituted capsule that was reinserted.

MR. SCHULTZ: Yes.

MR. HISER: No, they've been used at Peach Bottom previously. And there are ASTM standards. There's standard practices to do that.

MR. SCHULTZ: Okay, good. Thank you.

MEMBER BALLINGER: If my memory serves me the shroud cracking issue on Peach Bottom, there was an inspection and they compared the growth rates of the cracks with respect to BWRVIP something, 70 something.

And am I recalling right that they discovered that there was a lot more growth than the models would have predicted? Is the Peach Bottom one the one where they had that issue and that required or was going to require a revision to MRP 226 or whatever? Am I just completely off base here?

MR. JENKINS: Yes, this is Joel Jenkins. I was involved in the review of the core shroud. And that was not the issue with Peach Bottom.

MEMBER BALLINGER: Okay. All right.

MR. JENKINS: There was cracking there and we evaluated the licensee's evaluation of that.

MEMBER BALLINGER: Okay. All right. So I've got to do a little more research on that. Thank you.

MR. SADOLLAH: Okay. All right. So on the topic of the electrical cable qualification and condition assessment as it relates to this application we would like to discuss two areas.

One has to do with the underground cables and submerged conditions, potential submerged conditions of underground medium voltage cables. And also we would like to talk about the cables as -- the qualified cables and issues as it relates to the qualification of the cables. So, Peach Bottom has installed what's called Smartcover systems on electrical cable manholes.

This system monitors water accumulation constantly, continuously, water accumulation in the sumps, in the electrical manholes that has the following features.

It is floatless so there's no mechanical float, or no physical contact of the moving parts that monitors the level amount of water in the manholes.

And also automatic alarms are generated if the water level exceeds a certain amount, or if there's an issue, if there's a problem, a malfunction within the system.

Smartcovers we found out that have been used recently kind of widely in water and waste water applications in the industry.

We have not seen -- there has not been any reports of adverse operating experience with this system.

So based on that Exelon took exception for annual inspection of manholes, electrical manholes, that GALL SLR AMP XIE3A and 3B and 3C recommend and proposed a five-year inspection frequency rather than annual.

The staff reviewed the situation. We found the proposal acceptable as an alternative to the recommendations of GALL primarily because the continuous monitoring and the self-diagnostic features of the systems that are installed.

MEMBER RICCARDELLA: Excuse me. What is this technology used in these Smartcovers?

MR. SADOLLAH: It's like ultrasonic, some kind of ultrasonic.

MEMBER KIRCHNER: As part of your inspection or review did you look at the history of flooding in the cable areas, underground buried cables?

MR. SADOLLAH: So we do an OpE -- independent search of the OpE functions, the operating experience aspects of the thing.

We did look at the corrective actions database and there was no serious -- significant indications of water accumulations in those systems.

I'm not sure how far back those went prior to the installation of the system.

MEMBER KIRCHNER: So they're not getting intense precipitation issues on a frequent basis.

MR. SADOLLAH: Not that I could recall.

MEMBER KIRCHNER: Okay. Thank you.

MR. HEINLY: Hi, this is Justin Heinly, senior resident inspector. I might be able to help out with that if you'd like a little more insight.

CHAIR SUNSERI: Yes.

MR. HEINLY: So as a part of the baseline inspection sample we do look at those cable vaults and how they manage the water intrusion in the pump house.

We do a corrective action search and we look at the reliability of those answers as well as how they manage the water.

We would say that with -- the program is adequate and ensures that they're able to pump out the water prior to safety-related cables being submerged in water. So they've consistently had a very strong program we think.

MEMBER KIRCHNER: Thank you.

MEMBER DIMITRIJEVIC: But that has to be done under some assumption of what kind of you know -- the water you have outside.

I mean, if you say adequately pumps, does that mean adequately pumps if you get, you know, which they just had 30 inches in 8 hours.

Then I mean, you know, what assumptions are done in this adequate pumping analysis.

MR. SADOLLAH: Yes. So my understanding is that there is a certain threshold or level of water accumulation that generates an alarm.

Once that alarm is generated operators are notified, they notify the maintenance group to do a manual pump down.

MEMBER DIMITRIJEVIC: Manual pump down.

MR. SADOLLAH: Right.

MEMBER DIMITRIJEVIC: Okay, so the --

MR. HEINLY: This is Justin again. Those manual pump downs do require them to open the lids on these cable vaults, and they do do an inspection when they're there to determine whether the water has exceeded the lowest cable line.

And they would write a condition report if that was the case. We monitor for that on baseline.

MEMBER DIMITRIJEVIC: Thanks.

MR. SADOLLAH: Okay. If there's no other questions I'll continue.

And so the next topic is with the EQ-qualified cables. So the cables that are qualified under the environmental qualification EQ program are covered under 10 CFR 50.49.

For subsequent license renewal -- for first renewal and subsequent license renewal the EQ program is considered a TLAA and was confirmed by the staff that meets -- their program at Peach Bottom meets GALL SLR recommendation as an AMP to manage the aging effects of the cables. Not just cables, there's also other components in that EQ program, but in particular we talk about the cables here.

So the staff reviewed Peach Bottom's methods of re-analysis leading to extension of qualified life for the cables.

The re-analysis can take advantage of additional conservatism that's built in the original calculations.

Originally obviously plants were only interested in a 40-year qualified life, but there were -- typically there are conservatisms such as the ambient temperature in a given area that leads to a certain number of years for a qualified life.

And once you take advantage of those conservatisms based on actual environment temperatures that you have in different zones of the plant you can in most cases extend the life.

So the staff confirmed consistency with GALL SLR and the provisions of 10 CFR 50.49 as well as applicable current standards and guidance.

And if there are no further questions back to Bennett.

MS. BRADY: Next slide, please. In conclusion for the SLRA safety review the staff finds that the requirements of 10 CFR 54.29(a) have been met for the subsequent period of extended operation.

We would now like to turn the discussion over to Kevin Mangan on the results of the inspections and from Justin again on the materials condition of the plant. Then we'll have general questions, please. Kevin?

MR. MANGAN: Good morning, everyone. As mentioned my name's Kevin Mangan and I'm the senior reactor inspector in Region 1, Division of Reactor Safety, Engineering Branch 1. And we're responsible for license renewal inspections.

I'm the license renewal point of contact for the region and I was also the team lead for the phase 4 license renewal inspection of Peach Bottom completed last December.

And on the phone with me is Justin, senior reactor inspector. His wife decided to have a baby last week so he couldn't join us.

So we're here to discuss Region 1's review and assessment of the implementation of the aging management programs for license renewal, material condition of the plant and the overall regulatory assessment of Peach Bottom Units 2 and 3.

The license renewal inspection program and the baseline inspection program are both used to inspect different aspects of the existing aging management program at Peach Bottom and throughout the region.

This slide I have up here describes the specific license renewal inspections that we have performed at Peach Bottom. And they are used to assess the implementation of license renewal commitments for the first period of extended operation.

As you see the phase 1 and phase 2 inspections were performed prior to Peach Bottom entering the period of extended operations.

The phase 1 inspection occurs during the last outage prior to entering the period of extended operation, and a phase 2 inspection is a programmatic team inspection that focused on verifying that all the aging management programs are being -- and the commitments associated have been properly implemented prior through procedures, et cetera, prior to entering the period of extended operations.

And as you can see the phase 1 inspection was not performed at Unit 3. And also the phase 2 inspection at Unit 3 was of limited scope. And this is due to the AMPs -- the two units, they submitted their license renewal at the same time. Aging management programs are the same.

Some of the systems are used at both units like the emergency diesel generators are common to both units. Station blackout cable and the equipment associated with that and the emergency cooling tower is common to both units.

So as a result we much more limited the scope in our Unit 3 evaluation as opposed to Unit 2 evaluation.

But overall the region's conclusion following the completion of all the inspection was that Exelon had put in place the required procedures and programs as described in the updated final safety analysis report to meet the requirements of license renewal amendments and also the associated commitments.

So that was all done prior to entering the period of extended operation.

Subsequent to that we did have one more. It's called phase 4 inspection. And that's done 5 to 10 years into the period of extended operation.

And as I said, we conducted that. That was a one-week inspection, a team of three people and we did it starting in November of 2018, completed in December of 2018. Next slide.

So for -- at Peach Bottom Exelon committed to 35 aging management programs. Seventeen were previously existing programs which no changes were required. Twelve programs were previously existing but were enhancements included in those programs. And there were six new aging management programs created.

For the phase 4 inspections we picked six aging management programs and these are the six we picked.

Sample select data, we based them on criteria that's kind of outlined in the inspection procedure.

We focused on new and enhanced procedures. We wanted to make sure we picked some of those.

We looked at the aging management programs that were impacted by either internal operating experience, either conditions that they identified or external operating experience such as like the GALL report rev 1 and rev 2 that maybe changed some of the commitments to see how they addressed those.

