Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

Title: Meeting with CRGR to Discuss Duke Energy Views Associated with a Revised Draft Task Interface Agreement Response Regarding Oconee Nuclear Station

Docket Number: (n/a)

Location: Rockville, Maryland

Date: Tuesday, October 24, 2017

Work Order No.: NRC-3343 Pages 1-118

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

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

+ + + + +

CRGR COMMITTEE FOR REVIEW OF GENERIC REQUIREMENTS

+ + + + +

MEETING WITH CRGR TO DISCUSS DUKE ENERGY VIEWS ASSOCIATED WITH A REVISED DRAFT TASK INTERFACE AGREEMENT RESPONSE REGARDING OCONEE NUCLEAR STATION

+ + + + +

PUBLIC MEETING

+ + + + +

TUESDAY, OCTOBER 24, 2017

+ + + + +

The CRGR Committee met in the Nuclear Regulatory Commission, Two White Flint North, Room T2B3, 11545 Rockville Pike, at 1:00 p.m., Edwin Hackett, Chairman, presiding.

MEMBERS PRESENT

EDWIN HACKETT, Chairman

BRIAN MCDERMOTT, CRGR, NRR

JOHN MONNINGER, CRGR, NRO

SCOTT MOORE, CRGR, NMSS

DARRELL ROBERTS, CRGR, NSIR and R-III

CATHERINE SCOTT, CRGR, OGC

STAFF PRESENT

STEVEN ARNDT, NRR

HARRY BARRETT, NRR

JONATHAN BARTLEY, R-II*

ERIC BENNER, NRR

THERESA CLARK, OEDO

LES CUPIDON, RES

NICHOLAS DIFRANCESCO, RES

CJ FONG, NRR

ANDREY KLETT, NRR

JEFF KOSHY, RES

SAMSON LEE, NRR

JOHN LUBINSKI, NRR

MIKE MARKLEY, NRR

ROY MATHEW, NRR

KENN MILLER, RES

MARK MILLER, R-II*

JESSIE QUICHOCHO, NRR

TIM REED, NRR

SHAKUR WALKER, R-II

ALSO PRESENT

SCOTT BATSON, Duke Energy

JERRY BONNANO, NEI

ED BURCHFIELD, Duke Energy

DAVID CUMMINGS, Duke Energy

TODD GRANT, Duke Energy

RYAN GRECO, Duke Energy

DEAN HUBBARD, Duke Energy

CHRIS NOLAN, Duke Energy

TOM POINDEXTER, Morgan Lewis Bockius

RAY PRICE, Duke Energy

DARANI REDDICK, Exelon

GREG RICHARDSON*

JEFF SHARKEY, Southern Nuclear

CHRIS WASIK, Duke Energy

DAVID WILSON*

* Present via telephone

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

1:00 p.m.

CHAIRMAN HACKETT: So looking around the table, it looks like we have a quorum. So we can proceed from the CRGR perspective. So I have opening remarks before we turn things over to Scott and his team from Oconee. So I had down here good morning. That's clearly wrong.

(Laughter.)

CHAIRMAN HACKETT: So good afternoon to everyone here. My name is Ed Hackett. I am chair of the CRGR Committee for Review of Generic Requirements. This is our meeting number 449. So it's been a long history that the committee has been engaged on back-fitting issues. This is engaging what I would call step two of our ongoing review of this issue. The -- I guess what we'd -- high level, referred to as the Oconee Cable Separation TIA, which was initiated actually several years ago. So it was TIA 2014-05. I think as you all know, the CRGR has previously met internally with the staff on this matter on September 26th of this year. So as I said, this will be our second portion to hear perspectives from Duke Energy.

So going down our list, CRGR members in attendance are Brian McDermott representing NRR, Scott Moore representing NMSS, John Monninger from NRO, Cathy Scott from OGC and Darrell Roberts, dual-hatting, representing NSIR and Region III. I would also, as we are going through some opening, like to acknowledge the ongoing support of our crack team to support CRGR staff Nick -- Nick DiFrancesco and Les Cupidon, so thanks to you guys for everything you have done setting up the meeting.

So this is a category 1 public meeting. The primary purpose of the meeting is of course for us to hear perspectives from Duke Energy on the subject related to potential back-fitting with this -- with this TIA. And so why are we specifically here? Because -- a couple of things I wanted to say in opening, it's a bit of a deviation from the way we normally operate.

So Brian Holian, who is acting director of NRR, sent the committee a memo dated September 7 where he requested that the committee look into this matter and endorsed the NRC staff's position in the response to the TIA. So as I said, this is the latest portion of a process that started in late 2014 with

Region II's request for assistance from NRR. NRR provided the initial response in August of 2016 and subsequently made a draft available to Duke Energy, which Duke responded to also in August of 2016. Since that time the staff has had an extensive effort internally on addressing the comments from Duke within the last year. And by requests from the CRGR we remain -- we have the updated response made public several weeks in advance of this meeting, so everyone has had the benefit of that, hopefully.

Just a few words about the committee, just in case there's somebody in the room that doesn't know what we do. The charter of the CRGR currently specifies that the committee ensures the proposed generic back-fits to be imposed by NRC unregulated entities are appropriately based on back-fit provisions of applicable NRC regulations. And then the committee recommends to the EDO either approval or disapproval of staff proposals on that basis.

