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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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FUELS, MATERIALS, AND STRUCTURES SUBCOMMITTEE

and

PLANT OPERATIONS, RADIATION PROTECTION, AND FIRE PROTECTION SUBCOMMITTEE

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JOINT MEETING ON SEABROOK ALKALI-SILICA REACTION (ASR) ISSUE

+ + + + +

WEDNESDAY

APRIL 27, 2022

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The Subcommittees met via Video-Teleconference, at 8:30 a.m. EST, Ronald G. Ballinger and Gregory H. Halnon, Co-Chairs, presiding.

COMMITTEE MEMBERS:

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STEVE SCHULTZ

DESIGNATED FEDERAL OFFICIAL:
KENT HOWARD

NRC STAFF PRESENT:
NIKLAS FLOYD
MEL GRAY
BRYCE LEHMAN
CHRISTOPHER NEWPORT
JUSTIN POOLE
GEORGE THOMAS
MATT YOUNG

C-O-N-T-E-N-T-S

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

8:31 a.m.

CO-CHAIR BALLINGER: The meeting will now come to order, my name is Ron Ballinger, and I am the subcommittee chairman of the Fuel Materials and Structures Subcommittee. Co-chairing this meeting with me is Greg Halnon, the subcommittee chairman for the Plant Operations Radiation Protection and Fire Protection Subcommittee. This information briefing is part of the ongoing committee oversight of the alkali-silica reaction phenomena at the Seabrook Unit One Station.

The ACRS has previously evaluated the effective ASR at Seabrook as part of NextEra Energy's license renewal application. In our letter on this subject, we provided the following conclusions. One, NextEra license amendment request 1603 establishes a robust analytical methodology supported by a comprehensive large scale test program for the treatment, and monitoring of alkali-silica reaction affected seismic category one structures at Seabrook.

Two, the NextEra license renewal application includes two new aging management programs to monitor ASR, and building deformation. These incorporate the test program results, and license

amendment request methodology, and assure that the effects of alkali-silica reaction will be effectively tracked, and evaluated through the end of the license renewal application period of extended operation.

Three, the staff safety evaluations of the license amendment requests, and alkali-silica reaction aging management programs in the license renewal application provide thorough assessments, and findings. We agree with the staff's conclusion that NextEra's programs are acceptable. With respect to conclusion number two, the applicant committed to an extensive inspection program to ensure that requirements specified in the license renewal are met.

Among these are quote monitoring of building deformation includes measurement of seismic gaps, and other key dimensions to identify, and trend building deformation, and inspections to identify the impact of building deformation on plant components. During a recent periodic inspection, the staff issued a green finding related to the ASR inspection, and monitoring program.

And I quote, the NRC inspectors identified a green finding associated with NextEra's procedure ENAA2031001 revision 37, operability, determinations, functionality assessments. Because NextEra's staff

did not adequately account for the future progression of ASR, IE time dependent mechanism in their POD for several Seabrook structures.

Specifically NextEra staff did not trend, and project the periodic threshold monitoring data for the effected structural elements to ensure the structures would remain capable of performing their safety functions to the next scheduled inspection. The Plant Operations Radiation Protection and Fire Protection Subcommittee is therefore interested in ASR monitoring program performance, as well as any changes in updates that may be put in place in light of the findings.

Based on these inspection results, the committee decided to hold a joint subcommittee meeting of the Fuel Materials and Structures Subcommittee, and Plant Operations Radiation Protection and Fire Protection subcommittees. The purpose of this information briefing is for the NRC Region I, and Headquarters staff to brief the joint subcommittee on the findings, and subsequent NRC staff actions.

Interested members of the public will have an opportunity to make statements in accordance with the published agenda. We are aware that a member of the public representing the public interest group C-10

desires to make a public statement. Let me get to that agenda item. ACRS members in attendance are myself, Vicki Bier, Charles Brown, I have to go through this thing.

Dave Petti, Greg Halnon of course, Jose March-Leuba, Walt Kirchner, it keeps jumping around. Joy Rempe, our consultant Steve Shultz, Matt Sunseri, Vesna Dimitrijevic, and that probably does it, and that probably means everybody. During today's -- Kent Howard by the way, of the ACRS staff is the designated federal officer for this meeting. During today's meeting, the joint committee will gather information, analyze relevant issues, and facts, and formulate proposed positions and actions as appropriate.

However, at the subcommittee's discretion, any matters will be considered for presentation to the full committee if necessary as the members see fit. The ACRS was established by statute, and is governed by the Federal Advisory Committee Act, FACA. The committee only speaks through its published letter reports. Because this is a subcommittee meeting, participants should consider entered remarks by ACRS members as their personal comments, and not committee positions.

We hold subcommittee meetings to gather

information, and perform preparatory work that will support our deliberations at a full committee meeting if necessary. The rules for participation in all ACRS meetings, including today's, were announced previously in the Federal Register, and included on our website. The ACRS section of the U.S. NRC public website provides our charter, bylaws, agendas, letter reports, and transcripts of all full, and subcommittee meetings, including presented material.

As stated on the website, members of the public who desire to provide written or oral input to the subcommittee may do so, and should contact the designated federal officer, which in this case would be Kent Howard, prior to the meeting as practicable. Today's meeting is open to public attendance, and there will be time set aside during the meeting for comments from members of the public attending, and listening to our meetings.

Today's meeting is being held over Microsoft Teams for ACRS, NRC attendees, and members of the public. There is also a call in number allowing participation of the public to connect to the Teams session. This information is indicated on the published agenda. A transcript of today's meeting is being kept, therefore we request that meeting

participants not on the agenda identify themselves when they are asked to speak.

And to speak with sufficient clarity, and volume so that they can be readily heard. Before we continue, I'd like to invite Greg Halnon to add any additional comments he would like to make, Greg, are you there?

CO-CHAIR HALNON: Yeah Ron, thanks. As you stated, the plant ops subcommittee is interested in the performance, and inspections of the programmatic aspects of the ASR at Seabrook. So given the recent documentation of inspection results, we will discuss some of the facts surrounding the issues found during the inspections, and we look forward to a good interaction. So thanks Ron, back to you.

CO-CHAIR BALLINGER: Okay. At this time I'll ask the attendees to put their devices on mute to minimize disruptions, and unmute only when speaking, and via the magic of Teams we have this little thing that raises a hand. So at the end of this meeting when we start having a discussion, and having public comments, my guess is that's a good way to acknowledge people without having people talking over each other.

So are there any members of the subcommittee that wish to make an additional comment

before we begin? Okay, not hearing, and adhering to the five second rule, I'll call on Mel Gray, the Engineering Branch One chief, Division of Operating Reactor Safety Region I to take it away.

MR. GRAY: Good morning, just a sound check, can you hear me chairman?

CO-CHAIR BALLINGER: I can hear you fine.

MR. GRAY: Great, thank you. Good morning, thank you chairman, and subcommittee members for the opportunity to speak with you today. My name is Mel Gray, I'm branch chief of Engineering Branch One in the NRC's Region I Office outside of Philadelphia. We are here to present the results of our inspections, and oversight of the Seabrook station related to the plant owner's performance to monitor, manage, and correct the effects of ASR, and structures at the Seabrook plant.

The plant owner is NextEra Corporation. When we last met, as was described by the chairman, and to my recollection on this topic, it was October 2018. The NRC staff was completing a multi-year review of a proposed methodology by NextEra to address ASR at the Seabrook plant. At that time, licensing audits, and reviews were at the forefront.

With inspections being completed to inform

our reviews, and ensure Seabrook structures remained capable of performing their safety functions in the interim. Now that the NRC has issued a license amendment, a renewed license, and license conditions that require the use of that methodology, and monitoring program inspection is indeed at the forefront.

We expect NextEra's performance frequently to verify they're implementing the NRC's approved monitoring, and methodology processes, and meeting the important corresponding license conditions. As you will hear, we have identified some gaps in NextEra performance to implement the methodology. But we find the methodology remains sound to provide for the assessment of the effects of ASR.

And to drive corrective actions to maintain the capability of Seabrook structures. The technical staff from the Office of Nuclear Reactor Regulation, or NRR, continue to work closely with my Region I inspectors to ensure our safety requirements are met. The resident inspectors, as you know, serve as the eyes, and ears at the plant to identify ASR related activities.

Important for inspection, they review corrective action items daily, they do independent

plant walk downs, observe meetings, interact with staff, and they are our sounding board to frequently vet what inspections we should focus on. My staff work closely with the resident inspectors, my staff has specialties in materials engineering, and in service examinations.

And we accompany the resident inspectors, assist them, or lead inspections, and additionally, and finally you'll find that we pull in very frequently, the structural engineers from NRR that were intimately involved in reviewing the methodology over the years so that we have a robust staff knowledgeable that can readily, and ably examine NextEra's performance.

Which leads me to the next slide, Matt Young is a branch chief, he's flipping slides, thank you Matt. That leads me to the NRC presenters. We have Justin Poole, he's a project manager out of the Division of Operator Reactor Licensing. Justin is responsible for all licensing actions related to the Seabrook station. We have Bryce Lehman, structural engineer out of the Division of Engineering and External Hazards.

Bryce was intimately involved in reviewing the monitoring, and frequently accompanies us on site

for in depth inspections. Nik Floyd is out of Engineering Region I out of my branch, Nik is a specialist in materials, and engineering inspections. And finally we have Chris Newport speaking, Chris is the senior resident inspector at Seabrook, and the resident inspector, Travis Daun is here.

They are very knowledgeable in the requirements, and focused on this aspect of Seabrook's performance. I would also add we have George Thomas, a senior civil engineer, also from the Division of Engineering and External Hazards available today, and he also accompanies us on many inspections. Chairman, we can take questions any time, but I'll continue unless I hear.

So next slide please. The NRC staff presentation, we intend, we decided to do a quick move smartly through the background just to benchmark ASR, subcommittee members if need be, and stakeholders, and attendants, we can move quickly through that, we'll take our cue from the subcommittee members. We then intend to go through the approach to addressing ASR, just to refresh that.

It has a number of important aspects, and then we want to discuss our findings we've had in the last year related to ASR, and NextEra's performance,

and we have certainly the right folks here that are presenting, the actual folks who did the inspection, and I was on site to oversee those inspections. So I hope that meets the needs of the subcommittee, and with that I would go to the next slide.

With that, I'll turn it over to Mr. Justin Poole, unless there are questions. Maybe the five second rule. Okay, thank you.

MR. POOLE: Thanks Mel. So as Mel stated in the agenda, the staff will begin our presentation with some background materials that will allow, for those less familiar with ASR, specifically ASR at Seabrook, to get up to speed before we get into what has been identified through the inspection process. So for those that are very familiar with the background, please bear with us as we get to that point.

So let's start with what is ASR, or alkali-silica reaction. ASR is a type of chemical reaction that occurs in concrete. Concrete consists of three main ingredients, coarse aggregate, rocks such as gravel, fine aggregate, sand, and then cement, the binder that holds it all together. When combined with moisture, moisture reactive silica present in the aggregate reacts with the hydroxyl ions, and the

alkali ions in the cement.

The reaction produces an alkali-silica gel that expands as it absorbs moisture, resulting in micro-cracking in the concrete. In order for the reaction to occur, all three of the following conditions must be present. Reactive forms of silica in the concrete aggregate, high alkali cement pour solution, and adequate moisture, typically around 80 percent or higher relative humidity.

ASR is confirmed by what is known as petrographic analysis of concrete core samples. Next slide please. The gel expansion starts off as micro-cracking, and can later be observed as macro-cracking on the surface. The visual appearance is typically in the form of what is known as pattern cracking, or map cracking, where you may see deposits in the crack, and gel staining around the cracks.

The expansion cracking of concrete from ASR can potentially impact both structural capacity, IE the load carrying capacity for critical limit states, and the demand, IE load due to internal, and, or external restraint to expansion on a structure. Please note ASR is not new. While Seabrook is the only known nuclear plant in the United States to have identified ASR, there is lots of experience with ASR

in other industries.

The federal highway and transportation authority, IE the Department of Transportation, both federal, and state, have extensive experience with ASR in transportation infrastructure, but the concrete design of their structures, and the structures found at nuclear power plants are not the same. Next slide please. Now that we've talked ASR in general, let's move on to ASR at Seabrook.

In 2009, while preparing their submission of a license renewal application for Seabrook, NextEra identified that the aggressiveness of the groundwater chemistry (audio interference).

CO-CHAIR BALLINGER: I'm not sure why that's happening, but it's now stopped, so I guess we're okay.

MR. POOLE: Okay. The aggressiveness of the groundwater chemistry, and Seabrook concrete structures in contact with the groundwater needed to be determined. Therefore, testing was performed, and in August 2010, NextEra confirmed, through petrographic analysis, the presence of ASR in concrete in below grade walls of several category one structures.

As the codes of record in the Seabrook

licensing basis at that time did not account for ASR, NextEra then initiated a prompt operability determination to assess the safety significance of the issue, and the basis for continued operation. NextEra identified several causes for the ASR issue, and several reasons for why it was not identified until the license renewal review.

One cause was that the concrete mix for the initial construction unknowingly utilized an ASR susceptible aggregate, this was because the --

MEMBER BLEY: Justin?

MR. POOLE: Yes.

MEMBER BLEY: This is Dennis Bley, you said this all in below grade concrete I think, I don't believe I remember that from previous presentations here. Is that because of that's the source of moisture down there, or can you explain that at all?

MR. POOLE: So that is true, it is not currently -- it is currently more than just below grade structures, but it was first identified in below grade structures back in 2010.

MEMBER BLEY: Okay, but it's showing up elsewhere?

MR. POOLE: Correct.

MEMBER BLEY: Okay, thanks.

MR. POOLE: So one cause was the concrete mix for the initial construction unknowingly utilized an ASR susceptible aggregate. This was because the ASTM standard screening test approved, and used at that time have since been determined to have limited ability to predict slow reacting aggregates for ASR. Because of this, NextEra mistakenly assumed that its original cement, and aggregate selection would preclude ASR development.

And therefore did not initially consider that the observed cracking could be from ASR. Instead, NextEra initially characterized this cracking as shrinkage. Please note, new ASTM test standards have since been developed that now detects this type of slow reacting aggregate. Next slide please. NextEra concluded from its extended condition review, and prompt operability determination, that from a regulatory standpoint, the affected structures were operable, but degraded, and non-conforming.

The operability determinations were based on material properties, and margin. Regional inspectors and headquarters experts, that you heard Mel describe earlier, reviewed the operability determinations and concluded that ASR-affected structures remain capable of performing their safety

functions. The NRC issued a confirmatory action letter in May 2012 to confirm NextEra's actions to address ASR.

In the same year, NRC also issued a deviation memo, which allowed the region to increase the amount of oversight beyond the typical inspection activities you would normally see at a nuclear power plant. I'll now turn the presentation over to Bryce Lehman. Next slide please.

CO-CHAIR BALLINGER: Excuse me, this is Ron Ballinger.

MR. POOLE: Yes.

CO-CHAIR BALLINGER: I am remiss in identifying that Dennis Bley, our consultant, is also a member of this meeting. So if I've missed any other members, or consultants, please let me know. Thank you, go ahead.

MR. LEHMAN: All right, thanks Justin, and good morning everyone. My name is Bryce Lehman, and as Mel said, I was one of the reviewers of the license amendment request, and I'm now going to provide an overview of the steps that NextEra took to address ASR, and how the staff reviewed the resulting license amendment request. To resolve the open operability determinations, NextEra chose to perform a large scale

test program at the University of Texas in Austin.

The program lasted from 2013, to 2016. The goal of the testing was to better understand ASR's impact on the load carrying capacity of affected structures. The test specimens were designed to replicate the reinforced concrete walls at Seabrook. Basically, the test was developed to determine how much ASR could occur in a structure before impacting its strength, and to determine the best way to measure, and track ASR progression at Seabrook.

During the test program, the NRC conducted several audits, and inspections at the test facility which were focused on assuring quality assurance test standards were followed. This was especially important knowing that the test results would be used to update Seabrook's current licensing basis as part of a future license amendment.

MEMBER BROWN: This is Charlie Brown, can I ask a question on that slide?

MR. LEHMAN: Sure.

MEMBER BROWN: The test specimens, when did Seabrook go critical, what year? How long ago? They're in their first license renewal right now, isn't that correct?

MR. LEHMAN: Mid 90s I believe, I'm not

positive.

MEMBER BROWN: Okay, I guess my question is if they went in mid 90s, and they developed these test specimens, how did they account for the aging of the structure over the 20, or 25 year period before they actually developed these test sections?

MR. LEHMAN: Great question. The test specimens, they accelerated ASR in the test specimens by using reactive fine aggregate, and additives to the mix. I think the mix design's proprietary, but they basically accelerated ASR to make sure that they got expansions that would mimic, or bound what they were seeing at Seabrook at the time.

MEMBER BROWN: So the aggregate that they used had greater quantities of the susceptible aggregate?

MR. LEHMAN: Yeah, that's correct. I believe, and maybe George Thomas can correct me if I'm wrong, but the coarse aggregate was the same as Seabrook, it's the fines that they used that were more reactive. And they also added additives that would accelerate the reaction.

MEMBER BROWN: Okay, so it's not exactly the same, but it's the best they could do in terms of trying to replicate the circumstances?

MR. LEHMAN: Correct, as close as reasonably possible.

MEMBER BROWN: Okay, thank you.

CO-CHAIR BALLINGER: This is Ron Ballinger, I would add that while Seabrook went critical in the 90s, I guess that's true, the construction period was much, much longer than that. And so this concrete had been in place for a lot longer than the 90s.

MEMBER BROWN: Good point, thank you very much Ron.

MR. LEHMAN: I would just add that obviously when studying ASR, it's very slow reacting. So when you study it in a lab, it's very common to accelerate it like this, otherwise it would be impossible to get useful data in a reasonable amount of time. So what NextEra did is not uncommon.

CO-CHAIR HALNON: This is Greg, the operating license was 1990, just for reference. And that was one of my questions Bryce, you can accelerate this so that the test specimens are representative, where are we with that right now? Are they still monitoring them, or is the test program complete?

MR. LEHMAN: Yeah, the test program was completed in 2016, so it's -- there's no more

expansion, they're done with the test program.

CO-CHAIR HALNON: Okay, thank you.

MR. LEHMAN: And we'll talk some more as we go, how the limits were developed from that, and where Seabrook is in relation to that.

CO-CHAIR BALLINGER: This is Ron Ballinger once again. I would add that NIST had, or has maybe, a pretty extensive program on ASR, and concrete deformation, and the committee, or subcommittee actually visited, and observed that program in past years.