Certainly talked to the resident inspectors and their input on any aging management issues that they've looked at or were interested in us looking at.

And AMPs that are not inspected by other inspection procedures. There's a lot of AMPs that we already cover in the baseline inspection, heat sink inspections, ISI inspections for vessel internals, et cetera. They're all already covered so this inspection we tried not to focus on that and redo the same work.

And then finally we looked at some risk insights to pick the samples. For example, flow accelerated corrosion program comes up pretty high in risk. There's a lot of pipe failure problem areas, steam breaks associated with that.

One other thing that Exelon does, they do an aging management program effectiveness review. They do that every five years. That really helped. We looked at that review and that identified all the 10 aspects of aging management program and where they were meeting it, where they found problems, corrective actions that they had identified, operating experience, et cetera. So that also helped influence us to look at things that they had identified that were problems to see how they addressed them in our selection process.

And then for the inspection program we really do focus on aging effects, monitoring and trending corrective actions and implementing operating experience for this program as opposed to the original inspection program which looked at all 10 aspects of an aging management program and makes sure all the procedures were in place, et cetera. Any questions on that?

So as I said not only do we have the license renewal inspection program. We also have a baseline inspection program that looks at a lot of these aging management programs either directly or indirectly as part of their inspection process.

So, as I mentioned before, the ISI module performed which is an in-service inspection module.

It's performed at every plant each outage and is a biennial heat sink inspection, which is not a triennial heat sink inspection. So that covers another existing aging management program.

Some other ones, we've enhanced some programs like the design basis assurance inspection program now has -- our aim is to look at aging management programs for the components we've selected.

For these first couple, the first three we identified no violations associated with any aging management programs so the conclusion is the aging management --

CHAIR SUNSERI: Yes, why don't you just hold on for a second. We lost the public line and we're trying to get Justin back on.

MR. MANGAN: He's on the next slide so let me see if I can get him back on.

CHAIR SUNSERI: I think they've reached out to him. They're trying to reconnect him. But if you want to text him or something.

Justin, you back? Maybe not. Well, you

can go ahead.

MR. MANGAN: All right. I'll continue my slide and I'll see if he joins here.

So as I said we identified no violations in these first three inspection procedures, the ISI heat sink and design basis assurance inspection related directly to aging management programs.

Additionally, our baseline inspection program allows the resident inspectors to select any kind of problem identification and resolution samples where they identified the site had found some problems and they wanted someone to go in and look.

MR. HEINLY: I'm back.

MR. MANGAN: There we go. Look and see what corrective actions they had taken to address those identified deficiencies and whether they were adequate.

So there's a couple here that are directly or indirectly related to aging management programs.

So structural monitoring program we looked at as a PNR sample and Unit 2 coating defects. You see 2015 and 2018 for those. Both of those didn't identify any deficiencies. Thought that those programs were -- corrective actions were adequate.

For the final three PNR samples -- and

they were developed as a result of some non-cited violations that were written. Justin's going to talk about a few of those in the next slide.

But for the problem identification and resolutions cable reliability program. So we reviewed the actions following cable failures that had been discussed related to the EDGs and noted that Exelon had missed two opportunities in 2016 and 2018 to replace the cables associated with the Unit 3 emergency auxiliary transformer which is a separate cable.

Test results in 2014 concluded that the cables were not in the action range and required replacement for the next available work window. I'm sorry. Let me re-say that.

Tests in 2014 concluded that the cables were in the action range and would have required replacement in the next available work window. But the information was not communicated till 2018 and as a result the station did not correctly prioritize the replacement of those cables given their position.

These cables were originally in scope of the license renewal, but were subsequently scoped out since they were energized less than 25 percent of the time and that was a pre-GALL requirement that they didn't have to put them in the program.

And as I said that was consistent with the license renewal guidance at the time.

MEMBER KIRCHNER: Has that changed?

MR. MANGAN: That has changed.

MEMBER KIRCHNER: Because it doesn't make technical sense. And the percent time energized is not a factor necessarily.

MR. MANGAN: I think that was the original -- you can probably answer that better than I.

MR. SADOLLAH: Yes, yes. The thinking process was that if a cable is only partly energized growth of water trees would be limited.

But we're learning now that no, it's a lot more conservative whether a cable is energized all the time is to factor that in the testing of your inspections.

MEMBER KIRCHNER: I just think one would intuitively expect that the environmental conditions around the cable would be a bigger factor than whether it's energized or not.

MR. MANGAN: So yes. As I said they were scoped out. So that's -- we're operating in a license renewal space that it wasn't a license renewal aging management program issue and it is in their cable management program and they are testing it to assess degradation.

MEMBER KIRCHNER: Thank you.

MR. SCHULTZ: I'm trying to tie that discussion on the cable reliability program. That happened second quarter 2018 on your previous slide.

Then as part of the 71004 based core inspection that was also -- the medium voltage cables was also addressed? And so that happened after no findings, but?

MR. MANGAN: It's a good question. And I did that so I was questioning myself when all this happened afterwards.

And so for our review of the aging management program we were focused on the aging management program and the cables that were required to be reviewed as part of the aging management program in their license renewal commitment.

These cables and diesel cables were both scoped out of license renewal because they were energized less than 25 percent of the time so they were not scoped for a license renewal inspection.

MEMBER KIRCHNER: So how is this resolved now?

MR. SCHULTZ: Yes, that's a good question.

Especially the diesel cables.

MR. MANGAN: I don't want to steal too much of Justin's thunder, but the diesel cables, as I said they had replaced all those cables. So those are brand new cables now. They are in the cable testing program.

MEMBER KIRCHNER: And they are now part of the program.

MR. MANGAN: And then as far as subsequent license renewal they are all within the scope of license renewal.

MR. SCHULTZ: We do want to hear from Justin.

MS. BRADY: Justin, are you with us?

MR. MANGAN: Yes, he is.

MR. HEINLY: I'm here.

MR. MANGAN: For the second one, external flood seals. This is a problem identification resolution where the residents got out and found a couple of degraded flood seals.

And we did an extended communication on that and reviewed what the site had done.

So the inspection, reviewed activities related to the inspection of the external building flood seals after EDG building flood seals were found to be missing.

Inspector reviewed Exelon's previous evaluation to assess how that was previously missed and determined that the flood seals had been determined to be inaccessible for inspection. So that's why they hadn't been looked at before.

Our inspectors looked at that and determined the seals were accessible and should have been inspected.

And then subsequent to that inspectors also found that a total population of 108 flood seals onsite were incorrectly evaluated as inaccessible and needed to be inspected.

Exelon subsequently went and inspected all the seals, did not identify any missing or degraded seals. And so as a result it was an insight as opposed to any kind of onsite violation or anything like that.

And then, finally, following the failure of RICSI static O-ring for a pressure switch, this resulted in inoperability. A retrospective review corrective actions looked at the extent of condition of that event.

And inspection identified the replacement of seven other HIPSI and RICSI O-ring switches had not been scheduled till 2023 and questioned whether this time frame was commensurate with the significance of the issue.

And as a result of those questions Exelon created corrective actions creating a new PM. And they go in and look at the O-ring pressure switches on a six-month frequency until they schedule or replace the O-rings.

And so O-rings are not really directly tied to aging management programs in license renewal but they are part of the EQ program for the HIPSI one. The RICSI ones were not.

And that is an aging management program for our EQ program in general.

Any questions on any of those? All right. I will turn it over to Justin now.

MR. HEINLY: All right. Good morning, everybody. Can you hear me okay?

CHAIR SUNSERI: Just fine.

MR. HEINLY: Okay, great. So, we're on slide 4, the resident inspector insights and inspection results.

So I just wanted to take a moment to talk about material condition from the resident inspector point of view. Hold on just one second here.

So I just wanted to talk about the material conditions from the resident's point of view.

So currently Peach Bottom Units 2 and 3 are in the licensee response column. They have all green findings and PIs which indicates from a baseline perspective that the licensee is effectively identifying conditions adverse to quality and correcting them in a timely manner.

As Kevin kind of mentioned there were a few insights that we wanted to provide coming from the baseline inspection as far as how the licensee is identifying issues.

We did have two inspections -- inspection results we wanted to talk about.

So the first bullet there, the first thing that we wanted to just highlight was that there were no findings as a part of the license renewal program inspection.

So from a program perspective Kevin and his team identified that the programs that were established were adequate.

However, under baseline inspection we did have two issues we wanted to talk to you about.

First NRC identified -- this was the -- I'm sorry, the self-revealing issue with corrective action program involving the Echo-1 diesel underground cables.

So as Kevin had mentioned the underground cables for Peach Bottom for the diesel were excluded from the license renewal program because there was an exception for whether it be energized 25 percent of the time or not.

However, the licensee conservatively put them into their corporate procedure to be a part of their cable monitoring program.

So under that program they were to have tested them on a frequency of I believe about every six years.

When they went out to test them the first time they determined that it was either inaccessible or too difficult to be able to actually test them.

They wrote up the condition report. And unfortunately through a couple of missteps in the corrective action program they never did end up completing the diesel cable testing.

Unfortunately that resulted in the Echo-1 diesel cable failure and resulted in the Echo-1 diesel being inoperable.

It was unfortunate that they missed the multiple opportunities to identify it. We did identify through a detailed risk evaluation that this actually was still a green issue and the result of this was that the licensee went out and performed testing on all of their diesel cables and actually proactively replaced every one of them to ensure that the diesels remained reliable.

So when we look at it from a license renewal perspective it wasn't really part of the license renewal program.

MR. SCHULTZ: Justin, can you hear me?

MR. HEINLY: Specifically we wrote a violation on the HIPSI exhaust pressure switches. The station had gone through a PM program many years back where they looked at the due dates of PMs some of which were so far in the future that they actually exceeded the life of the plant. So they deactivated those PMs.

Once license renewal and now subsequent license renewal came about those PMs had to be reactivated.

Unfortunately not all of them were identified and in this case one of them for the HIPSI soft pressure switch had been missed.

So again we wrote a criterion 3 onsite violation against it. However, it was of minor safety significance because when they do their calculation they --

(Off-microphone comments.)

MR. HEINLY: To the point of highlighting these examples which indicate that the licensee has been able to identify aging components in a timely manner and that they didn't result in any safety significant issues. They maintained an effective corrective action program that identified them prior to those issues arising.

So just kind of generally speaking of material conditions. So you know, for a plant proposing 50 years of operation the material condition is generally adequate for safety-related structures and components.

The licensee to their credit have been successful in completing large capital improvement projects to maintain or improve the position of those SSCs.

So, some of the large projects that we talked to would be an RHR cross tie modification. They replaced their recirc MD sets with a solid state central drive modification. They implemented various program replacements.

They replaced two steam dryers. And

they're currently in an endeavor that's probably about six to eight years long to replace their cooling water system for the diesels from a surface water-based system to an air-cooled diesel, which not only will help them with various piping concerns, but also will help them from a risk perspective.

So for all those factors together we believe that the licensee is able to manage the effects of aging and we're able to confirm that through effectiveness.

I do want to open it up before we conclude if there are any questions on the specific or calculated risk.

MEMBER KIRCHNER: So, I would ask. I had asked the applicant earlier -- not well -- about the conflation between SLR and post Fukushima actions and such.

I mean, clearly diesel generators play a big role in risk mitigation. And that they wouldn't -- cables for diesel generators wouldn't be under an AMPs-like program.

Is that because they would naturally, or not naturally, but be covered by other regulatory requirements?

MR. HEINLY: So, our understanding is that based upon the time frame of which Peach Bottom got into license renewal is why those cables were not required to be scoped in.

Yes, we understand it doesn't seem intuitive. I think that's going to be corrected with the second license renewal and the programs there.

But to their credit their corporate program requires them to do that because they recognize the risk involved with the cables.

MEMBER KIRCHNER: So from a process standpoint is it -- would you -- this is like a lesson learned kind of experience.

Going forward with other SLRs are you going to somehow through an instruction or some branch position or something capture this and then have it included in future SLR AMPs programs?

How do you capture this in regulatory space if that's the right way to phrase it?

MR. SADOLLAH: With GALL SLR currently would include these cables in it.

MEMBER KIRCHNER: So the latest version of GALL for SLR would. And this application predated it.

MR. SADOLLAH: It does not have that 25 percent exception.

MEMBER KIRCHNER: Okay, thank you.

MR. GALLAGHER: If I could just add one thing. This is Mike Gallagher with Exelon.

So just for clarity the equipment was always in the scope of license renewal. It's whether or not it's in the testing program. And so that was the distinction.

So the cables were in scope, they were always in scope, so they are covered by Part 54 and it's covered there.

So what we in the original renewal, so just to give you numbers. It was 14. We had 14 circuits that were in the test program of all the circuits that are in.

We've added 27 additional circuits 4 of which are these diesels. And we did not test, unfortunately did not test the diesel cable, the E-1 cable that failed, but we had tested 10 other circuits that were originally less than 25 percent and so was not in the testing scope.

But we added -- developed our corporate cable program and we added additional cables, not only the 27 that we're adding formally for SLR, but many, many other cables because -- for power generation and that type of thing.

So we had tested 10 circuits that were

less than 25 percent. Similar cable to the diesels and they tested fine.

But unfortunately we didn't get to -- and as Justin said we lost a couple of opportunities to get to it earlier. And that's really our learning for this.

I think for the SLR program overall it's covered and as Mo had said it's in the SLR GALL.

MEMBER KIRCHNER: And how often are the diesel generators tested at load?

MR. GALLAGHER: Jim? Monthly?

MR. BROWN: James Brown from Exelon. We test them monthly.

MEMBER KIRCHNER: Thank you.

MR. GALLAGHER: Monthly operability runs.

MEMBER DIMITRIJEVIC: So, this is my question. When you test the cables because you test diesel generators monthly you know that the cables are working or not, right? So what's a cable test? Do you test for certain degradation mechanisms?

What degradation mechanisms were you testing?

MR. GALLAGHER: Yes. There's a formal test that's called TAN-DELTA test where you basically have to disconnect the cables and then you do this test and the test would basically give you a baseline, its performance level. And you can monitor and trend for degradation.

MEMBER DIMITRIJEVIC: What type of degradation are you looking to detect?

MR. GALLAGHER: The insulation degradation.

MEMBER DIMITRIJEVIC: Insulation. So what is the fail amount? The hot shot or the open circuit. I mean, I was wondering how does that failure mode depends on is the cable energized or not? That's what I'm sort of curious about.

MR. MANGAN: So the original theory was that the treeing effect that causes medium voltage cables to degrade, the cable insulation to degrade, was water and being energized. So that combination is what's causing the treeing effect, causing the cables to degrade.

So if they weren't ever energized then the water wouldn't tree and it wouldn't cause degradation of the cable. That's what the original assumptions were.

Subsequently to that they said well, that's not -- any underground cable could be wetted. They all could have tested -- I think originally it was 10 years for Peach Bottom. They moved that back to six years and that was a GALL report regression also.

So they eliminated that statement that if it's energized less than 25 percent of the time you don't have to test it as part of license renewal. So now all those cables are tested.

MEMBER DIMITRIJEVIC: Because if you test for insulation your main fail amount would be hot short or some spurious operation, not actually loss of the circuit.

MR. MANGAN: If the cable degrades then you have the voltage it's going to go to ground and going to short the cable and it will fail. So that's what the high pot -- it's TAN-DELTA testing, but it's kind of like a high pot test, in high pot tests. That they just test it, see how much voltage drops across the cable, and then trend it.

If that voltage drops faster that's an indication of cable degradation.

MEMBER BROWN: Be careful on saying it's a high pot test. A high pot test largely destroys the cable. If it fails. So you can't recover. The TAN-DELTA is more of a phase angle type test as opposed to an insulation resistance which is just a current, I guess through the cable insulation to ground.

MR. MANGAN: Right. And a TAN-DELTA test is the phase rate. But the IEEE standard describes it as kind of next step as once you start seeing the degradation is you go to the high pot test and verify that it's going to hold.

MEMBER RICCARDELLA: For the record what was the word you used, the treeing effect? Tree effect?

MR. MANGAN: Tree. Tree.

MEMBER RICCARDELLA: T-R-E.

MR. MANGAN: If that insulation failed it kind of looks like a tree in the cable insulation.

MEMBER RICCARDELLA: Thank you.

MEMBER BROWN: It gets mushy.

MR. SCHULTZ: Mike, I wanted to catch you while you were at the microphone. But I have a general question.

And that is with a couple of instances today where in the case of cables determined in the corrective action program that it was inaccessible and then found later that it was in fact an accessible cable that could have been tested.

And there has been an extent of condition evaluation of what is accessible and what is inaccessible in these testing programs, especially those related to the testing for extended operation?

MR. GALLAGHER: I think the cable issue is a different accessibility issue. It's about can it be -- can personnel safely disconnect cables to do the testing and its associated proximity to other equipment.

So it was more a concern that the maintenance technicians had when we first were going to test that cable.

MR. SCHULTZ: Okay.

MR. GALLAGHER: And so, I mean obviously we can -- we should have challenged that better because we can do it because we actually replaced those cables. So you still would have the same accessibility concerns.

So, I wouldn't tie it together with like the flood seal inaccessibility. I think that was just a programmatic, you know, you have a list of all your seals, what you're going to see.

Some are deemed inaccessible because of their location. And then there was some of them that really were accessible, we just had to correct that.

MR. SCHULTZ: So it has been examined as a result of the overall, overarching review of the corrective action program issues.