MR. LEHMAN: Yeah, that's correct, and if we get into more detailed questions about that test program, I think we've got Jose Pires from research that could possibly answer some of those questions. But that's kind of not specific to what was happening at Seabrook.

CO-CHAIR BALLINGER: Thanks.

MR. LEHMAN: All right, so I'm going to move on to the next slide. The test program results showed no reduction in structural capacity up to the expansion levels that were tested in the program. So based on that, NextEra determined that the original design code equations and the original material properties could be used to determine the structural

capacity of the impacted structures as long as the Seabrook expansion remained below the tested levels.

The test program also showed that expansion plateaued in the X Y direction, or the surface of the walls due to the reinforcement in that direction, and then continued in the through-wall direction, which lacks reinforcement. Based on that, it was determined that expansion, specifically through-wall expansion was the best parameter for tracking ASR progression.

In order to implement this tracking approach, it was necessary to determine the existing through-wall expansion of Seabrook structures at the time when extensometers would be installed in the wall, and the extensometers are the measuring tool that they use to measure expansion in that through-wall direction. So to know the full expansion, obviously you need to know how much occurred before the instrument was installed.

Using the results of the test program, NextEra developed a correlation between the measured modulus of elasticity, and the through-wall expansion that had occurred to date. The expansion limits, and monitoring techniques were incorporated into Seabrook's current licensing basis via a license

amendment. If the structures go outside these limits, it does not necessarily mean that they've made a firm safety limit.

But just that they've gone outside the boundaries of the test program, and what was tested during that program. Seabrook would need to reanalyze the structures, and demonstrate operability if they do go outside those limits. It sounded like there's a question?

CO-CHAIR HALNON: Just real quick, this is Greg Halnon. What was the NRC's involvement during the test program?

MR. LEHMAN: We, NRR, or Headquarters staff audited the program, and regional staff were inspecting the program. So we were involved in the program, mainly with the focus on quality assurance to make sure that whatever results they got from the program, we would be comfortable with them using in the future license amendment request.

CO-CHAIR HALNON: Okay, did you guys do any confirmatory analysis, or did you just kind of stay lock in step with them through the process?

MR. LEHMAN: It was mainly following along with them, and seeing the results as they provided them. We didn't want to sort of influence the way

they were going with their research.

CO-CHAIR HALNON: Thank you.

MR. GRAY: This is Mel Gray, hey Matt, if you go back to the previous slide. On the right there -- Mel Gray, my staff at the time, we were on site, that's Nik Floyd out of Region I, and Angie Buford out of NRR there. We were on site, our focus at that time was to ensure they were following safety related type levels of quality assurance with independence between the organizations testing and developing the materials.

Mixing it, and that the results were to that standard. So that was our focus, we did not -- Seabrook is responsible for developing the basis for their licensing actions they proposed to us, but our role was we wanted to ensure that the outcomes were to standards that were appropriate. Does that help? I'll go back on mute.

CO-CHAIR HALNON: Thank you Mel, it does.

MR. LEHMAN: Yeah, thanks Mel, and thanks for pointing that out, sorry I didn't call out the staff there, but in the picture, those are NRC staff. Okay I think we can go to slide ten I believe. Yeah, one more, perfect. So the previous two slides that we've discussed covered how Seabrook addressed ASR's

impact on the material properties of concrete, or the capacity of the concrete.

Well, the next couple slides discuss building deformation due to ASR, and how it impacts the demand, or the loads on a structure. So during routine walk downs in 2014, and 15, NRC resident inspectors observed degraded seismic, and fire seals that appeared to have been caused by differential movement between the buildings, and it wasn't specifically these, but you can kind of see some differential movement there in the pictures.

And it was determined that ASR had caused this movement through cumulative expansion in ASR affected structures, as well as from expanding structures pushing on adjacent structures. So many structures at Seabrook are surrounded by concrete back fill, which obviously used the same aggregate as the rest of the concrete, so it's also susceptible to ASR, and could expand, and apply additional loads to the structures.

And this can kind of complicate things at Seabrook, because there can be cases where the visible structures themselves aren't experiencing any ASR, but there's still some movement due to the backfill expanding, and pushing on those structures. So the

large scale test program did not address how building deformation would affect the ability of structures to perform their intended functions.

Therefore NextEra developed an additional program called the building deformation monitoring program to manage this deformation effect. The program includes a methodology for evaluating ASR affected structures, and the methodology was incorporated into NextEra's license amendment request. So, as I said, the deformation adds additional loads, and you can see there in the photos, it can impact attached equipment obviously.

The top photo shows deformed flexible conduit couplings, and the bottom photo shows deformed instrument air piping. Next slide please. NextEra developed a three stage analysis methodology to address the ASR load, and associated building deformations along with the original design loads. The methodology uses field measurements to estimate the ASR load both in the structure itself, and in the surrounding concrete backfill.

And then applies that load to the structure, as if it were a design load. The field measurements become more detailed in order to better capture the ASR load as the analysis stage progresses.

The analysis identifies quantitative acceptance criteria in the form of monitoring parameters, and limits that demonstrate the capacity is greater than the demand, including the ASR loads.

These parameters are then monitored against corresponding limits moving forward. If a structure approaches, or exceeds the limit, it is entered into the corrective action program, and may be reevaluated with a higher stage analysis, or structural modifications may be implemented to add additional margin, and I think we'll show some examples of that later in the presentation.

A detailed description of how to implement this methodology was captured in the license amendment, and eventually was incorporated into Seabrook's structures monitoring program. Next slide please. So this slide summarizes some of the licensing actions that are associated with ASR at Seabrook. As stated earlier, ASR degradation was not addressed in the Seabrook licensing basis.

So to address this, NextEra submitted an LAR to incorporate the expansion limits, and to get approval of the methodology to analyze structures. NextEra also updated their license renewal application to include activities to manage the effects of ASR

related aging of structures. The revisions were based on the test results, and the ASR methodology provided in the Lar.

Following an extensive review, the NRC approved the license amendment, followed by the renewed license in March of 2019. This review included peer reviews from other offices in the NRC, use of expert contractors from a national lab, as well as reviews by ACRS, and adjudication by the Atomic Licensing and Safety Board.

Next slide please. Just here I'll probably go into a little bit of what the staff reviewed, obviously very high level, but the staff's review, and approval of NextEra's approach focused on three main parts. Part one was the original large scale test program, which is sort of the foundation of NextEra's approach, and allows Seabrook to use the original design equations, and material properties for impacted structures.

Again, as long as the expansion behavior remains below the limits, and the expansion behavior is similar to that seen in the test program. The staff found it reasonable to apply the test results to Seabrook based on the similarity of the test specimens to Seabrook structures, along with future confirmatory

actions to verify that Seabrook structures would expand in a similar fashion as the test specimens.

Part two of the review focused on the methodology for evaluating ASR affected structures. The staff found that NextEra's methodology was acceptable, because it is consistent with Seabrook's code of record design philosophy. The approach for estimating the ASR load is reasonable, and it's based on actual measured field data. The load is incorporated into the existing load combinations with reasonable load factors.

The methodology accounts for future ASR expansion that can be accommodated by a structure, and identifies quantitative acceptance criteria that can be measured to ensure the structures remain within the bounds of the analysis. Part three of the review focused on the programs developed to monitor impacted structures moving forward. These included programs to monitor the ASR, building deformation, and impacted equipment.

ASR monitoring begins with visual inspections of all the structures, and changes to expansion measurements once ASR is identified, and expansion has progressed to predetermined thresholds, which were based on the large scale testing. The

building deformation program inspects against the threshold monitoring parameters that have been identified by structural evaluations.

These parameters are dependent on the structure, and the analysis, and are different for each structure. Examples of possible parameters include expansion measurements, seismic gap measurements, crack measurements, or measurements of the distances between walls. The staff found that monitoring programs were acceptable because they included reasonable inspection methods, and inspection intervals have become more conservative as ASR progresses, and margin decreases.

In addition, quantitative acceptance criteria are developed for each structure. Next slide please. Here, two examples of the various monitoring parameters used at Seabrook, and the tools that are used to measure expansion. You can see the picture on the top left is an example of pin to pin measurement location, where the licensee tracks expansion in the X Y direction.

In the top right, it just shows example of the seismic gap, and that an area like that could be monitored based on the output of the analysis if the analysis showed that that was one of the areas that

was critical, and needed to be monitored. The bottom left shows a typical example of an extensometer installed in the field. In this picture the actual extensometer is covered by a plate that protects the instrument.

But that's what it would look like in the field. And then the bottom right shows a crack gauge, which is used for monitoring specific crack locations. Next slide please. So, again, due to the importance of the test program, and ensuring that the results of the test program remain applicable to Seabrook, the NRC imposed two conditions on the license.

The first requires the licensee to assess the expansion behavior at Seabrook to ensure that it's behaving in the same fashion as the test program. In other words, that the expansion actually is plateauing in the X Y direction at a similar point as the test program, and that is continuing preferentially in the through-wall, or the Z direction.

The second condition relates to the modulus of elasticity to expansion correlation that was developed to estimate pre-instrument through-wall expansion. This requires the licensee to verify that the actual measured expansion at Seabrook aligns with the predictive expansion based on the developed

correlation. NextEra will complete the initial study no later than 2025, with a follow up study 10 years afterwards.

MEMBER BLEY: Bryce?

MR. LEHMAN: Yes.

MEMBER BLEY: Dennis Bley here. On your last slide, I think that was 14, you show the seismic gap in the upper right between buildings. And I don't know if there's anybody here that can address this, Seabrook had a rather extensive PRA performed, and included seismic PRA. Has this information been factored back into that risk assessment? And if so, what are those results showing?

MR. LEHMAN: Yeah, unfortunately I can't answer that, I don't know if anybody else on the phone can, on the call, but if not, I'll definitely take an action. It looks like we've got some takers. Mel, you're on mute.

MR. GRAY: I got it, I'm on mute there, sorry. Hey, Chris, correct me if I'm wrong, the licensee has been monitoring these, and we certainly focused on inspection space, but their approach has been to ensure that the gaps are sufficient for seismic capability design. I personally, I'm not aware that's been fed back in PRA space, Chris, do you

have anything different on that?

MR. NEWPORT: No, that's correct Mel, yeah, they don't feed the gaps into the PRA model, but they do use traditional engineering to show that those, if there are reductions in the gaps, that during that designed seismic event, that the buildings wouldn't impact each other negatively. So they don't feed into the PRA model, but they do use your standard, traditional engineering approach to evaluate anywhere where they find those gaps are reduced.

Like they would at any other plant. At other plants in the country, you sometimes see the gaps reduced for various reasons. They use the same kind of just traditional engineering encapsulation.

MEMBER BLEY: So when we're doing that, is the claim that the reduction in the gaps is such that there's no possibility of impact? Because when buildings impact, the damage is kind of uncertain what's going to happen. And I'm kind of surprised they didn't factor this back into the PRA. Chris, I was kind of asking if that traditional engineering analysis shows that there's no possibility of impact?

Or is it just that it's meeting some standard criteria, so that there might be a chance of impact?

MR. NEWPORT: Yeah, I wouldn't say there's no possibility. I would say when they do their evaluations, they look at the design safe shutdown earthquake, and they use that earthquake kind of as their line in the sand they analyze to, and they show given that earthquake there wouldn't be -- I wouldn't say there'd be no possibility of impact, I'd say there'd be no possibility of degraded performance.

The buildings wouldn't damage each other during that SSE, what they call the SSE earthquake, they don't go above that level though, they're not required to.

MEMBER BLEY: Just for reference, the design earthquake is never a big contributor to risk, because we design that out. It's the earthquakes that go beyond the design earthquakes that lead to significant damage. And it's kind of disappointing, do we know for sure that Seabrook has not included that in their Seismic PRA?

MR. NEWPORT: Let me -- we can verify that, and we can get that back to you for sure.

MEMBER BLEY: Okay, it's kind of disappointing that they haven't looked at that, because the possibility of damage, that's the only place you really look at it, is in the PRA. So well

I won't say it should have been done, there's no requirement to do it, but it would certainly seem to me to be wise.

MR. FLOYD: And I can chime in a little bit, because I've looked at the seismic gap measurements periodically during our site visits, and the areas that do have reduced gaps, they've gone through, they've performed the calculation, looked at the revised gaps needed. Because traditionally, they just develop the standard gap of two, to three inches for most of the structures.

With those specific analysis of hey, how much slower can that be, they went back, and refined that number for some of the structures, and it's not such that you won't have contact, it's such that the structures don't interact with one another. So that would be yeah, you're not going to have contact with structures, and otherwise invalidate the original seismic analysis.

So they do have refined numbers in some scenarios, and for the others, they just use the standard two to three inch seismic gap.

MEMBER BLEY: Okay, thanks for that.

MR. FLOYD: Yeah.

MR. LEHMAN: All right, thanks Chris, and

Nik. Maybe it's just me, but on my side it looks like we've lost the slides.

MEMBER BLEY: It looks that way to me too.

CO-CHAIR BALLINGER: Yeah, I can see your picture, but I can't see the slides, so we ought to try to fix that. I don't know who does the fixing.

MR. YOUNG: I will stop sharing, and try to reshare the slides.

MR. LEHMAN: Okay, perfect, just give him a second. Perfect.

CO-CHAIR BALLINGER: There we go.

MR. LEHMAN: All right, excellent. Then if we can go to the next slide, slide 16. Perfect. Okay, so as I mentioned earlier, the license was adjudicated by the Atomic Safety and Licensing Board, and the ASLB concurred with the NRC staff that NextEra's proposed method to evaluate ASR is acceptable, and provides reasonable assurance that these structures will continue to meet the relevant requirements.

However, the board did require four additional license conditions, and I'll just go over them very high level, quickly. The first requires NextEra to conduct a volumetric expansion check of control extensometers every six months. The second

requires NextEra to develop a monitoring program to detect rebar yielding if the structural evaluations indicate that stresses in the rebar may exceed rebar yield strength.

The third condition requires NextEra to evaluate the acceptability of a six month inspection interval if through-thickness ASR expansion exceeds .02 percent per year. And finally, the fourth condition requires NextEra to use petrographic analysis on all cores to detect internal micro-cracking, or delamination. So this is my last slide, with that I'll turn it over to Nik to discuss the next section.

MEMBER REMPE: Before you go on, I had a question, this is Joy Rempe. And when I looked at the inspection reports, it said the inspectors identified findings associated with not adhering to a particular procedure developed by NextEra to implement these license conditions, and the approach. Could you talk a little bit about how or when NextEra developed that procedure?

Did they start off with one and then modify it to consider the ASLB license conditions? And when it first became available to the NRC inspectors, and did they see that it was modified, or

give us a little perspective about this in the future.

MR. LEHMAN: Yeah, that's a great segue, because I believe that's basically what Nik was going to go through in his next few slides.

MEMBER REMPE: Okay, I looked at the next slides, and I did not -- I mean they just said that they did these inspections, and I didn't see much history on the procedures, so perhaps he could include that in his discussion.

MR. NEWPORT: Nik, I have those dates here if you want me to talk about the implementation dates.

MR. FLOYD: Yeah, sure. I mean I can -- yeah, I'll chime in after you go Chris.

MR. NEWPORT: Yeah, it's a good question. What we refer to now as the license for ASR, which is integrated into their structures monitoring program, additional chapters they've added on. The licensee developed that process, and submitted it to us, but they -- before we approved it, they implemented it. They started carrying out that process on site, and that was in late 2016.

They, even though we hadn't licensed them to use it, they voluntarily adopted that, those procedures that you're talking about. And I'll get to the conditions as well. And then we formally approved

that license in March 2019, which is now required by regulation to do what they had already been doing since 2016. And then to answer your specific question, as far as the license conditions.

They were already doing, by their procedures, and processes, I believe all of them, or maybe all but one of the license conditions, and they went back, and verified that. And they beefed up some of their procedures once the ASLB issued these license conditions. They also put notes in their procedures saying this is a license condition. And then I'll turn it over to Nik.

Because Nik led a team that actually inspected these four conditions to make sure they were properly carrying them out. So I hope that answers at least part of your question.

MEMBER REMPE: That helps, because again, as we get into what you guys detected, I'm curious about how difficult it was to follow that procedure, because it just seems like there's been some issues that you guys have detected.

MR. FLOYD: Yeah, and Joy, so I will go over what we found in that second quarter of 2021 report, in terms of the finding, and the observation. We didn't have a finding on the implementation of the

license conditions. We did have an observation on it though, and it was really just along the lines that the methodology and the license specified certain conditions on how to monitor rebar stress, and when you would do that.

We found that for several structures, and again, I'll expand on this in a couple slides, several structures are outside of the current licensing basis, because they exceed that structural demand to capacity ratio in certain elements. And so it was for those certain elements, it didn't explain specifically how you'd go back, and verify your rebar stresses remain bounded by the original analysis.

So we went through the methodology, we went through the procedures, and what we found is it wasn't so much implementation here, it was just that it wasn't documented anywhere. They verbally explained to us what they were doing, their actions, how they were tracking it. But it just was not written anywhere, and that's where we had the pause. It's like okay, we understand, we acknowledge.

But you really need to write it down, because you have a gap between your procedure, and what you're actually doing. So that was really the basis of that operation.

MEMBER REMPE: Thank you.

CO-CHAIR BALLINGER: This is Ron Ballinger, the ASLB report, or testimony has been mentioned a number of times. For those with an interest, this is probably the best set of overall documentation of this problem that you'll find. So if you're looking to read a simple -- not a simple, excuse me, one report, that's the place to go. Thanks, let's keep going then.

MR. LEHMAN: Yeah, this is Bryce. I was done, I was turning it over to Nik, so I think you're up, Nik. And I was done with sort of the background, and summary, so Nik's going to be talking about what's happened since the license was issued.

MR. FLOYD: Thanks Bryce. So, yes, this slide is really just to provide our overview of oversight activities at Seabrook. So we do continue to inspect Seabrook's implementation, and performance of their structural monitoring programs regarding ASR, and this is to ensure that they are identifying, managing, and correcting issues in a timely manner, and this is to ensure safe plant operation.

So what this really does is it starts with the onsite resident inspector, so as you've seen, Chris Newport, he's the senior resident inspector

there. Him, and Travis Daun, the resident will review Seabrook's entries into their corrective action program. They'll also review, and perform routine walk downs of the plant concrete structures, that's part of their daily plant status.