MR. GALLAGHER: Yes, I would think so. The idea is we want to look at the equipment and we want to inspect the equipment, do the inspections.

So you know, inaccessible, we really want to make sure it really is inaccessible. But we would use the accessible equipment to kind of -- based on the results of those inspections we would have to look for extent of condition which could drive you into doing something with inaccessible equipment if there was something -- some degradation that you had to chase after.

So just because it's inaccessible doesn't necessarily mean it will never be dealt with.

MR. SCHULTZ: That's right. I'm glad you mentioned that the definition of inaccessibility has got different aspects associated with it. Clarification of that is important. Thank you.

MEMBER BALLINGER: Stay there for a minute. To pull that string a little further, it was -- the cable issue with the diesels was a result of you said multiple failures to see things? Did I read that right? That it was a series of events that had to occur in order for this cable to not be picked up on?

MR. GALLAGHER: I think --

MR. HEINLY: Yes.

MR. GALLAGHER: Okay, Justin.

MEMBER BALLINGER: So we're assuming that this has been put in a corrective action so this sequence of events which occurred was thought through and then somehow fixed?

MR. GALLAGHER: Yes. Essentially the first attempt was done under the corrective maintenance program. It should have been created as a preventive maintenance program so that it could be -- ensure that there would be a recurring work order to go after it.

So, we've corrected that and so programmatically that's there.

There are only certain windows where we can do some of these testing. And some of them aren't that frequent. So you really want to make sure if you miss an opportunity you want to get the next one.

And so that's covered programmatically.

MEMBER BALLINGER: So do you consider this an isolated event?

MS. KRAUSE: If I could just -- Anna Krause. If I could just add a little bit of more detail.

We did enter this issue into the corrective action program. And we performed a root cause analysis or evaluation on the breakdowns. And then we have created corrective actions and actually completed corrective actions to prevent recurrence on this issue.

Specific to the diesel cables we did create preventive maintenance tasks to ensure that they are permanently within our work management process so that we don't miss them again which is how I would characterize our first missed opportunity to have tested those in 2013.

And then going forward just around general accountability and making sure that the cable program owner is properly tracking the testing being completed and the test results.

But in conclusion we have this within our corrective action program and thoroughly review this issue with actions.

MEMBER BALLINGER: Lastly, this kind of scenario is an isolated event?

MS. KRAUSE: Yes. We looked at other programs as well to understand if there were any similar type of gaps. And we'll continue to do that on an ongoing basis based on our operating experience with this issue.

MEMBER BALLINGER: Thank you.

MEMBER DIMITRIJEVIC: The same way, when you discovered the new cable wasn't connected right did you go back and check for all new cables, the replacement, the connection was made right?

MS. KRAUSE: That was associated with our condensate pump cables that we had pulled. We also did an extent of condition on that and have replaced all of our condensate pump cables.

MEMBER DIMITRIJEVIC: I think the issue was in replacement that connection wasn't made right. That's what you said.

MS. KRAUSE: Correct. There was also a root cause performed on that as well.

MEMBER DIMITRIJEVIC: And did you go back and check other replacement cables?

MS. KRAUSE: Yes. We performed an extent of condition and extent of cause as a result of that and didn't find any additional cables that we needed to replace.

But we did replace all the ones associated with the condensate pumps that had been installed during that time frame.

MEMBER DIMITRIJEVIC: I have another

question about the inaccessibility. Because you had these flood seals, you said that many of them were not tested originally, but then retested. Are they part of your Fukushima -- did you look in all of these flood seals as a part of your Fukushima initiative?

MR. GALLAGHER: Yes. Flood seals. Julian.

MR. LAVERDE: Julian Laverde, design engineer manager.

We did -- the list of seals that were inaccessible were part of the initial look for Fukushima. So they were part of that initial review.

We had identified them as being inaccessible. And then when the resident identified some opportunities for us to do that we went and we looked at the entire scope. We were able to get through the majority of them successfully.

MEMBER DIMITRIJEVIC: Do you have flood seals on these manholes for cables which are also part of the problem?

MR. LAVERDE: Yes.

MEMBER DIMITRIJEVIC: You do. And they're --

MR. LAVERDE: They're a part of the program and they're inspected through the structures monitoring program.

MEMBER DIMITRIJEVIC: Thanks.

CHAIR SUNSERI: Any other questions? So I had one for Justin if you're there. Can you still hear us?

MR. HEINLY: Yes, I can.

CHAIR SUNSERI: So I heard you use the phrase in describing the material condition of the plant as generally adequate. And I think I heard that from another staff member during their presentation as well.

That doesn't sound like a very strong endorsement to me. Can you provide a little bit more perspective on what generally adequate from a material condition perspective means?

MR. HEINLY: Sure. You know, we use that kind of terminology when we talk about some of our inspection results. Specifically, when we talk about PINR and assessment of programs.

So, that looks like to me is that the inspection record shows that they have primarily all green findings, green PIs so they're able to identify and correct issues prior to them becoming safety significant.

So just to kind of dive into it a little bit more. I mean, what we see is the site is proactive about -- they establish a work management program that looks more at replacement or repairs prior to failure than being reactive.

So most of what the residents will look at on a day to day basis are preventive maintenance work orders.

A very, very small subset of the work orders that are performed out in the field are actually corrective maintenance.

So it kind of gives you an indication that the site is very proactive in identifying when and how the failure modes can occur, and making sure that they have maintenance tasks for replacement schedules before that occurs.

So hopefully that helps just a little bit with what we see out there on a day to day basis.

CHAIR SUNSERI: Yes, that's helpful. Thank you. Okay. So we are on slide 21.

MR. GALLAGHER: Chairman, one other thing.

CHAIR SUNSERI: Yes.

MR. GALLAGHER: One of my guys corrected me on some numbers I gave out. So the first renewal circuits, I think I said 14 and it's 12.

And then we added 27, total 39. So I

might have said 14 rather than 12.

CHAIR SUNSERI: That's okay. Thanks.

MR. MANGAN: Justin and next slide.

MR. HEINLY: Yes. So, the inspectors found -- this is the conclusion. So the inspectors found the aging management programs were being implemented in accordance with the licensed condition.

So the region will still continue to monitor the AMP using the baseline ROP process. If there aren't any other questions I'll pass it back over to Bennett.

MS. BRADY: Thank you, Justin. This completes the presentation of the staff's review of the Peach Bottom subsequent license renewal application as documented in the safety evaluation report with one confirmatory item and the Region 1 presentation on inspections and plant's material condition.

At this point we would be pleased to address any further questions that you may have.

CHAIR SUNSERI: Members, any additional questions for staff?

MR. SCHULTZ: This may be for the staff here or for you, Justin.

Earlier I asked the applicant, the

licensee what -- how they would implement all of these programs that need to be in place six months prior to the SLR.

And the response was that this is going to be an ongoing process really between now and that time frame, and they'll be implementing augmentation to their current program as it's developed some of which would be developed over the next few years and continuing depending upon the order of magnitude of the effort.

From your perspective, Justin, how do you monitor all these changes that will occur to the overall program as it moves forward toward the SLR?

MR. HEINLY: Yes, that's a great question. So I think fundamentally in the ROP when we go out and inspect we are trained as inspectors to go back to what is the governing document. So start with the regulations, the FSAR and then most of those programs are going to be driven through a corporate-level procedure or a site-level procedure that's implemented by Exelon.

So I think one good example that we could use would be the maintenance rule program establishes guidelines for the structural monitoring program. They're kind of all and the same.

So as guidelines change for structural monitoring and the requirements get pulled in for second license renewal and required to be implemented we will pick that up when we do a structural monitoring sample because as inspectors we'll go back to that program, we'll review the revisions and the changes that have been made to that program, and then capture those as areas for focus when we look at inspections.

We kind of call them first-time evolutions. So when a plant does something for the first time it's usually the most -- carries with it a little bit more risk, whether that be from discovery or just the first time you do something you're not sure of the outcome.

So those are the ways that under the baseline program I think that we'll be capturing the changes that are going to occur.

MR. SCHULTZ: Thank you for that response. I appreciate it.

CHAIR SUNSERI: Any other questions from members? All right, we're going to turn to the room here to see if there's any members of the public that would like to come to the mike and make a statement.

And there's no one coming to the mike so we'll go to the phone line. Anybody on the public phone line that would like to make a statement? Now is your opportunity to state your name and provide your comment.

All right. We have none there so we can close that phone line. Thank you, Justin, for your participation.

Now we'll go around the members to see if there's any final thoughts or comments you would like to have. I'll start with Vesna.

MEMBER DIMITRIJEVIC: No additional questions. Thank you. That was very informative for everybody here, your presentation. Thank you very much.

CHAIR SUNSERI: All right, great. Thank you. And Steve, our consultant?

MR. SCHULTZ: Just echo your opening comments about the presentations that have been made by Exelon today and the staff that has helped support the application as well as the discussions.

And also the staff. The SER lists a couple of pages full of staff who have been involved in the SER process.

It's impressive not only because of the numbers of individuals that have been involved, but their experience base and their disciplines. Very thorough review. Thank you.

CHAIR SUNSERI: Jose.

MEMBER MARCH-LEUBA: I'd like to second that opinion. I'm pleasantly impressed by this review, by the quality of the presentations and the quality of the engineering behind it. Both the staff, the inspectors and the licensee.

It's highly unusual when we ask questions and there's an answer ready within a few seconds. Most of the time you don't understand what we're asking. Today you did so thank you very much.

CHAIR SUNSERI: Charlie.

MEMBER BROWN: I'm not going to add to that. Thank you.

CHAIR SUNSERI: Pete.

MEMBER RICCARDELLA: Yes, I have no further comments other than echo my colleagues.

CHAIR SUNSERI: Okay, thanks. Paul?

MEMBER KIRCHNER: No further questions or comments. Thank you to the staff and to the applicant for a very good set of presentations.

CHAIR SUNSERI: And Ron.

MEMBER BALLINGER: No further comments.

CHAIR SUNSERI: Okay, thank you. All

right. Well, we have reached the end of the meeting.

I want to extend my compliments to both the applicant and the staff for the well thought out and informative presentations. Makes our job easier when we can ask questions because we read the tons of material coming into this thing and our opportunity to interact with you helps understand the clarity to all that volume of material that we've seen. And so we do appreciate that.

So I recorded no follow-up items and we are adjourned.

(Whereupon, the above-entitled matter went off the record at 11:33 a.m.)

Peach Bottom Atomic Power Station, Units 2 and 3 Subsequent License Renewal Application

ACRS Subcommittee Presentation
November 5, 2019

Exelon

Introductions

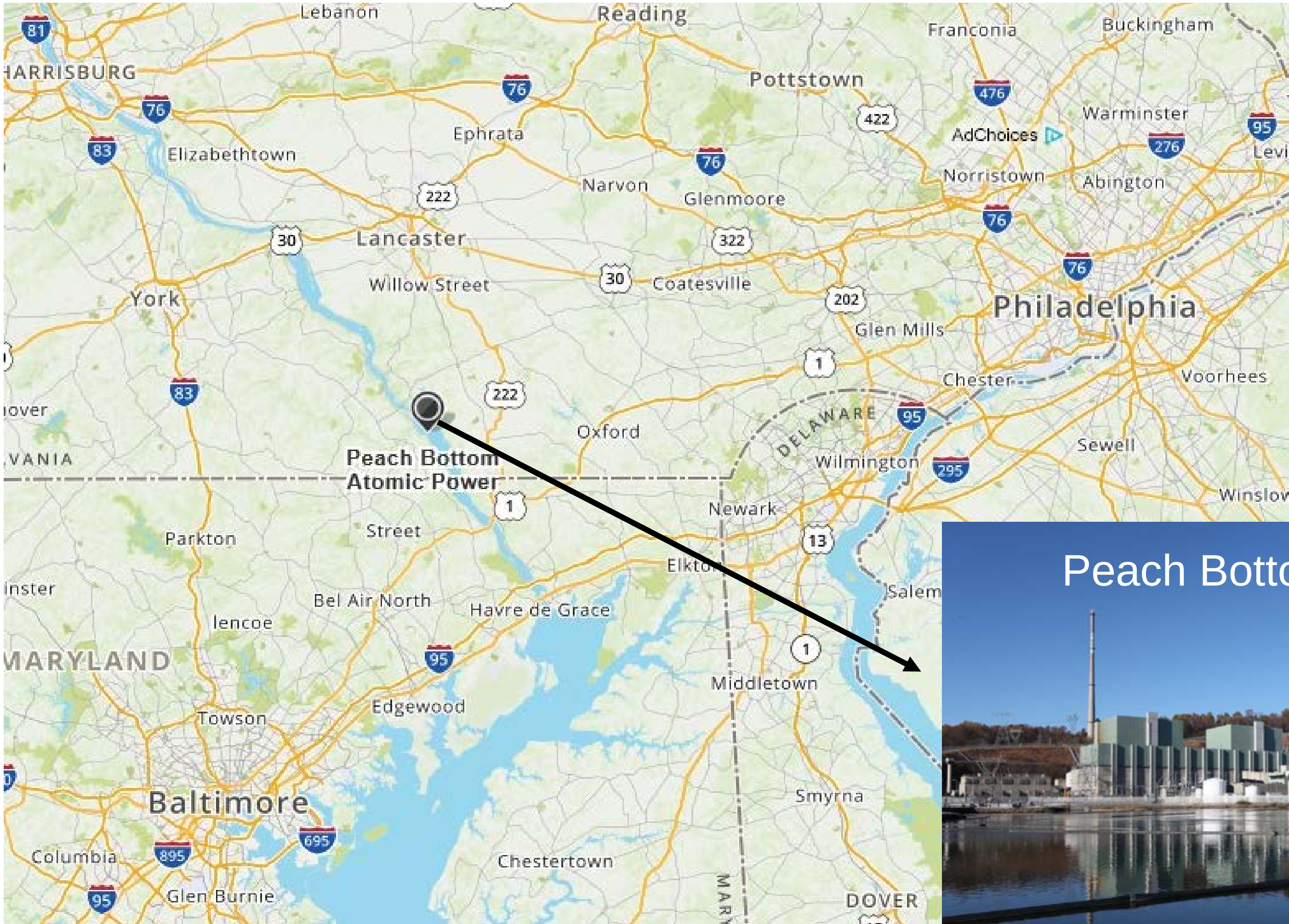
• Mike Gallagher	VP, License Renewal
• Anna Krause	PB Sr. Mgr. Design Engineering
• Paul Weyhmuller	LR Technical Manager
• Julian Laverde	PB Mechanical Design Manager
• Dave Distel	LR Licensing Engineer

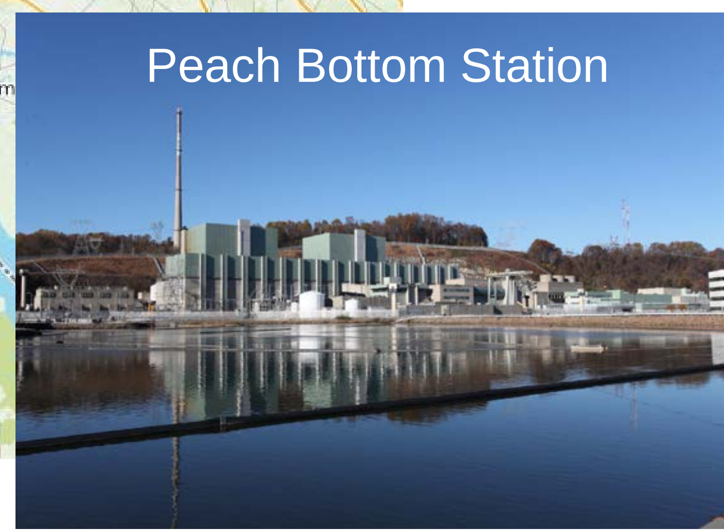
Exelon.

Agenda

• Introductions	Mike Gallagher
• Station Description and Overview	Anna Krause
• GALL Consistency and Commitments	Paul Weyhmuller
• Open and Confirmatory Items	Paul Weyhmuller
• Technical Topics	Julian Laverde
• Closing Remarks	Mike Gallagher

Peach Bottom Station Location





Exelon.

Peach Bottom Station

Exelon.

Peach Bottom Current Performance

- Plant operates on 24 month refueling cycle

- Plant Capacity Factor:
  - 2018 94.2%
  - 2019 98.6% (as of 9/30)

- Regulatory Status
  - ROP Action Matrix Column 1 (Licensee Response/Baseline Inspection)
  - All ROP Indicators are Green

Station Overview

Peach Bottom	Unit 2	Unit 3
Full Power License - 3293 MW_t	10/25/1973	7/02/1974
5% Power Uprate to 3458 MW_t	1994	1995
Independent Spent Fuel Storage Installation (ISFSI)	2000	
First License Renewal Approval	2003	2003
15% EPU to 3951 MW_t	2014	2014
1.66% MUR to 4016 MW_t	2017	2017
Current License Expiration	8/08/2033	7/02/2034

Exelon

Significant Plant Modifications

Peach Bottom	Unit 2	Unit 3
Main Condenser Upgrades (titanium tubes)	1991	1991
Hydrogen Water Chemistry	1997	1997
Noble Metal Chemical Addition	1998	1999
Main Power Transformers	2010	2009
RPV Core Spray Piping Upgrade	Not Required	2013
Torus Recoat	2012	2013
RHR Cross-tie Modification (EPU)	2014	2015
Steam Dryer Replacement (EPU)	2014	2015
Turbine/Generator Set Upgrade (EPU)	2014	2015
Digital Control Systems (EHC and Feedwater)	2018	2017
Fuel Pool Cooling Heat Exchangers	2017	2017
ISFSI Pad Expansion	2020	