Now, they might not walk down the structures every day, but they're walking down the plant every week at a minimum. And then we also use subject matter experts such as myself from our Region I Office, as well as structural engineers from our Headquarters Office with backgrounds in materials, concrete, and structures to perform as needed inspections.

And actually, if you go back, and look at the history of this, we've been documenting inspections approximately every six months going back to 2013. So I'll say as far as frequently performed inspections, ASR is at the top of the list. Our NRC senior leadership is continually assessing the level of inspection effort required under our reactor oversight program.

So that's the baseline set of inspections that we perform at the plants, and that also includes additional consideration of expanding our resources if necessary. Next slide please. So as part of the

approved license amendment, NextEra was required to go through, and review all of the seismic category one structures at Seabrook.

During that initial application of the methodology, six structures were determined to not meet the new licensing basis. So that includes the original design loads, plus the ASR loads, and margin for future ASR expansion. It's not the entire structure, it's really just discrete locations within that structure. So that could be a wall, a floor, a slab, a beam, or some other type of individual element.

For those six structures that didn't meet the licensing basis, licensee did perform a detailed evaluation to confirm that they are able to perform their design safety functions, and we reviewed those evaluations. Next slide please.

CO-CHAIR HALNON: Hey Nik, this is Greg Halnon. Before you go on, the prompt operability determination, it's not typical to have a POD that goes on forever. What is the end point of this operability determination, or will there be one? Is this going to be something that's a living document to the end of life for the plant?

MR. FLOYD: Right, that's a good question.

So the original idea was previous to the license amendment that we approved back in 2019. Basically all the structures affected by ASR were under the licensee's prompt operability determination. After getting that license amendment, the idea was now you have a methodology for evaluating ASR such that you're now in compliance.

And so after the application of the structure evaluations, which included ASR, the idea was you'd be out of operability determination space. Well, that didn't turn out to be the case here. In fact, we didn't know it at the time, but as they were applying this methodology, you added ASR loads, and it's not as simple as just adding the ASR loads, you also added load factors, which is a margin.

Plus you have to account for that future ASR expansion. And so when you do that, you add in a significant portion of load to that structure, and what the licensee found during that is that there were several areas in these six structures that weren't able to meet that load criteria. So really the end point of this is going to be once the licensee completes -- and in these cases, reanalysis is not an option.

So they're going to have to complete

physical modifications. Once those physical modifications are complete, they'll reanalyze it, taking into account the increased strength, which ups the capacity to account for that ASR load. And then they'll be able to get out of operability determination space. So it's not going to be a forever thing, and certainly we do not want them to stay in that space.

So that's something that we're going to continue to monitor, inspect going forward.

CO-CHAIR HALNON: Okay, where does the POD live, is it within the corrective action program?

MR. FLOYD: So the prompt operability determination is its own separate entity. Any time a degraded condition on site is found, it doesn't have to be in the structure, it can be in any component (audio interference) so you have an OD, operability determination, and then in corrective action space, you have to do something to get out of that OD.

And that can be, there's a suite of options there. Analysis, inspections, replacement, repair, and so the CAP (phonetic) is really a byproduct to drive you out of that operability determination, but two separate processes.

CO-CHAIR HALNON: Okay. Given that we're

hinging a lot of this on a good corrective action program performance, is that performance on site pretty good? How would you rate that? Maybe Chris needs to weigh in on that also.

MR. FLOYD: Yeah, I'll let Chris chime in on that since he's there daily.

MR. GRAY: Hey, do you mind if I chime -- go ahead Chris, I'm sorry, go ahead.

MR. NEWPORT: Sure. Yeah, so the NRC at every plant in the country, every two years we do a two week long inspection of their corrective action program called a problem identification, and resolution inspection, and usually one of the resident inspectors is on that team. But for Seabrook historically, they've had no significant issue. I do say that they have a strong, robust corrective action program.

And historically we have not found any significant issues with their program. Travis, and I look at it every day, and this team comes in, it does a deep dive every other year. So to answer your question, at Seabrook there are no issues with the carrying out of that regulatory required corrective action process.

CO-CHAIR HALNON: Okay, very good. I

assume that there was no themes emerging then in the cross cutting aspect world?

MR. NEWPORT: No, not at Seabrook.

CO-CHAIR HALNON: Okay, thank you. Go on, Nik, I'm good, I'm done asking questions on this.

MR. FLOYD: Okay, I know Mel was going to chime in, I don't know if he had anything additional to add there.

MR. GRAY: Thanks for that Nik. I don't know, I was just going to say, that question, that is a focus we have at Seabrook. That they have these prompt operability determinations, our first finding that will be talked about was all about doing that, and looking forward to how long that was valid, and that your corrective actions are on pace with marching to correct that before there's an issue.

That was the message. So but Nik will get into that, and what they're actually doing for mods. So we have another team on in May, and that will be, we are going to kick that tire hard about where they are in POD space, and corrective action space. Thanks.

CO-CHAIR HALNON: Thank you Mel.

MR. FLOYD: Okay, next slide please.

MEMBER PETTI: I have a question before

you get -- this is Dave Petti.

MR. FLOYD: Yes.

MEMBER PETTI: For some reason I lost you part of the way, the connection, I just want to make sure in my mind. So there are 20 total structures, six of them outside the licensing basis, and none of those six structures, there were 43 discrete locations in those structures that were outside the licensing basis, and that they will have to do some modification to those structures as a long term corrective action?

MR. FLOYD: That is correct.

MEMBER PETTI: So, okay, thank you.

MR. FLOYD: So slide 19. So I put together these numbers just to show where we've been at in oversight space since the approved license in 2019. These numbers do not include the additional hours spent by the resident inspectors on site performing their routine walk downs around the plant, or the daily review of condition reports.

But really since 2019 we've focused on those structures that were reevaluated for ASR as part of that methodology, and then were determined to be outside of the licensing basis. Our inspections verified that the licensee established appropriate compensatory monitoring consistent with the

evaluations. So in most cases that included the regular monitoring they were doing at an enhanced frequency.

As well as some additional qualitative monitoring looking at those specific areas of concern. We also continued to review the licensee's performance to monitor, and manage ASR at Seabrook. So that really includes review of their monitoring data, and doing our own independent looks at the data trends, and walk downs. In 2021, we documented inspection samples in every quarter, or every resident quarterly report.

Two of which were inspection findings, and we'll cover that in the next couple of slides. And I didn't put this on here, but myself, Region I, and NRR plan to be back on site the week of May 9th to perform additional inspections. So that'll be the second quarter of this year, 2022. Next slide. So this chart summarizes the methodology process to evaluate the impacts from ASR.

And those impacts aren't just ASR itself in the structure, but also includes indirect impacts of loading from backfill external to the structure. As Bryce previously described in the background section, there are three different stages of analysis.

Of these analyses, critical areas are identified for additional monitoring based on the available margin in that structure.

And these are those areas that are a part of the threshold limits. So while we're on this slide, I want to highlight two areas on this chart where we focus our inspection efforts. That first green box is the structure's monitoring program. So this is when we're reviewing the data, doing our own independent walk downs, and also doing our own informal trends of the ASR data on site.

And then we'll compare that to what the licensee is documenting. We'll also look at a sample of that threshold monitoring data during our inspections, and that ensures that those structural evaluations remain valid. And then now we're moving into kind of the later phase of this chart, which is corrective action. So right now, those structures that are not in compliance with the new license, they're in POD space.

So we'll look at the enhanced monitoring for those structures, and as they're moving towards their physical modifications as part of the long term corrective actions, we'll basically review the plans, and then the in progress work. And since we, I'll say

Region I experts are not always on site, Chris, and Travis will assist us with that. And then we're going on site next week -- actually not next week, in the next few weeks in May, we'll look at the in progress modification work as well.

So this process is the methodology that the NRC approved. We do hold the licensee accountable to this process. We have not identified issues with the collection of the monitoring data, or the methodology process itself, but really what we're seeing is implementation of specific procedures, so I'll discuss those now. Next slide please.

So for this second quarter 2021 report, I led this inspection with the assistance of our NRR structural engineers. So that's Bryce Lehman, and George Thomas is also on the call. The resident inspectors identified to their review of the licensee's corrective action program, that three structures had exceeded their threshold limits. At that point in time, Chris reached out to me at the Regional Office for expert assistance.

So it's important to note this is the first time the established threshold limits had been exceeded, but these buildings were already in POD space, so it didn't change that, it just changed the

fact that they had monitoring data that now is progressing. So we performed a detailed review of the prompt operability determinations for four structures, that included the three that had exceeded their threshold limits.

And this was to verify their continued safety function. We also looked at the associated corrective actions licensee had put in place, and the timeliness of those actions. And this is really focusing on their long term modification plans. While reviewing the ASR monitoring data, which was also the threshold monitoring data, I also looked at the trends in expansion measurements.

We identified that NextEra did not account for the future progression of ASR in their prompt operability determinations. More specifically, the pin to pin measurements on multiple walls in the control, and diesel generator building showed an observable trend. And this was based off of me looking at the data, and just making a trend graph, and seeing that hey, there's a positive trend here, and it needs to be accounted for.

So rather than evaluate this projected trend as required by their operability determination procedure, NextEra was evaluating the impact of that

increased expansion after it had occurred. So this is important, because as you get increased ASR expansion, that's going to result in increased loading. And so by their own procedures, they should project what that increased expansion, and resulting loading should be.

So they know the next time they do those expansions, they'll be okay, and it'll be an acceptable condition, and rather than being proactive, they were being reactive.

CO-CHAIR HALNON: So, Nik, this is Greg Halnon. I've seen through the documentation that the issue was addressed, but I never saw why it happened. I mean you used words like this is very important, this was easy to do, this was in their program. Can you address why it happened?

MR. FLOYD: That is a tougher question to answer. Really just because you have procedures in place, if you follow the procedures, it'll get you to the correct outcome. And I'm not exactly sure, maybe Chris can chime in here from a plant perspective, how they got in this boat. But yeah, I don't have the full reason as to why.

MR. NEWPORT: Thanks Nik, I won't answer why, but I can tell you what the plant did, which I think might help. As a result of this finding, and

some other issues, and observations that we brought to their attention, they did bring in a new manager to lead the ASR program, and they bolstered the staffing of the program.

So they did make some fairly resource intensive, and significant changes to how they run the ASR program as a result of some of the issues that we've brought up here, that were discussed today. So I don't want to speak for the licensee as to why it happened, but I can share with you what they've done to help mitigate these types of things moving forward.

CO-CHAIR HALNON: As I've seen these types of programs in the past, they become routine, and off the radar screen sometimes. And I'm just wondering if that's what occurred here, or I don't want to necessarily say complacent, but it becomes more of a routine, and then a lapse in personal performance, or lapse in management attention may allow one of these minor deficiencies to fester a little bit.

I was just thinking, wondering if the staff had written a condition report on the actual performance of the program, not necessarily the technical aspect of it, and done an organizational effectiveness type review. And maybe that's something just to go do, Chris take a look at, and see. I

understand that they made some corrective actions organizationally, but they didn't address the actual issue.

MR. GRAY: Chairman Halnon, this is Mel Gray. I'd probably feel more at ease giving a broader view than the staff. First of all, I will say that this was a finding, we will go back and look at the corrective actions, and it's up to the licensee to identify the causal factors of the corrective actions match. But of course I've had oversight of this for a number of years.

My sense is, I'll offer up, is that the licensee, NextEra, has brought to bear very good technical support. And they provide products to the plant that sometimes their contractors aren't nuclear per se. They'll provide something, and putting that in processes in the plant, and thinking about looking forward to the next exam is not something the contractor did for them.

But they missed that in accepting that product at that point. And I think that might be a common thread in both findings. This is my view, and Chris is correct. What they did in this instance, they did put an individual in charge that had a background in things like IST, testing of pumps, and

valves, where you routinely look forward, and project.

So my sense is that. We will look at corrective actions, and determine if they're effective, and of course our inspections will bear that out also. But I thought I'd share that, it's certainly not complacency, it might be the translation of highly technical products into normal station procedures. So thanks.

CO-CHAIR HALNON: Thank you Mel. And I assume that this is a topic that's discussed at those senior management meetings that you guys talk about -- was it a couple times a quarter you said you speak? You're on mute Mel.

MR. GRAY: Yeah, I'm sorry. We certainly do that at our periodic end of cycle, and mid cycle, and more often at the branch level, so yes, that's the case.

CO-CHAIR HALNON: Thank you.

CO-CHAIR BALLINGER: Joy has her hand raised, I hope it's current, and not a residual.

MEMBER REMPE: It's current. I guess I wanted to follow up on my earlier question, and Greg's comment. Because again, I'm trying to understand better, a root cause, which maybe you're saying the licensee still hasn't completed that. But I've heard

well it wasn't complacency, it was the first time that they hit a trigger point, again, in my review of this material, so correct me if I'm misunderstanding it.

But they hit a trigger point in the procedure, and I heard earlier today, no, they had flags in the procedure to tell them to do something. And I'm just wondering if the procedure was difficult for them to follow, or it was just sometimes mistakes happen, and it would be interesting to better understand the root cause to make sure that maybe some bigger flags are needed, or something.

But I'm sure that this lesson has been carefully honed in on to the staff by now. But again, you're looking for other places where similar things might occur, and you want it to be as easy as possible for the staff to follow it. It's why I had asked the earlier question, and I'm reiterating it again. Are the flags, and is the procedure easy enough to follow?

MR. NEWPORT: That's a great question, great insights. To zero in on what you say, the root cause. The cause of these issues is more on the human performance side than on the procedures side. I'll tell you that the changes that they made at the site were on the human performance side. So new management, additional management, additional

scrutiny.

The site vice president gets a personal weekly brief now on these things. So to answer your question, I hesitate to pass on opinions on behalf of the licensee of that density, but the changes they've made are all oriented to that human performance side, versus the procedure side. So hopefully that helps answer your question.

MEMBER REMPE: Okay, it's just something when I looked at it, and I'm still kind of puzzling a bit about it. But I get where you're saying you don't want to answer for them, but anyway, thank you.

MEMBER BROWN: This is Charlie Brown, can I ask a question also? You still there? Can you hear me?

MR. FLOYD: Yes, go ahead, sorry, I was nodding.

MEMBER BROWN: All right, I couldn't see your head nod on my screen, and now I see it, thank you. I look forward to -- there was a February inspection report also that followed up, I guess on the August -- I thought it did, report that we've been talking about where you talked about corrective actions. And did those -- I guess it was on page 19, started on page 16, 19 PDF, but page 16 of the report.

I didn't see a conclusion, it just said the corrective actions were generated committing to the performance, it was stage two ASR related structural evaluation per the monitoring program. But you still didn't get -- there was no conclusion when I left that, that things were okay, or not okay. It was just that the deficiency was not a high level deficiency.

It was -- how did they phrase it? The significance of the finding to be of very low safety significance. That was a two page evaluation that looked to me like a follow up on the August, this was in the February 21st issued inspection report.

MR. NEWPORT: That's our next topic, so I think we can --

MEMBER BROWN: Okay, I'll pass then, go ahead.

CO-CHAIR BALLINGER: This is Ron Ballinger, am I to understand based on all this discussion, that there will be a root cause report that's produced by NextEra, and that that would probably answer all of these questions that we've been having? Am I getting this right?

MR. NEWPORT: No, and that's why I hesitated to use the word root cause, because in

regulatory space, that's a very specific word. NextEra has not performed, nor are they required by their procedures to perform a wort cause for these green findings that we've identified. That being a formal, structured root cause.

There's very specific criteria in their procedures for them to do one of those analyses, which are pretty high level, you have to cross some pretty high thresholds to do a full root cause evaluation. But they have done lower level kind of causal products, and made, like I said, some significant changes to bolster the program. It was not a formal root cause evaluation.

CO-CHAIR BALLINGER: Okay, I'm using the wrong words then, but the fact that they made some changes, suggests to me that somebody thought about it before they made the changes.

MR. NEWPORT: Well, we call it broke fix, when something happens, they just fix it, and move along. Internally, we call that broke fix. They did not do that here. With these issues, like I said, they did kind of what you'd see out of a root cause, they did some analysis on why did this happen, and how do we prevent it from happening again? And so they went beyond just fixing the issue.

They implemented these changes that we talked about, that will help prevent these things from happening again in the future. Does that get at your question?

CO-CHAIR BALLINGER: Sort of, but you're saying that that's not documented anywhere?

MR. GRAY: Chris, this is Mel Gray. I think I would say that our inspection identified the issue. We made sure the plant was safe before we left the site. They put it in their corrective action process. As to what they've done, and have we formally inspected that yet? No. And we haven't put pen to paper for you to scrutinize that. That's probably the narrative there.

Is that, Nik, and Chris, I think that's the gist.

MR. NEWPORT: Yeah.

MR. GRAY: In the same report, we didn't tackle corrective actions, except the ones needed to help us determine that the plant was safe.

MR. NEWPORT: Yeah, they did what they call an organizational effectiveness investigation. It was Travis, and I informally reviewed as part of our daily day to day activities. We didn't document formally our review in a public inspection report, if

that's what you're getting at.

CO-CHAIR BALLINGER: Okay, so now you're using Halnon language.

CO-CHAIR HALNON: Ron, this is a typical corrective action program type performance, where you get a finding of low safety significance that goes into the corrective action program, and then that process carries it through to completion including -- and there may be some narrative in that document about what the apparent -- I even hesitate to use apparent cause, because that's a process within the industry as well.

But maybe a perceived cause, and fix, down to what Chris was saying, was a broke fix. Which is it's evident what happened, let's just fix it. So I don't see anything outside the norm of the regular corrective action process that they're talking about. I wanted to make sure that the organizational effectiveness piece was addressed.

It sounds like from what you just said Chris, it either is, or has an ongoing process of being addressed by the station management, and I think that was the key aspect here. That station management is aware of organizational issues, and have taken corrective actions based on them.

MR. NEWPORT: Yeah, I'll emphasize that again, they've taken substantial actions to bolster their programs as a result of some of these issues that we're briefing. And I talk with them, I talk with their manager, and I talk with the site vice president at least monthly, if not weekly, sometimes daily. But I run into them in the hallways, and ASR comes up a lot.

So there's a lot of informal conversations that I have. My boss, Matt Young, talks to them when he's on site, his boss talks to them. So there's a lot that's going on here. And I'll just say right now, I'll speak for myself here, we're confident right now that the changes they've made, they've bolstered the program.

They've beefed it up to where it needs to be to make sure that nothing is slipping through the cracks like we've seen here with some of the findings we're briefing.