GALL-SLR Consistency and Commitments

SLR Application Development

- Scoping and Screening
  - ✓ Updated for plant modifications
  - ✓ Updated to NEI 17-01 guidance
- Aging Management Reviews
  - ✓ PB FLR was pre-GALL, additional aging effects required assessment based on NUREG-2191 GALL-SLR
- Aging Management Programs (AMPs)
  - ✓ Total of 47 AMPs per GALL-SLR guidance
- Time-Limited Aging Analyses (TLAAs)
  - ✓ Existing TLAAs re-assessed
  - ✓ New TLAAs for SLR due to component repair/replacement
    - ✓ Jet Pump repair components for Loss of Preload
    - ✓ Replacement Steam Dryer Stress Report and Fatigue Evaluations
    - ✓ Replacement Core Plate Plugs for Stress Relaxation Analysis
    - ✓ U/3 Core Spray Replacement Piping for Fatigue and Loss of Preload
  - ✓ Total of 35 TLAA analyses per GALL-SLR guidance

GALL Consistency

- Submittal based on GALL-SLR
- High AMR consistency (98.6% Notes A thru E)
- 50 License Renewal Commitments
  - ✓ 47 Aging Management Programs
  - ✓ 3 Additional Commitments
    - ✓ OPEX Review, EPU OPEX Review, FERC Inspection of Conowingo Dam
  - ✓ UFSAR Supplement (Appendix A of the SLRA)
  - ✓ Managed by Exelon Commitment Tracking program based on NEI 99-04, “Guidelines for Managing NRC Commitment Changes”

		AMPs Consistent with GALL	AMPs Consistent with Enhancement	AMPs with Exception without Enhancement	AMPs with Exception and Enhancement	Plant Specific AMPs
Existing	**36**	8	19	2	6	1
New	**11**	8	0	3	0	0
Total AMPs	**47**					

GALL Consistency - AMP Exceptions

Program	Exception	Justification
Water Chemistry	Using this AMP to manage Auxiliary Boiler water chemistry.	Scope addition, while not part of BWRVIP-190, standards exist for monitoring water parameter (ISBN-0-7918-1204-9).
Bolting Integrity	Using this AMP to manage submerged mechanical bolting on intake structure traveling screens.	Scope addition, while this AMP is used to manage closure bolting for pressure retaining components, inspection requirements will be adequate to manage loss of preload.
Closed Treated Water	NUREG-2191 recommends EPRI document "Closed Cooling Water Chemistry Guideline" Rev. 1. Peach Bottom uses Rev.2 of this guideline.	Revised guideline incorporates latest industry OPEX. No changes to monitoring criteria.
Reactor Head Closure Stud Bolting	NUREG-2191 requires the use of material with ultimate tensile strength of less than 170 ksi for in-service studs. Both units have studs installed with studs over 170 ksi.	Test reports show some test values over limit. Studs are inspected for cracking.
	NUREG-2191 requires the use of material with yield strength of less than 150 ksi for replacement studs. Replacement stud has test results over 150 ksi.	Test reports show some test values over limit. Stud was inspected for cracking and will be re-inspected if utilized.
BWR Vessel Internals	Steam Dryer will not be inspected per BWRVIP-139-A	BWRVIP-139-A is for GE designed steam dryer assemblies. PB has installed Westinghouse steam dryers and has submitted an inspection plan to the NRC.

GALL Consistency - AMP Exceptions

Program	Exception	Justification
Fire Water System	NUREG-2191 requires foam system discharge test annually to confirm spray patterns. When not possible, visual inspection of nozzles and air testing is performed.	Single nozzle which sprays across down the inside of the tank. Nozzle has a vapor seal. One time visual inspection to assure proper orientation as it is within the fuel tank.
Internal Coatings	NUREG-2191 requires an internal inspection of portions of concrete lined pipe. Opportunistic inspections will be performed.	Fire header piping is buried. Various periodic flow tests will assure coating has not degraded impacting performance. 2014 inspections found concrete lining in good condition. When made available, visual inspection will be performed.
	NUREG-2191 requires coating found not meeting acceptance criteria are repaired, replaced, or removed. HPCI lube oil reservoir coating will not be repaired.	NMAC's Terry Turbine User's Group provides recommendations that degraded coatings not be replaced. Only remove portions that show poor adhesion.
ASME Section XI-IWE	NUREG-2191 requires pressure retaining components subject to cyclic loading that have no fatigue analysis are inspected for cracking. Peach Bottom will only inspect high temperature mechanical penetrations.	Peach Bottom, had it been constructed to a later code, would have met requirements of ASME Code for fatigue waivers for low temperature penetrations. High temperature penetration accessible surfaces will be inspected for cracking.
	Program will manage flow blockage due to fouling for the Core Spray System, High Pressure Coolant Injection System, Reactor Core Isolation Cooling System, and Residual Heat Removal System pump suction strainers.	No existing GALL line items exist for the management of flow blockage due to fouling for these components and as a result the IWE Program was selected because the station Containment ISI program plan and procedures will perform the required aging management actions.

GALL Consistency - AMP Exceptions

Program	Exception	Justification
E3A - Medium Voltage Cables E3B - I&C Cables E3C - Low Voltage Cables	NUREG-2191 recommends, inspections for water accumulation and manhole condition annually. Additionally, inspections for water accumulation are also to be performed after event driven occurrences, such as heavy rain. Manholes with level monitoring and alarms that result in consistent, subsequent pump out of accumulated water prior to wetting or submergence of cables will be inspected at least once every five years with additional inspections following event driven occurrences, such as heavy rain, rapid thawing of ice and snow, or flooding, when level monitoring indicates water is accumulating.	Level monitoring instrumentation, with alarms monitored by Operations Personnel, provide for detection of water level on an on-going basis. Corrective actions are taken when an alarm is received which includes manual pumping of the manhole as needed. In cases where it can be determined that cables have not been subjected to significant moisture, manhole inspections will be performed on a five-year frequency when structural inspections are performed. Following event driven occurrences, inspections and subsequent pump outs, as needed, will be performed when level instrumentation has detected increasing water levels.

FLR Aging Management Effectiveness Reviews

- Program effectiveness reviews included:
  - ✓ Detailed review of inspection schedules, results, and data
  - ✓ Review of relevant operating experience within the Corrective Action Program

- All first LR Programs were effectively implemented

- Summary of each review is found in Element 10, “Operating Experience” of each AMP and in the SLRA in Appendix B

- In November 2018, the NRC staff conducted a 71003 Phase 4 inspection at PBAPS, to assess aging management program effectiveness, and identified no issues

Exelon.

Open and Confirmatory Items

- **Open Items**
  - There are no Open Items

- **Confirmatory Items**
  - CI 3.0.3.2.3-1: BWR Vessel Internals Program
    - NRC Staff review of Enhancement 1 identified that additional information was required for core plate rim holddown bolts
    - A revision to Enhancement 1 was made to include the guidance of BWRVIP-25, Revision 1
    - Response to this Confirmatory Item was submitted to the NRC Staff in a supplement October 9, 2019

Technical Topics

RPV Embrittlement

	SLRA Sections Addressing GALL-SLR Recommendations
Reactor pressure vessel neutron embrittlement at high fluence	3.1.2.2.3 Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement 3.1.2.2.13 Loss of Fracture Toughness due to Neutron Irradiation or Thermal Aging Embrittlement 4.2 Reactor Vessel and Internals Neutron Embrittlement Analyses A.2.1.20 Reactor Vessel Material Surveillance A.3.1.2 Neutron Fluence Monitoring

- Fluence projections through SPEO (70 EFPY) were performed for neutron embrittlement analyses
- Analysis for USE, ART, Axial/Circ Weld Failure Probability, and Reflood Thermal Shock for beltline materials have been satisfactorily evaluated using the 70 EFPY fluence projections
- PBAPS will manage fluence projections consistent with GALL-SLR AMP X.M2, Neutron Fluence Monitoring Program
- PBAPS will manage embrittlement consistent with GALL-SLR AMP XI.M31, Reactor Vessel Material Surveillance Program.
    - ✓ One capsule will be withdrawn from each unit during SPEO at 60-62 EFPY

Exelon.

IASCC of Reactor Vessel Internals (RVI)

	SLRA Sections Addressing GALL-SLR Recommendations
IASCC of reactor internals and primary system components	3.1.2.2.12 Cracking Due to Irradiation-Assisted Stress Corrosion Cracking 4.2.1.2 Reactor Vessel Internals Neutron Fluence Analyses 4.2.14 First License Renewal Application Core Shroud IASCC and Embrittlement Analysis A.2.1.7 BWR Vessel Internals A.3.1.2 Neutron Fluence Monitoring

- IASCC is addressed in accordance with BWRVIP guidelines through:
  - ✓ periodic inspection using techniques capable of detecting cracking due to SCC
  - ✓ flaw tolerance guidance that considers the effect of neutron fluence on material properties and SCC growth rates.
- BWRVIP guidelines are adequate for use to determine the proper re-inspection interval and are not time dependent, rather are based on neutron fluence values.
- PBAPS Rx vessel internals have been assessed using governing BWRVIP inspection guidelines and existing program requirements were found acceptable
- PBAPS will manage RVI components and welds that are susceptible to IASCC consistent with GALL-SLR AMP XI.M9

Concrete and Containment Degradation

	SLRA Sections Addressing GALL-SLR Recommendations
Concrete and containment degradation	3.5.2.2.1 Pressurized Water Reactor and Boiling Water Reactor Containments 3.5.2.2.2 Safety-Related and Other Structures and Component Supports 4.6 Primary Containment Fatigue Analyses A.2.1.30 ASME Section XI, Subsection IWE A.2.1.32 10 CFR Part 50, Appendix J A.2.1.34 Structures Monitoring A.2.1.35 Inspection of Water-Control Structures Associated with Nuclear Power Plants

- Concrete overall is in good condition
  - ✓ No effects of ASR have been identified for PBAPS concrete structures
  - ✓ PBAPS will manage concrete structures consistent with GALL-SLR AMPs XI.S6, “Structures Monitoring” and XI.S7, “Inspection of Water-Control Structures Associated with Nuclear Power Plants”
- The Peach Bottom Mark I steel containments are in good condition
  - ✓ The Sand Pocket Region has been observed to be free of water leakage, each refueling outage
  - ✓ Reactor Vessel Shield Wall gamma and neutron irradiation remains within conservative radiation exposure levels, through SPEO, consistent with GALL-SLR
  - ✓ PBAPS will manage each containment consistent with GALL-SLR AMPs XI.S1, “ASME Section XI, Subsection IWE” and XI.S4, “10CFR 50, Appendix J”

Electrical Cable EQ and Condition Assessment

	SLRA Sections Addressing GALL-SLR Recommendations
Electrical cable qualification and condition assessment	3.6.2.2.1/4.4.1 Environmental Qualification of Electric Equipment A.2.1.37 through 41 Cable and Connection Insulation Programs A.3.1.3 Environmental Qualification of Electric Equipment

- Environmental Qualification of Electrical Equipment
  - ✓ EQ cable analyses have been updated for 80 years of operation
  - ✓ EQ cables have been evaluated to have a qualified life > 80 years
  - ✓ Cable analysis and EQ program are consistent with GALL-SLR

- Electrical cable condition assessment
  - ✓ Added new or enhanced programs to be consistent with GALL-SLR
    - o E1 Accessible Non-EQ Cables and Connections (enhanced)
    - o E2 Non-EQ Instrument Cables and Connections (enhanced)
    - o E3A for Medium Voltage Cables (enhanced)
    - o E3B for Instrument & Control Cables (new)
    - o E3C for Low Voltage Cables (new)

Peach Bottom Atomic Power Station, Units 2 and 3 Subsequent License Renewal Application

ACRS Subcommittee Presentation

November 5, 2019

Exelon

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Advisory Committee on Reactor Safeguards Plant License Renewal Subcommittee

Peach Bottom Atomic Power Station Units 2 and 3 Subsequent License Renewal Safety Evaluation Report (SER) with Confirmatory Item

November 5, 2019

Bennett Brady, Senior Project Manager
Office of Nuclear Reactor Regulation

Presentation Outline

- Overview of Safety Review of Peach Bottom SLRA
- SER Section 2, Scoping and Screening Review
- SER Section 3, Aging Management Review
- SER Section 4, Time-Limited Aging Analyses
- Closure of Confirmatory Item
- Specific Areas of Review – Reactor Vessel and Internals, Irradiated Concrete, and Electrical Cables
- SLRA Review Conclusion
- Region Presentation on Inspections and Plant Material Conditions
- Region Conclusion
- Summary Conclusion

Overview of Safety Review of Peach Bottom SLRA

Unit	Initial License	Initial License Renewal Application	Renewed License	Expiration Date	Subsequent License Renewal Application
2	10/25/1973	07/02/2001	05/07/2003	08/08/2033	07/10/2018
3	07/02/1974	07/02/2001	05/07/2003	07/02/2034	07/10/2018

- Application Submitted – July 10, 2018
- Acceptance Determination – September 6, 2018
- Safety Evaluation Report with Confirmatory Item – October 7, 2019

Audits and Inspections

	Dates	Location
Operating Experience Audit	September 17-27, 2018	Rockville, MD
In-office Audit	November 13, 2018 - April 29, 2019	Rockville, MD

SER Overview

- **SER with Confirmatory Item Issued October 7, 2019**
  - Confirmatory Item (CI) 3.0.3.2.3-1 BWR Vessel Internals
- **Requests for Additional Information (RAIs)**
  - 48 RAIs issued, 4 of which were follow-up RAIs

SER Section 2

Structures and Components Subject to Aging Management Review (AMR)

- Section 2.1 Scoping and Screening Methodology
- Section 2.2 Plant Level Scoping Results
- Sections 2.3, 2.4, 2.5, Scoping and Screening Results

SER Section 3

Aging Management Review (AMR)

- Section 3.0 Use of the Generic Aging Lessons Learned Report
- Section 3.1 Reactor Vessel, Internals, and Reactor Coolant System
- Section 3.2 Engineered Safety Features
- Section 3.3 Auxiliary Systems
- Section 3.4 Steam and Power Conversion Systems
- Section 3.5 Containment, Structures and Component Supports
- Section 3.6 Electrical and Instrumentation and Control Commodities

SER Section 3

3.0.3 - Aging Management Programs (AMPs)

SLRA - Original Disposition of AMPs	SER - Final Disposition of AMPs
• 11 new GALL programs – 8 consistent – 3 consistent with enhancements • 35 existing GALL programs - 8 consistent - 27 consistent with enhancements/exceptions • 1 plant-specific with enhancement	• 11 new GALL programs – 8 consistent – 3 consistent with enhancements • 35 existing GALL programs - 8 consistent - 27 consistent with enhancements/exceptions • 1 plant-specific with enhancement evaluated against Appendix A1 of the SRP-SLR

SER Section 4

Time-Limited Aging Analyses (TLAAs)

- 4.1 Identification of TLAAs
- 4.2 Reactor Vessel and Internals Neutron Embrittlement Analyses
- 4.3 Metal Fatigue Analyses
- 4.4 Environmental Qualification of Electric Equipment
- 4.5 Concrete Containment Tendon Prestress Analysis
- 4.6 Primary Containment Fatigue Analysis
- 4.7 Other Plant-Specific TLAAs

Confirmatory Item 3.0.3.2.3-1 BWR Vessel Internals

Issue: SLRA, AMP B.2.1.7 “BWR Vessel Internals” proposed to either:

- install core plate wedges or
- submit for NRC approval an inspection plan for the core plate rim hold-down bolts to mitigate stress corrosion cracking.

Staff determined the second option - a future inspection plan - does not provide sufficient information for the staff’s evaluation.

Resolution: Applicant enhances AMP B.2.1.7, in accordance with BWRVIP-25, Revision 1, to:

- install wedges or
- inspect core plate rim hold-down bolts, or
- demonstrate instead via analysis that the installation of wedges and inspections of the core plate rim hold-down bolts are not required.

The staff determined each of the three proposed options was acceptable.

Specific Areas of SLRA Review

- Reactor Pressure Vessel Neutron Embrittlement
- Reactor Vessel Internals – Irradiation-Assisted Stress Corrosion Cracking
- Irradiated Concrete and Containment
- Electrical Cable Qualification and Condition Assessment

RPV Neutron Embrittlement at High Fluence

- Neutron fluence of PBAPS Units 2 and 3 at 80 years estimated at 2.23×10^{18} n/cm^2
  - Not considered "high fluence"
- Reactor Vessel Material Surveillance Program (B.2.1.20) enhancement
  - Unit 2: withdraw 120 degree capsule (reconstituted specimens) at 60-62 EFPY
  - Unit 3: withdraw 120 degree capsule at 60-62 EFPY
- Evaluation of time-limited aging analyses in SLRA Section 4.2
  - Implements Regulatory Guide 1.99, Revision 2, including consideration of surveillance program data

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Reactor Internals Irradiation-Assisted Stress Corrosion Cracking (IASCC)