CO-CHAIR HALNON: Sounds good. Now, Steve Schultz, you've got your hand up?

DR. SCHULTZ: I did Ron, thank you. I don't want to parse the words here on the presentation paragraph here on the green finding, but I want to understand the phrase did not adequately account for

the future progression of ASR, and then it continues in the prompt operability determination. But as was described earlier in the overall program for ASR at Seabrook, the structures monitoring program.

There is a margin that looks at the future of structural capability of the buildings, and structures associated with the safety of the plant. And so there's a timing that's associated with that piece of it in the evaluation, and there's margin associated in that evaluation, and analysis. What you're talking about here is, you mentioned the evaluation of the ASR in between the inspections that wasn't being accounted for.

Can you describe for us more clearly what the inadequacy of accounting for future progression is here? Or, maybe just speak to the rate of progression as it relates to the structural evaluations that were discussed in the first presentation.

MR. FLOYD: I'll try my best, and anyone else that wants to chime in, please go ahead. But specifically, the reason why I say in the prompt operability determination is because these are, at least the structures we inspected for this inspection, these are structures that are already outside of that licensing basis. So ideally when you're in compliance

with the methodology in the licensing basis, there is margin for future expansion.

There's also the additional load factor, so there's plenty of margin to accommodate any type of expansion in that structure, and then you monitor that limit to ensure that you don't remove that margin up to a limit. Once you exceed that, and now you're -- I'll say eating into that margin, now you're outside of your licensing basis. Now it's not complying anymore, and you have to restore that compliance somehow.

So as they work in this interim before they do these corrective actions, they have to ensure the structures remain capable of performing their function, and they do that through going back to the calculation, and looking at areas where they can chip away the margin, and part of this is removing some of that future expansion. So in the original analysis, all of that loading already incorporated all those extra loads.

Once you remove those, and you continue to monitor, now any additional expansion you get, they have to go back, and reevaluate that as an additional impact on the loading. So basically any time they take monitoring data, if you've already exceeded a

limit, you've got to project ahead, hey, how much further is it going to exceed it so that they know how much additional load is going to be on there.

And that's not typical for the structures on site. It's really just for some of these specific structures that are in POD space, so under the normal structures monitoring program, we wouldn't be talking about this, but just because they're in POD space, that's why this was important. I don't know if that clarifies your question though.

DR. SCHULTZ: It does, and that's actually exactly what I wanted to make sure we explained at this time, thank you.

MR. FLOYD: Okay, you're welcome. Are there any more questions? I don't want to move on if anyone has anything, and we can always come back to this as well. Okay. Just a quick, important note here. So this finding is really written about the trend that I saw on the control, and diesel generator building. The other structures we reviewed, I didn't see any similar trends.

So this was really just, in terms of expansion rates, isolated to this one structure. Separately, we also had an observation on, and this is by proxy, because they're kind of one, and the same

trending of the data. The observation that they didn't have trend data to inform the timing of their long term corrective actions. So the example here, again, I'll go back to the control, and diesel generator building.

They showed an observable growth on a few of their ASR grids, but they didn't have a physical modification plan until out in the year 2026. So based off that trend, I looked at the timing of the corrective actions like well, you're not really going to meet that time line. And so part of the corrective action in response to our finding, and observation, they now have trend projections for each of the monitored structures now.

I think that was their original intent, but we saw it, and we brought it up to their attention, and that's how we got to the findings. So now going forward, while they correct trend data, they're also projecting setting trend data, and that will inform the timeliness of their future corrective actions.

So basically if you do see an observable trend, you'll be able to hedge that off, and correct the structure before you get there. So that was another key piece of this inspection.

CO-CHAIR BALLINGER: This is Ron Ballinger again, the conditions of operation required them to trend it, did it not?

MR. FLOYD: They should -- so they have kind of, they document the measurements, they kind of have trends. What I didn't see, what I did myself, is I actually plotted out those trends. I did it for myself, I wanted to see what this data looked like, and so I hadn't seen that previous. They had previous trends for CCI, and expansion measurements. But in terms of the data I looked at, I was looking at the threshold monitoring data.

Which is kind of a separate set from the initial chapter two ASR data. And so I was plotting that threshold monitoring data, and that's where I saw this trend. But no, their own program would point them to do some trending, it's just I did not see that.

CO-CHAIR HALNON: Nik, this is kind of a disconnect in my mind, and maybe you can provide some help. It seems very fundamental to do this, either in another process called scheduling, and planning of modifications, or just in the assessing of the risk of a corrective action, how long it can be open. So this seems fundamental to corrective action process, to

modification planning process, accountable engineering.

A system engineer type person, are you confident that the changes they made in the organization have been resensitized to this, where these fundamental issues like what you just found are going to get covered in the future?

MR. FLOYD: So Chris is probably the better person to weigh in on this right now, because he's seen the changes since the last time I was on site. When we go back in May, one of the key objectives of that inspection is I'm going to follow up on the results that we had from this report. Primarily looking at the timeliness of their future corrective actions.

So I expect to see some major changes as a result of that, but I can't comment on it yet, because we haven't been back. I don't know Chris, if you have any addition to that. Before I left, they had many trend progressions for each of the structures that they showed me, including the one that I brought up in the findings. So I felt confident when I left the site.

But going forward, for the remainder of the structures that are going to require modification,

I have not looked at those in detail yet.

MR. NEWPORT: The answer is yes. Currently, I am confident, and I passed onto my management, that we're confident the changes they've made bolstered the program to where we believe it needs to be. That being said, ASR is not a static thing, it's not a static phenomenon. So going forward, as long as the plant is going to continue to operate, it's going to require intensive scrutiny, and attention.

It's not something that just sits passively in the background. So it's incumbent on both the plant, and this is messaging we send to them, both the plant, and the NRC frankly, to continuously monitor this, and to continuously give it the scrutiny that it needs. Because it's not just a static condition that is never changing. So currently, yes, the program is bolstered.

They made significant changes that put the program where it needs to be, but it requires a continuous attention as long as the plant is operating. Did that answer your question?

CO-CHAIR HALNON: Yeah, it did, thanks. And I'm continuing to poke at, I guess the organizational effectiveness, and just making sure you

guys have assessed it, and are confident that these are behind us. It comes down to the next finding that we'll talk about, and the conclusion that it was not indicative of current performance.

Apparently it was, and maybe address the fact that -- when you get into the next finding, which we can go onto right now, whether, or not that was a missed opportunity to address some of these fundamental issues that we're finding now. So go ahead, let's move on, and then we can talk more about organization if it comes up.

MR. FLOYD: Okay, yeah, I didn't have anything additional on this slide. So with that, I will turn it over to Chris to discuss our inspection results from the fourth quarter report.

MR. NEWPORT: All right, thanks Nik. Thank you everyone, appreciate the opportunity to present the NRC's perspective on the ASR, and ASR at Seabrook, and what's been happening. My name is Chris Newport, I'm the senior resident inspector at Seabrook. My colleague, Travis Daun, he's on the call today, he's the other resident inspector here at Seabrook.

As I think you're all aware, Travis and I live in the area, we work on site, we're on site every

day, we're out in the plant every day, interacting with the licensee every day. We review the corrective action documents every day as they come through. While I'm not a practicing structural engineer, and I can't perform elemental analysis, or even review some of those more complex products, Travis, and I both do understand the framework of the program.

How the program needs to be implemented. And we know when to call for help is what I'd say. So we see these products, we see them come through, we see what's happening at the plant, and when we see things that we think need more scrutiny that exceed our ability, we call for help from Nik, and our partners at headquarters. A lot of the things that the plant -- pumps, and valves Travis, and I can handle.

But for some of these more technical issues, I wanted to emphasize that we do work with headquarters, and some of our experts there to really make sure we're getting an independent safety review on all of these products. So I wanted to talk about, this is one of these findings that's probably come to your attention, and we wanted to make sure you're aware of what the issue is, and what happened.

This was in the fourth quarter of 2021

during a refueling outage. While they're talking about an instance where Seabrook failed to properly implement the program, they failed to properly perform a very specific, one of these building deformation ASR related evaluations that's required by their new license program. So next slide please.

So, again, the area that we're talking about, and hopefully our graphics here can help, it's inside of containment, and it's part of what they call the containment internal structures. Specifically it's the reactor cavity pit. So if you can see the blue dot that I think Matt's circling there, you can almost think of it like a basement. You have the floor of containment, but there's a cut out in the middle.

And the picture on the top is kind of an overhead view of that cut out. But it's basically a cut out down through the floor of containment that allows the reactor vessel to kind of, it hangs there above the cut out, and allows access to the underside of the reactor vessel, both for inspections, and then also there's some detectors, and instruments that come up through the underside of the reactor vessel there.

This area has a lethal radiation dose while the plant's operating, there's a direct neutron

dose coming down under there, so you cannot go in there while the plant's operating, so it's an inaccessible area. It's an area that's generally only accessible when they shut down for a refueling outage, which is once every 18 months. So this refueling outage in the fall of 2021.

They went down there for their required structural monitoring inspections, and this is me in the picture here, if you look at my right knee, you can see this is a non-structural floor slab that's in direct contact with the vertical structural wall. You can see the spalled concrete by my right knee, and you can see a bowed deck plate there. And that was not there the last time that the licensee inspected this in 2018.

So what it appears, that vertical wall that you can see where I'm shining my flashlight, it appears that that vertical wall had been placing stress onto that floor slab, and spalled up the concrete, and bowed up that deck plate. So obviously that raised the attention of the licensee, and that raised our attention. So Travis and I, within the next morning, we went down there.

And did our own independent inspections of what was going on down there. And so we started

pulling the thread on what happened here, what's going on down there? And what's the licensee, what have they done, and what are they doing to correct this issue? So what we found down here is kind of what some of these classic signs of potential, I want to emphasize potential building deformation.

So you see on the vertical wall here, some horizontal, what is called flexural cracks. Obviously you see the bowed deck plate, the spalled concrete, which would lead one to believe that that vertical wall might be pushing up against that floor slab. And then around the corner not shown in the picture there, there are some wide cracks that had opened up on some weak points in the structure, and the door opening.

So all of those together, instinctually, as an inspector who knows about ASR, I said huh, that seems to me like that could be building deformation. So we pulled the thread, we went, and we looked at their formal license program. And it actually gives in the program very specific sets of criteria that said you shall do a formal ASR driven building deformation evaluation, finite element analysis model, if you see these signs of degradation.

And what we saw down here in the cavity pit clearly met those criteria, and that told us as a

regulator that they were required to do this evaluation, that basically they had not done. And let me talk about the history there to tie this together. Like I said earlier, they submitted this, the ASR of the entire program to us to approve as a license amendment way back 2015, 2016 time frame.

They adopted the program, even though we hadn't approved it yet, in late 2016. So as early as 2017, they were down here in the cavity pit looking for some of these ASR related building deformation signs. And you can see on the wall, barely, some of the markings, the crack width markings there. Those were placed there in 2017 as they were starting to go through, and do these analyses on these buildings.

So these cracks were known to the licensee, the spalling of the concrete, and the bowed deck plate you saw there, that was first identified in 2012, before they even know about building deformation, and they repaired it, so it respalled recently. So what we discovered is that we had documented this, and they had done an evaluation of this.

But the evaluation that they did was more of a traditional structural evaluation, as if there was no ASR potentially impacting the walls. So they

looked at it for reductions in friction shear strength, more of your classical, we had a crack in the wall, is the wall okay? But what we saw, what we determined is that when you look at this building deformation, and the potential issue here is not that there's ASR in this vertical wall that you see here.

There's no ASR in this vertical wall, there's a steel liner plate behind it, so there's no ground water in that wall, no humidity impact on that wall, it's a very dry space. But what potentially could be happening is that that backfill concrete that's behind this wall, sandwiched between the bedrock, and the wall, that backfill concrete potentially does have ASR in it.

And it potentially is exerting a force on that wall, which would cause it to bow out like you're seeing there, and impact the deck plate. The licensee's contractor, they assessed this, like I said, and they said this was not due to the building deformation, this was due to shrinkage, and due to the differential temperatures. But our assessment was your program says if you see these things you shall do an evaluation.

Taking into account any potential loads that those forces might be putting on the wall, and

they didn't do that, and their procedure required them to do that. And that's in a nut shell, what our finding was.

CO-CHAIR HALNON: So, Chris, is the containment, the steel liner in the reactor building, the concrete?

MR. NEWPORT: Well, if you look at the side view here, you see this thin black line? So one of the primary purposes of containment is it acts as a giant pressure vessel. And there's a huge, air tight, steel liner plate that surrounds all of containment, and that's what holds the pressure in. The concrete --

CO-CHAIR HALNON: Right, so that's containment, and the concrete's the shield building essentially.

MR. NEWPORT: That's right.

CO-CHAIR HALNON: So was the evaluation they did based on the deformation, apparently it's pushing against that steel liner, has that steel liner as well been evaluated as acceptable to continue being in containment?

MR. NEWPORT: Yeah, that's a separate -- you're talking about, because the purpose of the steel liner is to prevent, during an accident with fuel

damage, to prevent radionuclides from getting out to the public.

CO-CHAIR HALNON: Correct.

MR. NEWPORT: Yeah, there's no signs in this vertical wall right here, there's no sights of a breach of that liner. But from a safety significance, for a radionuclide, the cracks aren't big enough, there's no way that radionuclides could get through those tiny cracks, and then somehow through -- the path would just be too torturous, and even then, it just hits that back fill concrete.

So there's not a safety concern for purposes --

CO-CHAIR HALNON: I guess my point is, and maybe I heard it wrong, that the back fill is pushing against the steel liner, which is pushing against the internal concrete, which is causing it to spall. So the liner must be moving as well, so if there's deformation in the liner, has that been evaluated?

MR. NEWPORT: That's going to be -- so this is the corrective actions. What we said we didn't do is this formal ASR related license finite element analysis, what they are going to do is called a stage two analysis. That takes a considerable amount of time, and that's in progress right now, as

a result of this finding that we documented. That should be done by the fall.

It will take all of that into account, and that will be heavily scrutinized by the NRC when that product is complete.

CO-CHAIR HALNON: Do they have an immediate operability determination, if the liner is acceptable for lasting that long, until the operability determination is complete?

MR. NEWPORT: They did -- so I was going to get to that. They did do, because they're automatically not in compliance, because they haven't performed this evaluation. They did do an operability evaluation that did assess the wall, the structural strength, that the wall can still perform its safety function. Which, we reviewed, and we agree that it could still perform its safety function.

Nik, if you want to chime in, I don't think it specifically addressed the liner, but we have talked about that. And there are no safety concerns with that, somehow that liner allowing radionuclides to get out into the public.

MR. FLOYD: Yeah, I'll chime in, I've got a couple of tidbits I can add here. Actually I made this little diagram here, so I hope it helps. So the

primary containment is this gray line with the black line touching it. That's the primary containment structure, that's the one that's credited for all your design basis accidents for things occurring inside containment.

So loss of coolant accident, main steam line, feedwater breaks, everything under the sun in design accident space, that's that piece, that's primary containment. The second gray line outside of there, that's your containment enclosure building. So that's your containment around the containment so to speak. So both of those two structures have been evaluated by NextEra, and the NRC has reviewed those.

So we don't have any issues with those two structures. The new structure in question is called the containment internal structures, it's very much everything else concrete wise, other than those two things. So that includes the dark gray horizontal line, that's your containment base mat, so that's basically your containment floor. And then it also includes kind of the hatched black, and gray area.

That's all of your foundation mat, and there is a very, very thin layer of back fill basically underneath, and surrounding that. But it's all of that concrete which basically is your

supporting containment foundation, and then all the concrete structures inside that the licensee is now going to have to do an evaluation for.

So in the prompt operability determination that the licensee did for the containment internal structure, it looks at the structure itself from a structural standpoint, they did not specifically address any impacts to the containment liner. Now, we don't know for a fact if it is being impacted by ASR. We have our suspicions, and per their process, they need to do an evaluation.

Which is going to include, and they already started taking measurements during the last refueling outage in the fall of 2021. So they need to take the measurements, they need to do the evaluation, and start adding up what those ASR loads, and deformations are going to be. And then they'll have their formal stage two evaluation completed, I think the estimated time period for that is later this year, that we'll look at.

But there was no discussion on the liner in there. I would not suspect there is any impact to the liner right now, given what we're seeing in there, but it was not formally evaluated by the licensee.

CO-CHAIR HALNON: Okay, I was just

reacting to the cause of the bowing of the grating. It looks roughly half inch maybe movement that caused that to bow, which means if you translate that back all the way to the back fill, that steel liner must be deformed in some respect.

MR. FLOYD: Potentially so, that was the other piece, sorry, I wanted to add a correction to what Chris said earlier. So that steel deck grating right there, that was previously deformed, and identified by the licensee going back to as early as 2017 when they did their initial walk downs. What was new was this spalled area that had respalled, that was the new indication that we had not previously seen.

MR. NEWPORT: Yeah, to answer your question, they did not evaluate specifically the liner in a prompt operability determination. They have no indications that it's, what they would call breached right now, and we don't -- the safety concern there, that liner not being able to perform its function, we don't have a concern with that, with this specific wall given its location below grade.

And what's behind the wall, so I hope that answers your question.

CO-CHAIR HALNON: Yeah, given that you've physically put your eyes on it, you don't have a

concern, I will take credit in your experience, and in your inspection. I would just think that that would be a good thing to say somewhere in writing, that we don't have a concern with that respect, since it's part of that whole structure that's in question at this point.

MR. NEWPORT: Yeah, that's an insightful comment, much appreciate, very insightful comment. To reiterate, our main concern here, and again, the licensee's contractor, and they're very smart, they have PhD structural engineers, they initially seemed to think this is thermal expansion, they may be right. But to us, it certain, we felt, and they're required to analyze this using those formal analyses.

Obviously the concern is you have loads being applied to this wall that aren't being accounted for as part of that -- that aren't being accounted for, and compared against the design code.

CO-CHAIR HALNON: Okay, and the other question I had was the relative difference between the two findings. One was on mitigating systems, and one on barrier integrity. I think I get the reason for that now. But there was a statement based on this one, that given the lack of ASR -- of the NextEra staff addressing ASR, you said it was not indicative

of current performance.

Therefore it kind of decreased the ability to put a cross cutting aspect on it. However, in hindsight, looking back now, do you think that just in general the ASR program could have been indicative of maybe some ASR program performance issues?

MR. NEWPORT: That's another very insightful question, we've had extensive conversations internally on this very topic. So when we write these findings, and violations, when was the mistake made? We call this when was the performance deficiency made? We determine, we have to choose a specific time, when did the error happen? Like I said before, they implemented the program.

They voluntarily adopted this program in 2016, and then they went down there in 2017, and they saw these cracks, they knew that that deck plate had spalled up previously, the bowing grate was there. So they saw these signs as early as 2017, and they had voluntarily adopted that program which required them to do the stage two analysis. They said this is not due to ASR.

They incorrectly used their -- procedures required them to do this, they didn't use that procedure correctly, they said we believe this is just

due to thermal expansion, they did a traditional evaluation, but they did not do that formal evaluation back in 2017, that's when the mistake happened so to speak. So that's why we use that as the time frame for our performance deficiency, therefore we said it's not reflective.

Could they have figured this out later, in the ensuing years? Yes, but we have to choose one time where we said the mistake happened, and we chose back in 2017, when they initially saw some of these indications. So does that answer your question?

CO-CHAIR HALNON: Yeah, I guess I just wanted to make sure you still had confidence that the mistake back in 2017 wasn't a missed opportunity to look forward, and catch this next error that was found. So it sounds like you're still standing on your report.

MR. NEWPORT: Yeah, with the changes that they've made to the program, and how they've bolstered the program, and the new awareness of the importance of paying very close attention to this because it's changing, we currently do have confidence that they are where they need to be. And again, like I said before, I say currently, because this is going to need continuous scrutiny throughout the plant's operating

life.

So currently we believe they're where they are, but we're going to keep a close eye on the program as the years go by to make sure they stay in the space they need to be.

CO-CHAIR HALNON: Thank you Chris.

MEMBER KIRCHNER: Chris, this is Walt Kirchner. We can't see very well the details here, obviously we can see the spallation. Did you say that this was an area that had been patched previously?

CO-CHAIR HALNON: Chris you're on mute.

MEMBER KIRCHNER: I think you're on mute Chris.

MS. BRADY: They said you're on mute.

MR. NEWPORT: Sorry, I unmuted, but then muted again. Can you hear me now?

MR. FLOYD: Yes.

MR. NEWPORT: So if you look at my right knee, that spalled concrete there, that occurred in 2012. And I want to emphasize, this is before anyone knew about building deformation. So it was not on anyone's mind in 2012, that these buildings could be moving. So they found this, they repaired it just like a normal plant without ASR would. Chalked it up to thermal cycling, or thermal expansion, because it

does get very hot in there, and cools down.

So after 2012, this was a clean slab. You can kind of see up against the wall, some of the repair grout there. And they went down there in 2017, and it hadn't spalled back, and then they went down there in 2018, and there was no spalling of the floor slab. And then the next time they went down there was in 2021, and then they see what you see here in the picture.

So it spalled at some point from construction until 2012, they repaired it, and then it spalled again at some point between 2012, and when this photo was taken. Apologies, between 2018, during the last inspection, and when this photo was taken in the fall of 2021. Does that answer the question?

MEMBER KIRCHNER: Yes. So buildings move, and deform with, or without ASR. Do you have something in place to measure -- there is going to be continuing movement, and you suspect it is ASR, do you have some ability to do periodic measurements on movement, and such to have a feeling for whether this is going to continue? Or, was it one time thermal expansion, and cracking, or it was ASR pressure from backfill?

Are you just going to monitor this

visually going forward, or are you going to put some -- lay some tracks so to speak, so you can measure whether there's continuing building movement?

MR. NEWPORT: Great question. The short answer is yes. The long answer is, so they absolutely do monitor these things. You can see even in the picture, they write on the walls, they measure the crack width, so they put the date, and they indicate what the crack width is. You saw in some of the previous pictures, they have those crack width gauges, it's case by case depending on the structure.

But they do extensively monitor growth of the structures. In the RHR vaults for example, which are long, tall, elevator shaft like structures, they have these gauges that go three, or four stories tall that measure vertical expansion very accurately. So there's a number of different ways they track, and monitor changes in these buildings from building deformation.

They've taken some initial measurements on the reactor cavity pit for measurements, and monitoring. And depending on what their stage two analysis comes up with, they may implement even more monitoring techniques, and measurements. So absolutely, they're tracking, and monitoring these

things. And we do as well, I track with gauges, Travis and I go down there, and we do our own independent assessments too.

And we keep our eye on some of these devices they have in the field as well.

MR. FLOYD: Yeah, and to add to what Chris was saying, again, it's structure dependent, location dependent, but the licensee does take distance measurements between structures. So like seismic gap widths, they also measure wall to wall distances, like in the electrical cable tunnel, they were doing that for a portion of time. Down here, during the last refueling outage, they took laser measurements looking at the distance.

Because this is kind of a small keyway, so it's easy to measure the distance at different elevations between those two walls. So I envision going forward, they're probably going to continue that. I know they took it last outage, it's on the plans to take next outage, all of that's going into their stage two evaluation. And depending on how critical that is will dictate whether, or not it's continued to be monitored.

But in several of the structures on site, they are taking distance measurements looking at the

lengths, and widths, and deltas between structures. And, sorry, just to add to that, there are some walls that if you suspect moving, you can do basically a plumbness measurements. So if you imagine your wall was straight, now it's moving, you can look at the profile, that side profile of the wall.

So they are, for certain key structures and locations, they are monitoring the movement, and the length displacement of those walls.

MR. NEWPORT: Yeah, and just as an aside as well, those are critical inputs into these finite element analysis models, so they update those models too when they get some of these inputs coming through over the years. Great question, I hope that answers the question.

MEMBER KIRCHNER: Yes, thank you, yes. Because I was thinking that if they have the measurements, you can discern whether it's the building deformation movement, or expansion, versus thermal effects that led to the spalling of the concrete, thank you.

MEMBER BIER: Quick question from Vicki Bier if I can follow up at this point. It looks like the monitoring is quite conscientious I would say, quite thorough. What confidence do we have in the

reliability of predictions after we have that monitoring about whether we're getting into trouble? Is that mainly based on finite element calculations, or how do we decide the cut offs?

And are we in a situation where we could be just monitoring, and monitoring, and at every step convincing ourselves that well, it's not that much worse than last time, so we're okay, and then finally something bad happens even though we were monitoring, how do we avoid that?

MR. NEWPORT: Yeah, great question, I'll take a cut, and then turn it over to you Nik. Great question, very complicated question to answer, I'll take my first cut, and then Nik can chime in here. Personally, I break it down into -- for what you're talking about, there's two things. There's the ASR in the walls, what is that doing to the structural properties of the physical wall?

Like we briefed earlier, that the measurements they take, the extensometers, and the CCI measurements, they correlate that to that Texas testing. And as long as they're in the bounds of that Texas testing, what the ASR is doing in those walls doesn't negatively impact those structural properties such that a code would apply. The second piece of

this though, is what about the building deformation?

What about the ASR in the walls causing bulk deformation, or what about that back fill concrete pushing up against a wall that may not even have ASR in it? And that's where that methodology process that we talked about comes into play, where they do these increasingly complicated finite element analysis modeling. So to answer your question, there's two parts.

As long as they stay within the bounds of that Texas testing with the measurements they're taking, they're safe by their current license. But then with the building deformation aspect of this, they have to continuously look at these models, the outputs of these models, and they have to continuously be feeding in the changes that they're seeing in the plant.

They set limit space on the output of these models, and they monitor them depending on how far -- they could do 18 month monitoring, 12 month monitoring, six month monitoring depending on what the models are putting out. So they're continuously looking at these measurements, and as they approach some of those limits, they have to either do more advanced modeling.

Or they have to do modifications to the structures to get that margin, which we'll talk about in the next slide. So that's my first cut, I'll turn it over to Nik to elaborate more.

MEMBER PETTI: Just a quick follow up for Nik, this is Dave. But the finite element models implicitly have these load factors, so there's margin in the calculation to account for some potential uncertainties, right?

MR. NEWPORT: Yeah, that's a good point. By their license, they bake in a margin into that load that they're applying for the calculation, specifically to account for that we're not taking the next set of measurements for six months, or 18 months, or 12 months, so that margin is very important.

MEMBER PETTI: Okay, thanks.

MEMBER KIRCHNER: Chris, this is Walt Kirchner again. Who does NextEra use? Do they do their finite element analysis calculations in house, or are they contracting that work out? I'm presuming they were using Ansys, and state of the art models that are approved, and accepted by the agency?

MR. NEWPORT: Yeah, they're using SG&H currently, and then Nik, you can elaborate, but if you look at what's called the methodology document, kind

of an addendum to the license, addendum to the structures monitoring program. It goes into pretty high level -- it goes into significant detail on how they need to do these models. There's a lot in there, it's hundreds of pages.

So they use that document to then take that document to guide how they do the finite element analysis models. Nik, do you want to, anything I'm missing here?

MR. FLOYD: Correct, so it's the contractor, the vendor that does all of the finite element modeling. They don't have that ability to do that in house, and they are using an Ansys based software. I can't comment on the specific version of the software, I know that was looked at during the initial audit as part of the license amendment request that developed the methodology.

I don't know George, or Bryce, if you can comment further, because they look specifically at those models. But it is, to the best of my knowledge, we have multiple approved versions of Ansys by the NRC. But I don't know the specific one for this application.

MR. LEHMAN: Yeah Nik, this is Bryce, unfortunately I don't know the specific one either,

but we definitely did look at that, and I was in the staff's SE related to the license amendment request.

MEMBER KIRCHNER: Okay, so I'm not so interested in, I'm assuming it's probably a recent version of Ansys. My question was more whether the NRR staff, or research reviewed the code methodology that was being applied. And I think the answer you're giving us is yes, they conducted a confirmatory review of that methodology.

MR. FLOYD: Yes, that's correct.

MEMBER KIRCHNER: Thank you.

MR. FLOYD: And in addition to our NRR staff that audit in 2018, might have said 19, sorry, 2018. We brought on Brookhaven National Lab as two outside contractors that assisted the NRC staff with that review. So they also looked at the software, and the methodology, and how the licensees perform those calculations.

MEMBER KIRCHNER: Thank you.

MR. FLOYD: And then to add on Chris's response to the previous question, so the licensee has this whole ASR program as an ASR piece. They also have the building deformation, which is a separate program, the two feed in hand in hand to one another. But those are all the additional programs that got

added in for monitoring at the site. The site still has their normal structures monitoring program, that they're going to do the walk downs of the structures.

So while we're looking at key areas on the site, and we're looking at the threshold monitoring data, we're looking at the established ASR grids, the extensometer locations, I mean those aren't -- they're not 100 percent around the site. They're in a sample of walls, slabs, floors. But in addition to those, they still do the normal walk downs around the site. So as conditions were to change, they would be detected during those walk downs.

Now, they might not have the explicit data, but if you were to see additional cracking, additional spalling, if for example the equipment impacted from a building deformation, they're actually doing measurements there, looking at deformations between different pipes, and different conduits. So if conditions were to continue to change, there's a high likelihood it is going to be detected if it wasn't already part of the other ASR enhanced monitoring.

That's what gives us that additional confidence. I don't think we'd ever be led down the path that they're doing monitoring, and not finding

something, that's not proven to be the case.

MR. NEWPORT: So I have one more slide -- go ahead Nik.

MR. FLOYD: In my opinion, in my professional opinion.

MR. NEWPORT: I do have one more slide on a separate subject before we turn it over to summary. So if there's any more questions on the fourth quarter finding that we just talked about before I move on to this slide? All right, so we also wanted to just touch on what happens if they either approach the limits of the building deformation.

The stage -- they've done all of the evaluation they can do, and they're still approaching the limits, or what happens if, like we briefed earlier, they've gone outside of those limits, and they need to restore compliance. The NRC traditionally gives you two, you either have to restore compliance, or change the license.

If you're outside of compliance with your licensing basis, those are your two options. And when we talk about restoring compliance for these structures, they restore compliance by doing physical modifications to the structures. So for those six structures that we talked about that are outside of

licensing basis, and also some structures that they believe might be approaching those limits at some point in the future.

The licensee has elected to perform physical modifications. Travis, and I were actually down in the mechanical penetration area looking at some of the modifications they've already started. But we wanted to touch on just some examples of some of the structural -- there's dozens, and dozens of different way where you can buy back margin by doing physical modifications like reinforced concrete walls.

But two of them we'll show here as an example, example one, those are the strong backs. I always say if you've ever been up to California, and you see old brick buildings, they have to retrofit them for modern seismic codes, so they'll put essentially bolts through the wall that tie it together, like you see in the example here. That's one example of ways they can restore margin back into the walls.

Another example, example two, this is a corner brace there, I think that's kind of self-explanatory there, it braces the wall, and adds strength that way. So like I said, there's dozens of different ways that they can get this margin back.

They use their contractors to find the best way for that specific wall they're looking at, and then they do the analysis, and they go out to -- they physically perform these modifications.

As I said, for these buildings that are out of compliance, they're required to restore compliance, they've already started that process through these modifications, and Travis, and I have been looking at them, and we have a team coming out this quarter to do a deep dive on some of these modifications, the adequacy of the modifications, and whether they're doing them in a timely manner.

So any questions on this slide before I turn it over to Mel for a summary? And then we'll open it up to general questions after that. All right, then I think it's over to you Mel.

MR. GRAY: Okay, thanks. Hey, we've been going at it here for a while, I hope these conclusions are self-evident to you. But we have done inspections to date, and we found some gaps, and indeed that got your attention, and other stakeholder attention, and we've talked about them in detail today. But we focus on NextEra's performance to monitor, and manage, and correct the effects of ASR.

After all is said, and done, we've had

findings of very low safety significance, because the structures have been found to be able to perform their safety function. And that will be a continual focus for our inspections, and that just leads me -- my second summary item is just inspections are going to continue, we will focus on NextEra's performance monitoring, and corrective actions as we've said.

And finally, the third item is important, I hope it's evident to you that the inspectors we bring to bear, and the help from headquarters, it's not a checklist approach, it's a very invasive inspection. And the third item, just verifying that those license conditions are all met, the ones imposed, the ones the staff imposed, that those type speed limits are inspected in detail on an ongoing basis to ensure that the underlying testing and the behavior of the plant are as the staff assumed in approving this.

And so that, I envision those inspections to continue on the license conditions. And with that, I'll just say we found the methodology from a regional perspective, we found it to be scrutable, measurable, observable in the field. Yes, it might be complicated, but it can be implemented.

And it's a standard that just has shown

itself to be, with the scrutiny it had in licensing, to be a sound approach to observe, and make judgements about Seabrook's performance, and the safety of the plant. So thanks for that. I would turn it over to the Chairman Ballinger, or Halnon, and we would go from there.

CO-CHAIR HALNON: Thank you Mel, this is Greg. I got just one big picture question. So the plant was licensed to operate in 1990, so we're not in the period of extended operation yet, we've got another eight years, or so to go. Do you see the -- I mean this program as aging management, it was done, or at least perceived, or conceived during the license renewal aspect for the first period of extended operation.

Do you see any need for additional inspector training, or focused inspections beyond what you talked about, or focused audits? As we get closer to the period of extended operation, or is this program up to snuff to carry us into the next 40, or 20 years?

MR. GRAY: Right, great question. Structurally, the oversight program provides for additional team inspections as a plant approaches their, what's called the period of extended operation,

the 40 year license. We would bring to bear a team of inspectors to look at their aging management programs. And clearly this is an aging management program credited in license renewal.

I think this will have significant inspection effort as we approach the period of extended operation, that there will be a strong record of their performance. But in license renewal space, we would probably verify if there's any additional aspect that wasn't inspected, we would go ahead and look at that at the time, but I think you bring a point up.

It's important that the NRC, we continue knowledge management of this inspection space, and the licensee provides for that in their organization, and we're mindful of that here, growing our own inspectors at headquarters in that manner. So I guess I'm sorry, Greg, I might have lost the thread there on your question. I think the program provides for license renewal augmented inspection as we get closer.

But I suspect this will have a long and detailed track record. Finally, we do, in the region, ask ourselves if the reactor oversight baseline is sufficient to get at these insights about performance. We have to date said that, and I think that's the

case. We take somewhat of an expansive view about what we can do under the ROP, it's intended to serve the regulator, not the other way around.

And so we do devote significant resources on these samples, and we just think it's warranted, so that's what I would say.

CO-CHAIR HALNON: Thanks. Is the deviation still open, or has that been closed down?

MR. GRAY: That was closed a number of years ago.

CO-CHAIR HALNON: Okay, and the confirmatory action letter is closed as well?

MR. GRAY: Correct.

CO-CHAIR HALNON: Okay. So the only thing I would encourage is continue to try to close out this prompt operability determination, operating the plant to an operability determination in a non-conformance. Even on the previous slide, Nik, and Chris were talking about the modifications plus operability determination. It's not necessarily an ideal way to move through operating a nuclear plant, to be relying on an operability determination all the time.

So I would hope that there's an end point to that at some point, and that we can clear the non-conformance, clear the operability determination, and

just move forward with an aging management program. Thank you for the presentation, and we wanted to make sure we opened it up to the rest of the members, to make sure there weren't any other questions, and --

MEMBER BROWN: I have one.

CO-CHAIR HALNON: Go ahead.

CO-CHAIR BALLINGER: Let me -- this is Ron Ballinger, we have been going on this for quite a while, and certainly some of us would like to have a break of some kind, and we're actually on schedule. I would propose that we have a break until the hour, at which point we'll have the subcommittee discussion where we get all these questions, I suspect that they're going to be extensive. So let's take a break until 11:00 o'clock.

(Whereupon, the above-entitled matter went off the record at 10:42 a.m. and resumed at 11:00 a.m.)

CO-CHAIR BALLINGER: Okay, it's 11:00 o'clock. We can reconvene the meeting. This is the discussion period. And what I would like to see happen is, apart from the general discussion, from the members I would like to hear their opinion as to how we should quantify the results of this meeting, as well as any suggestions or related to path forward on

this area.

My reading of the situation is -- and this is a personal opinion, of course -- is that the staff and the applicant have done their due diligence and have the situation under control. But there's a significant event that's happening on May 9th. I guess there's a visit that's happening. And then there's a quarterly inspection that may be occurring, that's occurring in the fall during, which time I think I've heard that this extensive analysis, this I guess phase 2 or whatever, will be -- will have been done.

And so that would be a fairly significant milestone in this process. But I'd like to open the session, the committee meeting, to Q&A from the members.

CO-CHAIR HALNON: Charlie, you had a question, didn't you? Before we broke.

He may not be back yet.

CO-CHAIR BALLINGER: It is 11:00 o'clock.