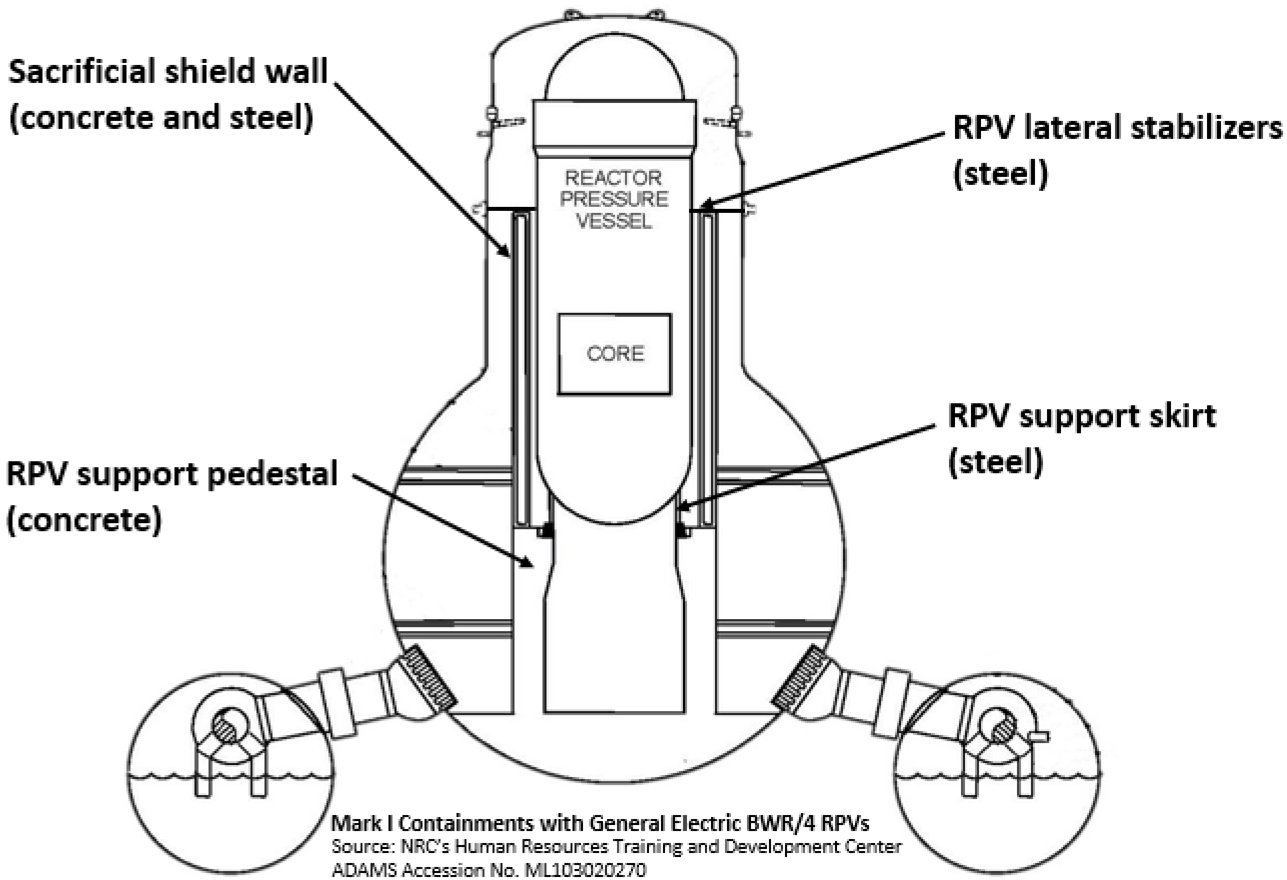
- IASCC of reactor vessel internals managed by:
  - BWR Vessel Internals program (B.2.1.7)
  - VT-1 and EVT-1 examinations to detect cracks
  - Water Chemistry program (B.2.1.2)

- SLRA Section 4.2.14 Core Shroud IASCC and Embrittlement Analysis
  - License renewal application (for 60 years) Section 4.3.2.2 identified a threshold value of 5.0E+20 n/cm^2 (E > 1 MeV) for IASCC and embrittlement
  - Fluence for core shroud and top guide projected to exceed this value for 80 years
  - Dispositioned in accordance with 10 CFR 54.21(c)(1)(iii)
  - Inspections of core shroud (BWRVIP-76-R1-A) and top guide (BWRVIP-26-A)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Irradiation of Concrete and Steel

Components of Interest



Mark I Containments with General Electric BWR/4 RPVs
Source: NRC's Human Resources Training and Development Center
ADAMS Accession No. ML103020270

Irradiation of Concrete and Steel

Concrete

- The shield wall concrete provides radiation shielding and only the lower 10 ft of the wall concrete performs a structural function
- SRP-SLR thresholds are not exceeded at the peak location
- A plant-specific program is not needed

Steel

- Used NUREG-1509 transition temperature approach
- 80-yr nil-ductility transition temperature (NDTT) is less than the lowest service temperature (LST) of 100° F
- Loss of fracture toughness is not an aging effect that needs to be managed for the RPV structural steel component supports

Electrical Cable Qualification and Condition Assessment

- Peach Bottom has installed the Smartcover™ system on electrical cable manholes to monitor water accumulation:
  - Float-less transmitter design for level monitoring and alarm
  - Self-monitoring capability
  - Alarms are generated to alert operators if high water level is sensed or a malfunction occurs
  - Staff accepted five-year inspection frequency as an exception for annual inspection per GALL-SLR
- EQ qualified cables are covered under the EQ program per 10 CFR 50.49
  - Exelon used the provisions of re-analysis per 10 CFR 50.49 to monitor and extend the qualified life of the cables
  - The staff audited the re-analysis methods and calculations and confirmed consistency with current rules and guidelines

SLRA Review Conclusion

- On the basis of its review of the SLRA and the resolution of the confirmatory item, the staff determined that the requirements of 10 CFR 54.29(a) have been met for the subsequent license renewal of Peach Bottom Atomic Power Station Units 2 and 3.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Region I
AMP Inspections

License Renewal Inspection Program for Period of Extended Operations

Inspection	Dates	Results
U2 IP 71003 Phase 1	4Q 2012 ML13029A013	No Findings
U3 IP 71003 Phase 1	Not performed	N/A
U2 IP 71003 Phase 2	March 2013 ML13071A608	No Findings
U3 IP71003 Modified Phase 2	4Q 2014 ML14121A474	No Findings
U2 and U3 IP71003 Phase 4	4Q 2018 ML18355A401	No Findings

Region I
AMP Inspections

AMPs Reviewed During 71004 Phase 4 Inspection

- Flow Accelerated Corrosion Program (existing)
- Maintenance Rule Structural Monitoring Program (existing)
- Ventilation System Inspection and Testing Activities (enhanced)
- Outdoor, Buried and Submerged Component Inspection Activities (enhanced)
- Fire Protection Activities (enhanced)
- In-accessible Medium Voltage Cables not subject to 10 CFR 50.49 Environmental Qualification Requirements (New)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Region I AMP Inspections

ROP Baseline Inspections

Inspection	Date	Age Management Program
IP71111.08 ISI	Annually alternate units	Reactor Pressure Vessel and Internals ISI Program
IP71111.07T Heat Sink	2013, 2016, 2019	GL 89-13 Activities Heat Exchanger Inspection Activities
IP71111.21M DBAI	4Q 2017	Ensure the selected SSCs that are subject (operating in the post-40-year licensing period) to aging management review pursuant to 10 CFR Part 54 are being managed for aging in accordance with appropriate aging management programs.
<u>IP71152 PI&R Sample</u> The structural monitoring program did not match the procedural requirements for all elements	1Q 2018	Maintenance Rule Structural Monitoring Program
<u>IP71152 PI&R Sample</u> Review of Unit 2 Torus Coating Defects	4Q 2015	Torus Water Chemistry
<u>IP71152 PI&R Sample</u> Cable reliability program	2Q 2018	Inaccessible Medium-Voltage Cables not subject to 10 CFR 50.49 Environmental Qualification Requirements
<u>IP71152 PI&R Sample</u> External flood seal	4Q 2018	Maintenance Rule Structural Monitoring Program
<u>IP71152 PI&R Sample</u> U-3, Static O-Ring Pressure Switch Failure	2Q 2019	10 CFR 50.49 Environmental Qualification Requirements

Region I
AMP Inspections

Resident Inspector Insight and Inspection Results

- No findings from License Renewal Program inspections and the AMPs being appropriately implemented
- Green NCV of 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Action,” involving Exelon’s E-1 EDG underground cable failure
- Green NCV of 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” involving High Pressure Coolant Injection (HPCI) System Exhaust Pressure Switches Exceeded Documented Qualified Life

Region Conclusion

- Regional Inspections

The inspectors found the aging management programs were being implemented in accordance with the license condition. The region will continue to monitor AMPs using the baseline Reactor Oversight Process.

United States Nuclear Regulatory Commission
Protecting People and the Environment

Summary Conclusion

- Completes the staff's presentation on the safety review of the Peach Bottom SLRA as documented in the Safety Evaluation Report with Confirmatory Item and the Region I presentation on inspections and plant material conditions
- Additional questions