CO-CHAIR HALNON: Yes.

CO-CHAIR BALLINGER: So he should be.

CO-CHAIR HALNON: So, Ron, I agree with you. It feels like the inspection staff, the NRR staff, with how they described the licensee's reaction

and corrective actions, it feels like we're back on track. Because the NextEra staff, I know many of them are diligent folks. They're good performers so I don't have a concern there.

But I do agree that there's some milestones coming up that are important, and that it may warrant, maybe just a Plant Ops Committee looking at it later this year or early next year, to make sure that the corrective actions that have been put in place are continuing to take hold and protect the plant.

I'm not sure we might have to kind of look at the reports and see how they come out. We may just hold that as a potential in the future. However, I agree that what we've heard today sounds like everyone's being very diligent and on top of this.

MEMBER SUNSERI: Greg and Ron, this is Matt. I would concur with those positions. You know I like to hang back and kind of listen to the entire, the discussion in its entirety from what the staff is saying, what kind of questions the members are asking, what are we hearing from others.

And I thought today's interactions were informative about the current state of the progression of ASR at Seabrook. And we even probed beyond the

central topic into other organizational performance, system structure, and component performance issues.

It seems to me that the actions taken and ongoing, are commensurate with what I would call, you know, good operator and good regulator performance.

I mean some of the sort of the things that they should be looking at, to address a very technical issue like this.

So I really don't have any questions or other comments.

I do think though, like you're saying in light of the continuing nature of this what I would call a unique issue in our industry for, you know, ASR at a nuclear power plant, that we should continue to, or consider establishing some kind of follow-up frequency.

And maybe these inspections are that avenue for doing that. But some kind of follow-up just to kind of close the loop, or see where this plateau's out.

That's all I have, thanks.

MEMBER BROWN: Greg, this is Charlie. Is anybody else?

CO-CHAIR HALNON: Yes, go ahead, Charlie. We were waiting for you to get back. Go ahead.

MEMBER BROWN: Okay, yes my dog slowed me down a minute, excuse me.

I wanted to ask a question relative to, yes, I have same conclusions Matt did relative to the presentation. I thought it was a very good presentation, with a lot of good detail.

In the February inspection report, the last part of that write up noted that the NRC inspectors, including inspectors from the regional office, reviewed the operational, operability determination, determined that there was sufficient technical rigor to support that the structure remain capable of performing a safety function. Okay?

The last part of it, the last sentence said the inspectors noted that a more detailed, fine item element analysis was underway in accordance with the Seabrook structure's monitoring program methodology document.

Is that more finite element analysis focused on that part that was discussed with the flooring, and that grating, and the wall that was highlighted in those last few slides?

The keyway, and, or is it a more general finite element analysis? And if it's more general, yes, thank you, that's it.

Was it focused on that are explicitly as you show in the slide?

MR. NEWPORT: Yes, I can. Yes, so basically by their program, they're required to do that, that's what they call stage two analysis, which is a finite element analysis.

They're required to do the whole structure, which in this case is the containment internal structure.

So it includes the cavity, the reactor cavity pit that you see here. But it also includes the, the floor of containment, and all of the other, you know, all the other concrete structures inside of containment.

So it's more than just the cavity pit, but it does include the cavity pit that you see here. And that's by their process.

Did that answer your question?

MEMBER BROWN: Yes, part of it. The second part of my question was, I think you stated that that was due to be completed in the fall of this year?

MR. NEWPORT: So that's preliminary.

Yes, right now their contractor estimates sometime in the fall. The structure itself is a very

complicated structure so it's, it take some time to do this analysis.

So right now they're projecting for the fall. Obviously like anything, there could be delays. But like we said, when that valuation is complete, we do plan on conducting a detailed inspection of that product.

MEMBER BROWN: Is, relative to the gaps and stuff you focused on in some of the other slides, you know you showed us building-to-building gaps, and things like that.

Is there, but you didn't mention, or I missed it if you did, any specific limits that you say if you get closer than this amount, then that becomes unsatisfactory?

Or are there additional analyses could say that even if they impact somewhat, it would be okay? Or has that been addressed?

MR. NEWPORT: Do you mean for the, this specific structure here, the reactor cavity pit, or are you talking generically?

MEMBER BROWN: Yes, yes. No, I'm talking about the areas where you had focused on, where you found the problems right now.

MR. NEWPORT: Okay. Yes, so for the

cavity pit, there's no seismic gaps down there, it's all one building. And --

(Simultaneous speaking.)

MEMBER BROWN: Oh, okay.

MR. NEWPORT: But based off what we saw down there, there's no, you know, there's no limit.

So there's nothing that between now and the fall that if they hit, that, you know, they say if we hit this we cannot you know, operate or we're unsafe.

There's nothing identified of that nature down in this cavity pit down there, yes.

MEMBER BROWN: Okay, well what about the backfill pressure you were talking about?

MR. NEWPORT: So that's what, now again, that's just an assumption. That's just what we think could be happening.

Now, their Ph.D. structural engineers, you know, their initial take was they think it might be thermal. So we don't know that for sure.

But what that stage two analysis will do is it will look at the whole structure. They're going to get out the original design drawings, and find out exactly what is behind those walls; how much is behind those walls.

And they're going to do that modeling to see if that backfill could be exerting pressure, and it could account for what they're seeing here.

So until that's done, that's what the product will output. And if they do determine that that backfill's applying pressure, then they'll add that load onto the loads that that wall is required to account for, and compare it against the code.

Did that, Nik do you want to chime in, too?

MR. FLOYD: No, I was going to say that analysis, you know, as Chris was saying, it's not just the reactor cavity pit. It will be the entire containment internal structure.

So part of the walk-downs that the licensee and their vendor did this past refueling outage in the fall of 2021, they were taking measurements and doing walk-downs of all the internal structure.

And the whole idea there is that you fit together the bigger picture. So we're focused on just one area down below, but as you can see, that foundation mat concrete is a large, it's a very large section of concrete that is, it's underneath the entire containment structure.

So they're going to look at the whole structure as the bigger picture, as part of that analysis.

So it, we'll be able to piece together everything at that moment in time. But right now yes, it's, yes, we're focused on this area but we're going to look at the larger structure as a whole.

If that helps.

MEMBER BROWN: Oh, yes.

MEMBER KIRCHNER: This is Walt Kirchner. Does that include looking at the underlying foundations, or that backfill concrete?

Is there any sampling program that's going on to determine its? I mean obviously concrete of that size, it's probably, that's not a reinforced concrete structure underneath the base mat and containment, is it? It's just backfill?

MR. FLOYD: Oh no, that foundation mat, that kind of black and gray area?

MEMBER KIRCHNER: Yes.

MR. FLOYD: All of that's reinforced concrete.

MEMBER KIRCHNER: It's all reinforced, okay.

MR. FLOYD: Yes. I would say heavily

reinforced.

MEMBER KIRCHNER: Okay, and is there any condition assessment of it, its current, I don't know what the right word to use would be, but do you have some understanding of, for example, is there a ground water penetration or any other things that might impact the -- its own structural integrity?

MR. FLOYD: There is, as along with the rest of the Seabrook structures, there was a waterproofing membrane installed on the underside of that.

MEMBER KIRCHNER: Okay, right.

MR. FLOYD: But as we know through experience, that waterproof membrane did not hold up to par.

So there is potential, and that's also why we think there's some pressure pushing on this under, on this underground structure that.

There's a potential for groundwater to get in contact with that concrete, and likely affect it. But that's, that's our assumptions right now, and that's why we pushed the licensee on this.

MEMBER KIRCHNER: Well, I ask that question because it also supports your containment and closure building there at Seabrook.

So I'm presuming they're also NextEra will also do an evaluation of the CEB, as well as the containment structure?

Or is it, or is the requirement as per the program that you've approved, just to do the containment, the inner containment structure?

MR. FLOYD: So just one point of clarity. This is just a schematic. I don't think that containment foundation mat is also underneath the CEB. I'm not for certain. This is not the specific design drawing.

I know it's definitely under the inner containment structure, so that was previously evaluated, and the CEB was previously evaluated.

So the only thing getting looked at this time around, will be the actual containment internal structure itself, which will include the foundation.

Now certainly if they start seeing measurements, or changes in measurements on the CEB that would impact that, or vice versa, they should take into consideration all of those.

MEMBER KIRCHNER: Have they seen any settling, or movement of the CEB in terms of how it sits there on that, that underlying concrete?

MR. NEWPORT: Yes, just to clarify Nik's

point, what we have there is just a, you know, just for illustration purposes only.

I have a structural drawing in front of me. The CEB from my, we do not believe sits on that mat. I'm looking at a structural drawing right now.

So I, that's just for illustrative purposes only. CEB is, I believe, a standalone structure.

But that being said, they have done that full what they call stage three analysis of the CEB, which is the most in-depth, fine element analysis they do.

And that analysis would show any of that settling. They are seeing quite a bit of movement in the CEB, and that's from kind of this cumulative effect of the strain.

There is ASR actually in that containment and closure building, and that strain that that that cumulatively pushes bulges and causes forces on that. And that shows up in their output of their models.

And any kind of that settlement and other things would show up, as they correlate the model to the actual measurements they've taken.

Does that help answer the question?

MEMBER KIRCHNER: Yes, it does. So when

was the most recent time they did a finite element analysis of the CEB?

MR. NEWPORT: Do you know the date, Nik? It was --

(Simultaneous speaking.)

MR. FLOYD: I don't have the date. We reviewed it in March of 2018, during the audit that NRR and Brookhaven National Lab looked at.

I can try to find the date for you.

MEMBER KIRCHNER: Okay, so coming up now, the analysis is going to mainly focus on the inner containment building structure, is that correct?

MR. NEWPORT: The containment internal structure, which is different than the containment dome.

MEMBER KIRCHNER: Okay, no, I get that.

So what's your process? What do you expect once NextEra and its contractor has their model up and running, and they've done their analyses?

What are you, what's your, what are you going to look for when they present the results from their finite element analysis of that structure?

And what process are you going to use to review that?

MR. NEWPORT: Well, I will immediately

send it to Nik and our headquarters experts, because I do not have the expertise to understand finite element analysis, IGS.

But yes, it's a very complicated analysis. So we will have, you know, the regional team and the headquarters team do a deep dive on it.

And I don't know, Nik, Bryce, or George, did you want to talk about it just generically what you look at when you, when you get these work products?

I don't want to speak specifically for this one because we don't know what it's going to say yet, but Bryce or Nik, did you want to talk about generically what, what you look at when you look through these, these outputs?

MR. FLOYD: I'm going to punt to Bryce, since him and George are the ones that do those detailed reviews.

MR. LEHMAN: Yes, thanks.

I mean obviously we'll just go through the analysis and make sure that their assumptions are reasonable, and that they've been following the methodology document.

And that the model that they develop is actually aligning with what they are, what they are

seeing in the field. And just look at it and make sure that it makes sense.

Do you have anything else, George, to add?

MR. THOMAS: No.

MEMBER KIRCHNER: Well, yes, of course a very important part of using any kind of code. My area is thermohydraulics, not finite element methods for structure.

But yes, the first part is the model, the actual model and its validity in terms of representing the physical structure as, and its condition.

But I was leading to something else. Then you get the results of the analyses, and I would presume what you're looking for is what margins you'd have based on assumptions about the progress of ASR, and so on.

So that you have confidence that the structure has significant margin to perform its safety functions.

MR. NEWPORT: Yes, that's right, yes. And it gives you, it gives you essentially loads that you can add to the other load --

(Simultaneous speaking.)

MEMBER KIRCHNER: Right.

MR. NEWPORT: -- to assume comparator

code, and make sure you're below the code limits. And there's margins built in to the -- at least there's --

MEMBER KIRCHNER: Well, what I'm asking you to do is to tell the public, because we have a large audience today, what you're going to do with this analysis, why you're doing it, and then from that, you know, from those results, how you review them? And then how you make a finding, essentially, of you've got adequate margin to the demand.

MR. NEWPORT: Yes --

(Simultaneous speaking.)

MR. GRAY: Yes, let me step in here.

MR. NEWPORT: Okay.

MR. GRAY: Mel Gray, Branch Chief.

We would, Chris will be well attuned when that's done, and we would expect that to be shared with us. We would look at it internally, and develop an inspection plan to look at that.

And the pace of our plan would be, and engagement, would be a function of the confidence we had in the modeling. That it represented the as-found, as-measured structure, as, and that it followed the methodology. That it modeled correctly ASR, use the correct load factors, and added future ASR.

And if any elements of the structure

didn't meet that, we'd have a special focus on that. Why that function, why that structure can still perform its safety function.

So if it came out that there was margin throughout that structure that fully met the licensing basis, we would certainly inspect that, and we would have a footprint on it.

We would have a quicker and more in-depth and detailed footprint, if there was anything that gave us pause about safety.

That's really the overall. As to what inspection it will be, we'll use the one. I would think it would be if it was, if it was results that were in line with the COB, we might have it in the maintenance rule sample, which for the public is, is in general monitoring and modeling.

And then if it had functionality issues, we would probably take an operability sample. And if there are corrective actions that we're meeting or near term, we'd probably use what's called a problem identification and resolution sample.

That might be more detail, but overall we would take a look at that and, and put the footprint on it, explicit that would be available for stakeholder awareness.

MR. FLOYD: And just to add to that. Being the inspector that's going to be leading that charge, you know, once they get the results of the model. So I, again, I'm not the expert in finite element that will be Bryce and George, and NRR, back in our headquarters office.

They'll look at the modeling, the appropriateness of the modeling, the appropriateness of the assumptions, and the consistency with our methodology.

On the inspection side, I'll be looking at the results of the model, and primarily as you said, yes, areas of low margin and those areas they're targeting for threshold limits, make sure that they actually have monitoring in place for those key areas.

And that it's now captured in the structures monitoring program.

One of the things that we do when we go back onsite to look at that monitoring, is hey, one, did you capture it in your document, because that ensures that you're doing the scheduling; and, then two, do you actually do the inspections?

And once you do the inspections, are you tracking that data and trending that data?

So I mean yes, the biggest result here

will be what is the output of the model, and then what monitoring do they establish to ensure that they stay consistent with that model. Those are the key things.

And, without seeing the results, I can't tell you for sure what that's going to look like. But I mean from a high level, that's -- that's what we'll do.

MR. NEWPORT: And I will also add, too, for, you know, for the members of the public listening.

And when you look through what's called the methodology document, which is this formal license document that they have to follow, it's very proscriptive when they're doing this modeling, that they don't, you know, for example there's a whole section that talks about how do you model backfill concrete pressing up against the wall.

There's multiple pages about how you input that into the model, what assumptions you have to use. So it's very proscriptive on how they have to do these models.

And that's what Bryce and George, would be kind of making sure they use that process correctly.

Does that help answer the question?

MEMBER KIRCHNER: Yes, thank you. I just

wanted you to go through the process, not the results obviously. You don't have them yet.

Thank you.

CO-CHAIR BALLINGER: Questions, more questions from the members? Or consultants?

What I have not heard is a recommendation with respect to path forward, with, by way of for lack of a better word, documenting what we've heard today, and going forward.

MEMBER BROWN: Ron, I'll give you a suggestion. I didn't bring it up wanting the rest of the people to talk.

Based on the analyses being done, should we have some path established that in the fall, or when they finish these other analyses, do we want to take, do we want to hear from them again as to what their results were?

That's the only question I had left.

CO-CHAIR BALLINGER: That would have been, and would be my recommendation based on what we've heard. But I'm talking more, I was more referring to the immediate future.

That is to say, right now we have the minutes of this meeting, which will be public. Is that sufficient?

Or do the members think that we should do something a little bit more, more than that?

MEMBER BROWN: My opinion is unless we have something else that we want done, that the minutes should be, suffice unless we have a big problem that we think needs to be illuminated farther now.

CO-CHAIR BALLINGER: Thank you.

MEMBER BROWN: Other members can chime in on that, but that's my thoughts.

MEMBER KIRCHNER: Ron, this is Walt.

I would like to second Charlie's suggestion. I think that it would be of much interest to see whenever this, these sets of finite element calculations are done for the structure, for the containment structure.

I think that's a logical point to, after the NRC has completed its own audit and review, to re-engage on this topic.

CO-CHAIR BALLINGER: Yes, I think Kent has got that --

(Simultaneous speaking.)

MEMBER KIRCHNER: At least from my perspective --

CO-CHAIR BALLINGER: -- got that on his

list for sure.

MEMBER KIRCHNER: -- that's my opinion.

CO-CHAIR BALLINGER: Yes.

CO-CHAIR HALNON: Ron, this is Greg.

I think that we're touching on what I was trying to get to earlier, which was a let's get through the May inspection; let's get the fall calculations; and, let's look at those.

And then make a decision if we need another subcommittee meeting, or if everything played out the way we thought.

It may be prudent to go ahead and schedule a subcommittee meeting in October or November timeframe, just to put it on the calendar.

And, then after we see the products, determine whether or not we actually need to have a meeting or not. But I think that we don't want to let go of this just yet, until we see some of the results.

CO-CHAIR BALLINGER: Yes, that would be my, that would be my opinion as well.

MEMBER BROWN: That's what I was suggesting we do also. Thanks for clarifying it better, Frank.

CO-CHAIR BALLINGER: Other members?

MEMBER PETTI: This is Dave. It seems

reasonable, that approach seems reasonable to me.

CO-CHAIR BALLINGER: We're rapidly approaching a majority. But we're not there yet.

MEMBER REMPE: If you need another voice to say yes, me, too, I also agree. This is Joy.

CO-CHAIR BALLINGER: Okay, so there seems to be a general consensus that that's an appropriate path.

MEMBER SUNSERI: Yes, this is Matt, I'm in consensus.

CO-CHAIR BALLINGER: Okay, all right having said all that, we now need to go to public comments.

I would remind the public that there has been an invitation, a Team invitation out there, and you're on it, I think.

If you are dialing in with a phone, I think you need to do the *6 trick to get in. But if you wish to make a comment, please state your name, and make your comment.

I would remind people that we, as part of our procedure, we look for comments but we don't make responses. The only responses that we make are through a committee letter.

So with that said, please, any member of

the public that wants to make a comment, please unmute or make your comment.

I see photographs coming up, or video coming up from somewhere. But I don't hear anything.

DR. SAOUMA: This is Victor Saouma, from the University of Colorado.

CO-CHAIR BALLINGER: Ah, thank you. Please make your comment.

DR. SAOUMA: Yes. In the interest of time, allow me to make one specific, and one overarching remark.

I have done sufficient finite element analysis in my life to say that especially when it comes to ASR, one can get a linear elastic finite element analysis program, especially if they don't specifically validated for AR analysis to give you any results you want it to give you.

Especially if there is no proper oversight, by real independent expert both at the early, intermediate, and final stages.

And my second remark is a bit more general. Based on what I heard today, based on my extensive study of Seabrook through C-10 for my testimony to the ASLB, based on my 35 plus years of research, 20 of which on ASR.

Based on numerous peer reviewed publication, material testing, fracture of concrete, probabilistic risk assessment, finite element seismic analysis and more, I cannot say that the NRC is making a convincing argument that it is currently safe to live within 10 miles of Seabrook.

Those are my remarks.

CO-CHAIR BALLINGER: Thank you, but this, I see another, another video coming up.

CO-CHAIR HALNON: Patricia, that's to you. Are you interested in making a comment?

MS. SKIBBEE: Oh, yes, I am. I was just unmuting myself. So I have a number of comments but I think you've explained that you don't respond, which is fine. So let me start. And I know that another member of C-10 has comments also and will be speaking after me.

So I'm Pat Skibbee. I'm the president of the board of directors of C-10 Research and Education Foundation, an organization that monitors Seabrook within the 10-mile emergency planning zone. So I have some general comments, too.

As far as like, and I'm not a scientist. As far as I can figure out, we still don't know where we are on the curve of the activity of the ASR

situation at Seabrook.

I think that I read, and I hope this is right, that there are methodologies to actually determine where in the activity arch a specific case of ASR is.

But I don't believe that that has been done at Seabrook. Not being a scientist, I'm not sure it can be.

But if it could be, I certainly think that would be incredibly helpful to find that out. So that's my first comment.

My second general comment is, over the years of reading NRC documentation, it seems to me the approach to monitoring is always phrased so that the plan is always found to be degraded, but operable.

In other words, it's always worded that the goal of the inspection is to show or prove, that the plant structures are still able to perform their safety functions.

It doesn't seem to me that that approach is an objective, scientific approach. It seems that the approaches, we going to check everything to make sure it's still working well, but then you're approaching it with almost a foregone conclusion. That's a little bit stronger than reality I think.

But I think it's really important to word the goals of monitoring the ASR situation, in a very objective way. In other words, the monitoring and inspections should be to find out if the structures are certainly safe. In other words, operable in a safe way.

And I think when it's phrased that you're trying to prove that there's, I don't mean you personally, is trying to prove that the structures are operable and safe, that's a bias, and that that's not a good thing at all.

I want to address the idea of margins. So it was talked about today several times that when you approach a margin, there are many ways to create a greater margin, or to get around that problem.

And one of the ways is through recalculating the margin. I've come across this idea in other NRC documentation.

I'm not a mathematician either and I don't really understand the, if there's a given margin and there's ASR damage if you will, and you're approaching a margin, how can recalculation solve that?

I mean the other ways that were stated today, said there were dozens of ways to help maintain a margin.

Some of those are structural, structural modifications. Those I can understand. But addressing the problem of a narrowing, dangerously narrowing margin through mathematical recalculation, that doesn't seem, that doesn't seem sound to me.

And again, I don't want to take too much time here. I know that our other person is going to talk about structural modifications, so I don't need to talk about that.

Going back a couple of years, it was on slide number 12, it seemed to strongly indicate that the license extension, the 20-year license extension granted to Seabrook, was granted in light of, and because of, the license amendment request incorporating higher standards for monitoring.

And that once the LAR was approved, then the license extension was granted in light of that. And that's not accurate. It was the other way.

The license extension, the 20-year license extension, was granted before the LAR hearings even took place.

So I think that's something that everybody should be aware of, and many may be, maybe many of you are already.

No, I'm not going to talk about, not going

to talk about remediation.

I want to ask a question, and I understand that you can't respond to it. But the wording threshold I hadn't come across before.

And it was stated today that three buildings are approaching, or have crossed a specific threshold for the first time.

I don't know what that means. I think maybe it means, well, I don't know what it means. So maybe I'll put that in writing and someone can answer what that actually means.

I also want to add --

(Simultaneous speaking.)

CO-CHAIR BALLINGER: This is Ron Ballinger again. I'm remiss in reminding, in indicating that if you have specific questions and things, please supply them to Kent Howard, and he'll, there will be a response.

MS. SKIBBEE: To Kent. Okay, thank you. I will do that for sure.

And in closing, I just want to say I should have opened this way, to say that thank you all.

There are many people on this call. Many professionals. Thank you for your time. It seems to

me that everybody is really trying to be very conscientious here in the oversight of Seabrook, and I just want you to know that is much appreciated.

And it's much appreciated by C-10, by me personally, and I'm sure by the hundreds of thousands of people who live in our area, who don't even know this meeting is going on.

So thank you very much.

MS. GRINNELL: I totally agree. I'm Debbie Grinnell, I'm also with the C-10 Foundation.

And I would like to say first of all, that we've had confidence in our energy inspectors, and we appreciate the in-depth work that they're doing.

However, C-10 does not have a radiation on ASR. And, as a result, we can only, as the NRC, you can only ask, ask them to do it.

And there is no request in a timeframe. And I think that since we've had the ASR become much worse since 2009, and our NRC inspectors have worked very hard to monitor and interview the NRC, time is of the essence.

So I would like to say that after hearing the presentation today, the NRC Foundation requests that there be additional ACRS proprietary meetings on these C-10 necessary remediation-critical structures

that are seriously out of -- I'm sorry, did anyone not hear me?

CO-CHAIR BALLINGER: We missed the last couple of words. I don't know what happened.

MS. GRINNELL: Oh, neither do I.

So what I said was the NRC inspection is requesting an additional ACRS proprietary meeting on all of Seabrook's necessary remediation, that's necessary to do on critical structures that are seriously out of design basis.

As NextEra is, and has been, in violation of their current license, and in their renewed license, and they are not completing their corrective actions. They are if not at all, and their assumptions are incorrect often.

These are serious issues when we don't have a regulation, and you can't require that it's done within a timeframe.

So we all know that Seabrook's ASR concrete degradation was first NRC inspected in 2009, and tested to be moderate and severe on that category one building.

Unfortunately, that was too late to repair any of this. And, since 2013, the ASR at Seabrook tested for an ASTM C 1020 expansion of a mortar bar.

And what we found then was it was without reaching and a plate plateau. Or expansion of the reactive silica.

Now, the problem with this is it's 13 years later, and the NRC still is stating consistently that ASR is still operating slow to develop.

Well, this is not prudent, and not true at all anymore. Because the structures are far worse.

We have more deformation; we have an increase, we need to have more frequent inspections and they're much worse; and, we are now at a point where we need to do something about it now.

The NRC has not reported an NRC remediable, long-term plan. Where is it? The NRC is responsible for letting us know, for one thing, it was the NRC Foundation that had the case that had the expert who had the four new amendments done on the ASR.

And we have not seen anything about it. So the NRC requested NextEra to submit a long-term ASR remediation long-term plan. And we haven't seen it.

Obviously, a short-term ASR remediation plan is the most, to the most serious plants at Seabrook.

The NRC really is very aware that the,

that NextEra has not completed their correct actions. And, as a result, without having a regulation, and without having the cooperation to do the work that's necessary at NextEra, a short-term plan for the remediation should be done. And the public should know the result of all the tests.

So I will pass this on to anyone else who's ready to ask, or suggest any comments.

Thank you very much.

CO-CHAIR BALLINGER: Thank you.

Are there other members of the public that would, oops, wait a minute, sorry about that.

Well, there was a hand up and now it's gone. Oh, now it's back.

That's Justin Poole?

MR. POOLE: Yes, sorry, Charlie, this is Justin Poole, I'm part of the staff and the project manager.

I had one more thing if we're, if there's no more public comment but I can wait.

CO-CHAIR BALLINGER: I don't see anymore. Wait a minute, well, there's, Victor, you have your hand up?

DR. SAOUMA: Yes, I do. Just to mention that there are indeed, well established so-called

acceleration, accelerated expansion tests, which have been performed all over the world, to make anticipated prediction as to what would be the future expansion.

When I mentioned that in my (audio interference) report, and in my testimony at the ASLB, it was vehemently pushed back by NextEra and the NRC. They don't want to undertake such a test.

Such tests exist. It's called accelerated expansion test, and we can make prediction on the near- and long-term future. And I don't know why they do not perform those tests.

CO-CHAIR BALLINGER: Thank you. Okay, I'm assuming that Victor's hand is going to come down.

Justin?

MR. POOLE: Thank you, Chairman.

I just wanted to propose real quick. You guys talked before about having a follow up, or potentially having a follow up meeting with the subcommittee.

And the timeframe that you mentioned, I think, at that time, was the fall timeframe. And I would just like to propose that I work with Kent, you know, with what that, with what ends up being the proper timeframe to have that said meeting.

Because if the report doesn't come in

until October, which could be delayed, you know, we need some time to go complete our inspection, which is probably going to be the fourth quarter inspection.

Doesn't get published till, you know, probably early in the following year.

CO-CHAIR BALLINGER: I'm sure Kent will work with you. I mean we just mentioned the fall because it was mentioned in the presentation.

So we're fine.

MR. POOLE: Okay. Understood, thank you.

CO-CHAIR BALLINGER: Yes.

Okay, for the members of the public we'll apply a 10-second rule, as opposed to a 5-second rule.

There is another person with their hand up. Patricia?

MS. SKIBBEE: It's me again.

CO-CHAIR BALLINGER: Oh.

MS. SKIBBEE: I always thought the 5-second rule was when you drop a cookie on the kitchen floor, that you had to pick it up --

(Simultaneous speaking.)

CO-CHAIR BALLINGER: That also applies unless you own a dog.

MS. SKIBBEE: Oh, yes, then you don't even have the 5-seconds, that's true.

I just wanted to say, so for example on slide 13 it says the expansion, expansion must remain below the tested limits.

But of course the question is, and I understand you're not answering questions, that it's very nice to say that it must stay below the tested limits. But I'm not sure the ASR understands that it has this stricture that it must stay below these limits.

And this concept has come up over and over in our discussion with NRC regulations that well, don't worry because, you know, we'll be sure that the ASR expansion always stays within, within this certain box.

But my comment is just, I don't think ASR knows that. And that obviously makes one wonder what happens in this situation, where it goes beyond the limits that we are saying it must abide by.

And again, not a question because I know you can't answer it. But just a comment.

CO-CHAIR BALLINGER: Thank you.

MS. GRINNELL: I'd like to add one more comment, if I could.

CO-CHAIR BALLINGER: Sure.

MS. GRINNELL: It's Debbie Grinnell, with

the C-10 Foundation. And I agree with Pat completely. And I think the thing that the ACRS should know, is that we have a wild -- we have a world renowned expert on ASR.

And, as a result of having him and winning the case, we were able to get four really good, although not always as requested or our expert had requested for, four very good license amendments.

Now, the other issue with this is that we don't have anyone within the NRC staff, or in any department, who is an expert on ASR.

And, as a result, there are some limitations that engineering can do on this. Because the primary issue that we have at Seabrook is a scientific one.

And, as a result, we need an expert on ASR. And the result is this should be that the NRC has not only one, but has someone reliable on ASR expertise, to then recall some peers to form a group to look closely at C-10. Because public safety is the number one concern that we all have.

And as this is not happening slowly, as NRC continues to say repeatedly for 14 years without knowing anything about ASR, and also without having anyone from ASR on the staff.

Thank you very much.

CO-CHAIR BALLINGER: Thank you.

Victor has got his hand up again.

DR. SAOUMA: One more time. Yes, my concern is that indeed the NRC has taken over all, reasonably decent engineering approach to an extremely complex problem, which would have required a scientific approach. And that has been missing in the overall assessment of the safety of Seabrook.

It is the very first time that we have such a complex structure subjected to ASR, and it has been handled almost as a routine engineering problem, analyzed by engineer with very little if any, background in ASR.

And when we defer to expert for instance at some of the national lab, as it was evidenced during the hearing, none of them had any expertise on ASR. They were just assessing the validity of linear elastic finite element model.

So I would urge everyone to make sure that we take a more comprehensive assessment, on a structure which plays such an important role on the safety of the public.

For example, on slide number 23, when it was assessed by NextEra, that the crack might be due

to shrinkage, how can you talk about shrinkage over 20 years, 20 years after the structure had been completed?

Shrinkage manifest itself at the early stage. This is clearly due to ASR, which is an ongoing, time dependent expansion.

But for them to say that it is shrinkage or even due to thermal load, where there has been so many cycle of thermal load over the past 25 years, is unbelievable.

Thank you.

CO-CHAIR BALLINGER: Thank you once again.

Okay, I think we've exhausted the public comments to this point.

One last request, are there any other comments, questions from the members, or consultants?

MEMBER KIRCHNER: Ron?

CO-CHAIR BALLINGER: Yes.

MEMBER KIRCHNER: This is Walt.

I have one question I did want to ask. I think it could, if the staff would like to answer it now, that would be good. But certainly I would like to put it on the agenda if, when we re-engage on this topic.

And that is to what extent have structural

modifications been made to date, or are planned, to deal with some of the effects of ASR in the plant?

Now I'm talking actual physical. We had a slide on, you know, reinforcements and other techniques. But no details on what might be under way at the plant.

Thank you.

MR. NEWPORT: I can answer that.

CO-CHAIR BALLINGER: Yes, I'm guessing that in a subsequent meeting, there will be a lot of information on that topic.

Okay, other comments from members? Members are allowed to ask questions of course, and get answers.

MEMBER BLEY: And, Ron, somebody from NRC staff wanted to respond to Walt's question.

CO-CHAIR BALLINGER: I don't see a, gee whiz, I don't see a hand up so I'm sorry, who is it?

MR. NEWPORT: I can answer that briefly if you can hear me.

CO-CHAIR BALLINGER: That's fine. Yes.

MR. NEWPORT: Yes, the so I think we touched on this earlier, but the modifications, you know, obviously we said the licensee's chosen to perform a physical modifications to restore compliance

of the structures, that are outside of compliance.

Those have been budgeted for. The plan is underway, and they've already started the work on at least one structure.

And then, like we mentioned there, we do have a team coming onsite likely in May to do a detailed evaluation of, of those modifications. The timeliness of those modifications, and the adequacy of those modifications.

MR. FLOYD: And I'll comment on the previous modifications. There have been two previous physical modifications performed on Seabrook structures.

So the first one was the missile shield blocks and the containment annulus. That was part of the CEB. That was a restoration of the seismic gaps that had closed up. So that was a restoration of the seismic gaps.

And then the second one was the CEVA, that's C-E-V-A, the containment enclosure ventilation area. A north wall in the stairwell was modified, and that involved strengthening that structure.

So those are two physical mods that have been completed at the site. We have -- we did document some of those details in past inspection reports.

MS. GRINNELL: May I make one more comment?

CO-CHAIR BALLINGER: My computer just went berserk on me and I had to re-engage. So.

CO-CHAIR HALNON: There was another comment.

MS. GRINNELL: Can I make?

CO-CHAIR HALNON: Go ahead.

MS. GRINNELL: Yes, can I make another comment? The NRC needs the public to know, because of the concern for the extent of every building in the plant on concrete, an ASR concrete. And we need to know the remediation issues that are being done, requested, completed, and what the results are.

It is that important, which is why we asked for a proprietary meeting, for the ACRS to discuss this. Because it's not clear at each one of these, as the corrective actions are not completed, often incomplete, to be understood in time. And these things need to be resolved in time.

Thank you very much.

CO-CHAIR HALNON: Ron, are you there?

Okay, Ron might be having computer problems. This is Greg.

Victor, one last time and then we're going to close public comments.

DR. SAOUMA: Very short.

There cannot be any remediation for a structure suffering from ASR. There's no such a thing as remediation.

CO-CHAIR HALNON: Thank you, Victor.

We'll do one last call for public comment, and then I'm going to close the public comment and then we'll summarize the meeting.

Patricia?

Patricia, you're muted. You're welcome to make your comment.

MS. SKIBBEE: Apologies, sorry, sorry.

I have to say, I'm finding it shocking that physical remediation attempts are going on apparently without an overall plan, whether it's short-term or long-term, as Deb Grinnell mentioned. That seems astonishing.

And apparently there is no plan, because I would have to hope that if there were such a plan, number one, the ACRS would have been aware of it and had read it, and number two, that it would be publicly available for public comment.

So I do find this shocking. And I'm not an engineer, but I did look at those slides, those little braces, and I think I have to echo without a

basis of very good information, what Victor just said.

It doesn't seem to me that a lot of corner braces are going to make a difference, when you're talking about the deformation of gigantic concrete structures. But we'll see.

But again, thank you very much for your efforts. I think you're doing your best, and I think there's more that could be done, and I think you will do it. And, thank you.

CO-CHAIR HALNON: Thank you, Patricia.

Okay, I'm going to go ahead and close the public comment period at this point. One last call for any member or consultant.

Hearing none --

(Simultaneous speaking.)

MS. GRINNELL: You know --

CO-CHAIR HALNON: I'm sorry --

MS. GRINNELL: Well, there is one. There is one very short one.

CO-CHAIR HALNON: I'm sorry, we closed public comments. I'm sorry.

MS. GRINNELL: Sorry, of course.

CO-CHAIR HALNON: If you have additional comments, you can get a hold of Kent Howard, the DFO.

MS. GRINNELL: Got it.

CO-CHAIR HALNON: Thank you.

MS. GRINNELL: Thank you.

CO-CHAIR BALLINGER: Okay, this is Ron, I'm back again. I don't know, my computer just went up the imaginary axis.

CO-CHAIR HALNON: Okay, hey, Ron, we just closed public comments.

CO-CHAIR BALLINGER: Okay.

CO-CHAIR HALNON: And we had one that wanted to make another comment, but I asked her to go ahead and just send it to, to Kent.

CO-CHAIR BALLINGER: Sure enough.

CO-CHAIR HALNON: So we're ready to summarize and close.

CO-CHAIR BALLINGER: Okay, good enough. Thanks again.

Wow. In any case, I found the meeting very, very informative, and everybody was pretty well prepared. And very prepared.

And I think we got the information that we were looking for. And we have an identified path forward where we can follow through on this.

We have considered comments from the members of the public, and I'm sure they will stay engaged. And I'm sure we will let people know that

when we have an additional meeting on this, so you'll be well informed.

But other than that, Greg, do you have anything else you want to come through with?

CO-CHAIR HALNON: No, I echo it. I think that the staff did a fine job explaining it to us. I think the questions from the members were, were pointed and well received.

I think the comments from the public were on target, and I appreciate the professionalism of the comments that came in.

And, you know, we'll certainly take all these comments to heart and in our, formulating our next meeting, we will ensure that we try to cover all the bases on this. So in general, I think it was a very good, informative meeting.

Thanks, Ron.

CO-CHAIR BALLINGER: Okay, before my computer decides to misbehave again, I think we're all set. And, my goodness, we're within about 30 seconds of the schedule.

So thank you all very much for participating and this meeting is adjourned.

(Whereupon, the above-entitled matter went off the record at 11:59 a.m.)

Advisory Committee on Reactor Safeguards Subcommittee Meeting

Seabrook Alkali Silica Reaction (ASR) Information Briefing

Division of Operating Reactor Safety
Division of Engineering and External Hazards
Division of Operating Reactor Licensing

U.S. NRC Region I and
Office of Nuclear Reactor Regulation

April 27, 2022

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

NRC Staff Presenters

Justin Poole
Project Manager
Division of Operating Reactor Licensing, NRR

Bryce Lehman
Structural Engineer
Division of Engineering and External Hazards, NRR

Niklas Floyd
Senior Reactor Inspector
Region I

Christopher Newport
Senior Resident Inspector, Seabrook
Region I

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Agenda

NRC Staff Presentations on:

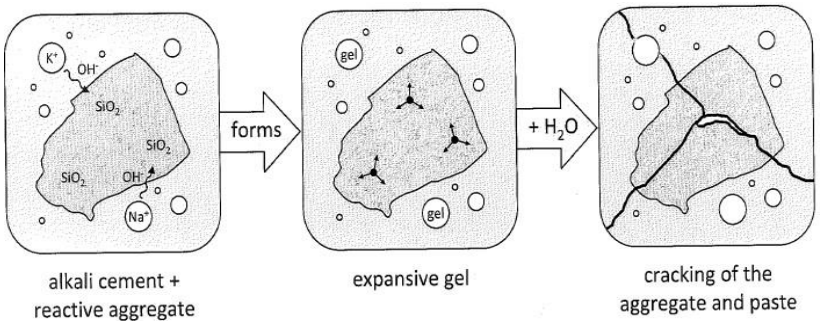
- Alkali-Silica Reaction (ASR) Background
- NRC Approval of Approach to Address ASR
- NRC Inspection and Assessment of Seabrook ASR
- Summary

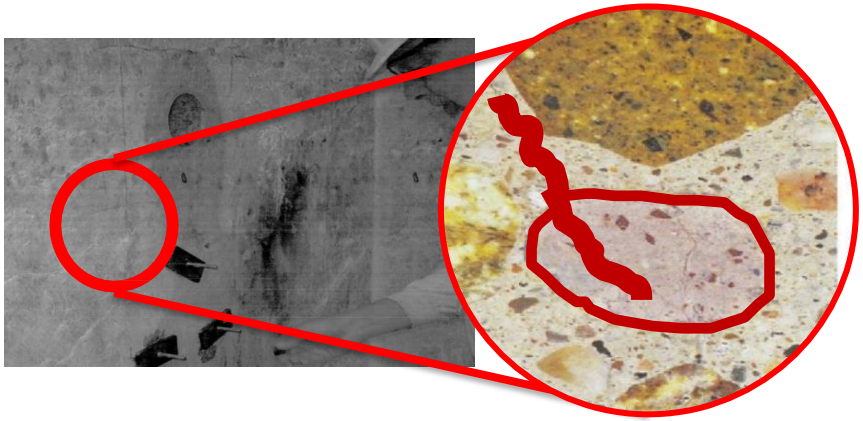
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

ASR Background

- ASR is a slow, expansive chemical reaction in hardened concrete which occurs in the presence of water, between the alkaline cement and reactive silica found in some aggregates
- The expansion can cause various material impacts
- ASR is a very slow-moving phenomenon

Reaction:





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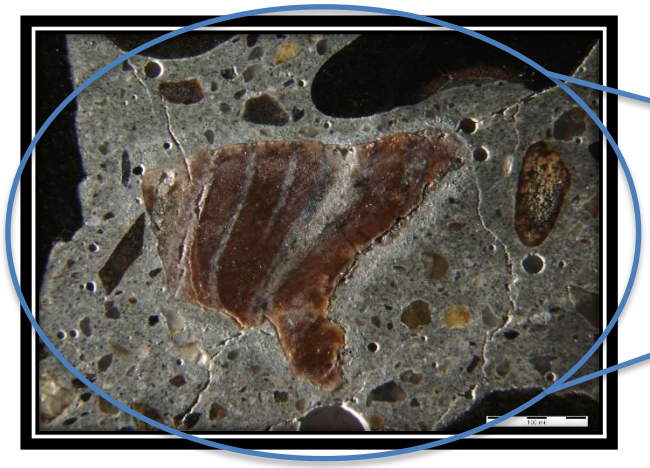
ASR Background



Micro-cracking in the aggregate

Visual signs of cracking on the surface of the concrete

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ASR Background

- 2009 – 2010: Degradation in Seabrook concrete exposed to groundwater identified during license renewal audit walkdowns
  - Testing confirmed the presence of ASR
  - Codes of record in the Seabrook current licensing basis did not account for ASR
  - NextEra initiated prompt operability determination (POD) and extent-of-condition (early 2011)

- Why ASR occurred and was not identified earlier:
  - Seabrook unknowingly used a slow-reactive aggregate in the concrete
  - Ineffective ASTM Standards at the time of construction
  - ASR development was not expected
  - Inspections were not looking for ASR

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ASR Background

- NextEra concluded that ASR-affected structures were Operable but Degraded and Non-conforming

- Regional Inspectors and HQ Experts reviewed Operability Determinations and concluded that ASR-affected structures remained capable of performing their safety functions

- 2012: NRC increased oversight to ensure structures remained functional while NextEra developed corrective actions

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ASR Background

Large-Scale Testing Program:

- NextEra Test Program at The University of Texas – Austin
- 2013 – 2016: NRC conducted inspections at the test facility to ensure NRC requirements for quality test standards were met

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ASR Background

Large-Scale Testing Program Results:

- Showed no reduction in structural capacity up to the expansion levels tested, and code equations can be used up to the tested limits
- Determined through-wall expansion was best way to track ASR progression after in-plane expansion plateaus
- Data was used to develop a correlation between measured modulus-of-elasticity and through-wall expansion; used to estimate expansion until extensometer installation
- Expansion levels from the testing were added to Seabrook's CLB as expansion limits for capacity limit states

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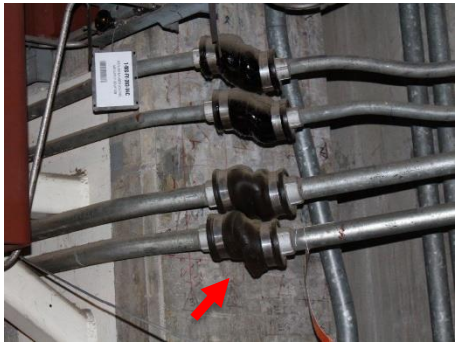
ASR Background

Building Deformation Program:

- 2014 – 2015: NRC identified bulk structural deformation in the following Seismic Category 1 structures on site:
  - Containment Enclosure Building
  - Residual Heat Removal vaults
  - Spent Fuel Building



- Bulk deformation results in additional loading and can impact equipment

- Building deformation was incorporated into NextEra's license amendment request

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ASR Background

Building Deformation Program:

- 3-stage analysis methodology to address ASR loads
  - More detailed and accurate as stages progress from 1 to 3
- Estimates ASR loads based on field measurements
  - Also accounts for future ASR progression
- Demonstrates Capacity >= Total Demand (including ASR)
- Identifies quantitative acceptance criteria (threshold monitoring parameters, limits) for each structure based on analysis; triggers corrective action when approached or exceeded
- Allows for structural modifications instead of further evaluation
- Methodology described in the LAR and incorporated into Seabrook's Structures Monitoring Program

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ASR Background

- License Amendment Request:
  - Incorporated test program expansion limits for capacity
  - Detailed methodology for evaluating the effects of ASR on Seabrook Structures (incorporates ASR load/demand, acceptance criteria)
  - Monitoring ensures timely corrective action
- License Renewal:
  - Aging management programs (AMPs) identify and manage future effects of aging
  - License renewal application supplemented to include ASR monitoring and evaluation programs as AMPs
- NRC approved and issued the license amendment and renewed license in March 2019.
  - ACRS meetings and ASLB hearing

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NRC Approval of Approach to Address ASR

- Large-Scale Testing Program
  - Reasonable to use the original design equations and material properties
  - Expansion behavior must remain similar to test specimens and expansion must remain below the tested limits
- Methodology for Evaluating ASR-Affected Structures
  - Consistent with existing code-of-record design philosophy
  - Reasonable approach for estimating ASR loads based on field data
- Monitoring Programs
  - Three programs: 1) ASR monitoring, 2) Building Deformation, and 3) Equipment Impacted by Deformation
  - Reasonable inspection methods, intervals, and acceptance criteria

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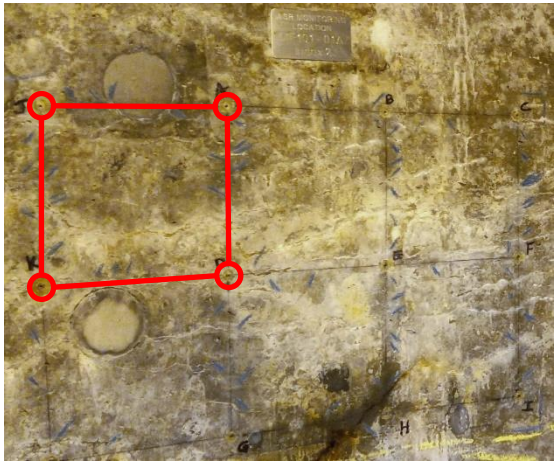
NRC Approval of Approach to Address ASR

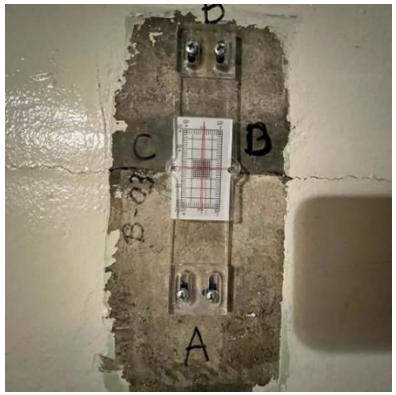
Examples of Monitoring ASR at Seabrook:



Combined crack indexing (CCI) and pin-to-pin distance

Seismic gap widths between buildings

Extensometers



Crack gauges

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NRC Approval of Approach to Address ASR

Original License Conditions on ASR:

a) Assess the Seabrook expansion behavior to ensure it is behaving in the same fashion as the test program expansion

b) Corroborate, using Seabrook field data, the concrete modulus to expansion correlation used to calculate pre-instrument through-thickness expansion

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NRC Approval of Approach to Address ASR

In November 2020, ASLB added four license conditions:

c) Conduct a volumetric expansion check for control extensometers every six months.

d) Develop a monitoring program to ensure that rebar failure or yielding does not occur, or is detected if it has already occurred, if the structural evaluations indicate rebar stress may exceed yield.

e) If the ASR expansion rate significantly exceeds 0.2 mm/m (0.02%) through-thickness expansion per year, NextEra will perform an engineering evaluation focused on the continued suitability of the six-month monitoring interval.

f) Each core extracted from Seabrook Unit 1 will be subjected to a petrographic analysis to detect internal microcracking and delamination.

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NRC Inspection and Assessment of Seabrook ASR

- Onsite oversight by resident inspectors via Plant Status (daily condition report review and plant walk downs)
- Selection of risk-informed samples including Maintenance Rule, Operability Determinations, Modifications, and focused PI&R samples
- Utilize Regional and NRR technical expertise
- Periodic discussions with Region I senior managers and formal end-of-cycle reviews
- Document inspection results in publicly available reports

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NRC Inspection and Assessment of Seabrook ASR

- NextEra reviewed Seismic Category I structures using the Methodology Document
- **28** Total Structures
  - **6** structures outside of the licensing basis
  - **43** elements in discrete locations
- Continued functionality is documented in a detailed Prompt Operability Determination
  - Additional monitoring (typically every 2 months)
  - Long-term corrective actions via modification

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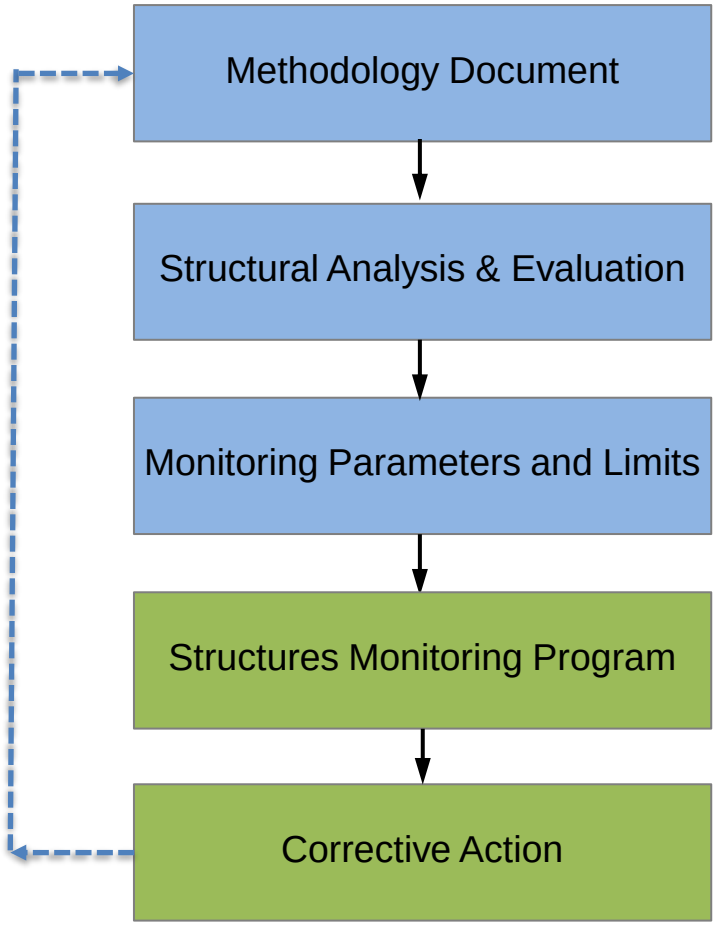
NRC Inspection and Assessment of Seabrook ASR

- Since 2019 approval of ASR license amendment
  - 8 weeks of direct, on-site inspections
  - 11 total inspection samples
  - 2 very low safety significant findings
- In 2021, Region I completed ROP baseline samples related to ASR activities during each quarter of the year

NRC Inspection and Assessment of Seabrook ASR

Methodology Overview:



- Stage 1, 2, and 3 analyses
- Load demand calculations
- Design margin for future ASR expansion
- Threshold limits
- Monitoring parameters and frequency
- Trending
- Action if approaching threshold limits
- Further analysis and/or monitoring
- Structural modification

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NRC Inspection and Assessment of Seabrook ASR

2Q2021 Finding (ML21222A126):

- Green finding associated with NextEra's procedure because NextEra staff did not adequately account for the future progression of ASR (i.e., a time dependent mechanism) in the prompt operability determination for several Seabrook structures

- Observation on the lack of trend data to inform the timing of long-term corrective actions

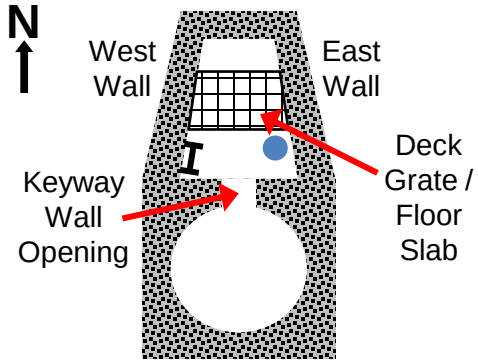
NRC Inspection and Assessment of Seabrook ASR

4Q2021 Finding (ML22040A204):

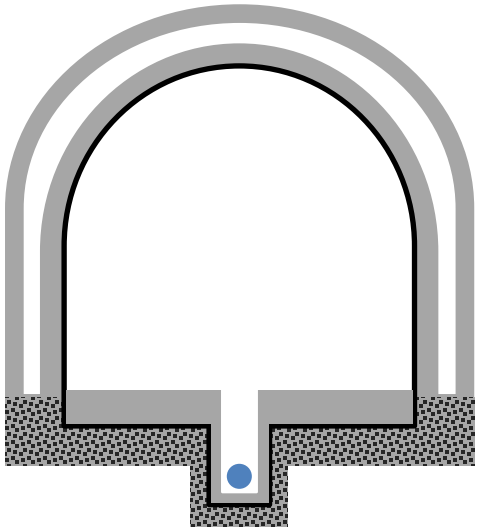
- Inspectors identified and documented an instance where structural monitoring measurements of the Seabrook containment internal structure were not properly evaluated in accordance with the licensee's structural monitoring program.

- Potential additional loads on the containment internal structures from ASR related building deformation were not accounted for.

NRC Inspection and Assessment of Seabrook ASR



Reactor Cavity Pit Overhead View



Containment Side View

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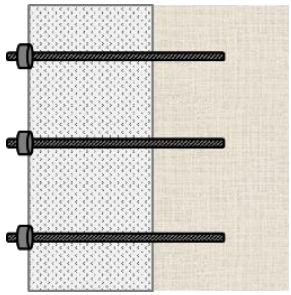
NRC Inspection and Assessment of Seabrook ASR

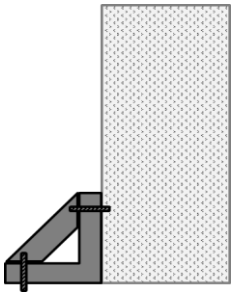
Corrective Actions for Structures Approaching or Outside of Methodology Limits:

- Physical Modification + Operability Evaluation

- Physical modification process described in the NRC-approved methodology to evaluate and manage the effects of ASR



Example 1 - Strong backs



Example 2 - Corner Braces

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Summary

- NRC inspections to date have determined Seabrook structures remain capable of performing their safety functions

- NRC inspections will continue to verify NextEra performance to monitor and take corrective actions to maintain Seabrook structures

- NRC inspections will continue to verify NextEra performance to meet ASR related license conditions

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End of Staff Presentation