So today we are actually violating our current charter, because we are not supposed to delve into plant-specific issues by the current charter. But we have the approval of our high-level management and EDO to do that. And that will probably result in a change of the CRGR charter in the future since we are delving into a plant-specific issue here.

For today we are gathering information so there will be no decision from the committee in the matter today, as probably no one was expecting. So after this meeting we will deliberate further internally before rendering a decision -- a recommendation that we would make to the -- to the EDO. We will have a public comment period following the presentation from Duke. And those in the room or on the phone line can avail themselves of that at that point.

And it's at this point maybe not entirely determinate as to when that will be. So you will just have to bear with us on that. I will ask our colleagues, any of the members, if they have any opening remarks?

(No audible response.)

CHAIRMAN HACKETT: Okay. And hearing none, I think what has been requested for the phone line -- which I probably remiss in, you know, not checking in on the phone line to start with -- but I think it would probably be a good idea to -- we will go around the table here. Maybe we will check in on the phone lines and ask for folks to identify themselves and kind of go around to who is on the phone line. So if you guys -- whoever is on the phone line, if you could please commence that process now?

MR. BARTLEY: Jonathan Bartley, Region II.

CHAIRMAN HACKETT: Great.

MR. MILLER: Mark Miller, Region II.

(Simultaneous speaking.)

PARTICIPANT: Engineering Planning and Management.

(Simultaneous speaking.)

MR. RICHARDSON: Greg Richardson, Engineering, Planning and Management.

CHAIRMAN HACKETT: Okay, anybody else out there? All right, well thanks very much. I guess we will just go around the table here. I guess we've already done that to the CRGR, but we will just do that again. Again, I am Ed Hackett, Chair of the CRGR.

MR. McDERMOTT: Brian McDermott, Deputy Director, NRR.

MR. ROBERT: Darrell Roberts, Acting Deputy Director of NSIR.

MR. MONNINGER: John Monninger, NRO.

MS. SCOTT: Cathy Scott, Office of General Counsel.

MR. WASIK: Chris Wasik, Regulatory Affairs Manager, Oconee.

MR. BATSON: Scott Batson, Senior V.P. of Operations for Duke Energy --

CHAIRMAN HACKETT: Sorry, the green light needs to be on the microphone. It's the bar right at the front of the microphone -- will activate it.

MR. BATSON: Do it again, or no?

PARTICIPANT: I was able to pick a few of you up through the ones at the top of the table, so I think it was towards the end of those -

MS. SCOTT: Cathy Scott, Office of General Counsel.

MR. WASIK: Chris Wasik, Oconee Regulatory Affairs Manager.

MR. BATSON: Scott Batson, Senior V.P. of Operations for Duke Energy, South Carolina sites.

MR. BURCHFIELD: Ed Burchfield, Plant Manager at Oconee.

MR. GRANT: I am Todd Grant, the Engineering general manager at Oconee.

MR. GRECO: I am Ryan Greco. I work in Electrical Design in Oconee.

MR. PRICE: Ray Price, Electrical Engineering Manager at Oconee.

MR. NOLAN: Chris Nolan, Director of Regulatory Affairs for Duke Energy.

MR. HUBBARD: Dean Hubbard, OR Director at Oconee.

MR. MOORE: And Scott Moore, Office of Nuclear Materials Safety and Safeguards.

CHAIRMAN HACKETT: Thanks. I guess that completes our introductions around the table and on the phone line. And I guess before I turn it over I just wanted to thank you guys for the interactions we had in advance. Hopefully setting this up for a successful interaction allotted credit to -- to Chris and Chris for interactions with myself and staff here for -- for the preparation. So I appreciate that. And I guess, Scott, I will turn it over to you.

MR. BATSON: Okay, thank you very much. Good afternoon. We -- in terms of Duke Energy and the Oconee Nuclear Site, we just want to thank the Office of NRR, Mr. Holian, for actually making the request that you referred to earlier to have this come before the CRGR for the committee's review. We very much appreciate the opportunity that the CRGR has offered to us to come and actually present the information -- our perspectives on the information that is currently contained in the draft TIA, specifically with the Oconee station cable design.

If you go back in history with Duke Energy and specifically Oconee, there's been a number of issues over the years that -- that we have worked through in conjunction with the NRC. I will tell you that my personal involvement with Oconee Nuclear Station -- I recall a time when the -- there was a -- more of debate relative to some of the technical issues and challenges that we faced at Oconee. And we do believe that there's a different approach for Duke Energy and for the Oconee site now in terms of differences on technical opinions and issues that both the NRC and Duke Energy has.

And we believe that some of those examples recent -- will resonate with some of the folks that are here as members of the CRGR -- one of those being our transition to NFPA 805, completion of the Protected Service Water Project and all of the work that was associated with that. After a start that didn't deliver the initial results that we desired in terms of the Protected Service Water Project, six mile stones were set -- agreed upon by the NRC. And we met each and every one of those with margin in terms of the date.

It was over $1 million investment in the Oconee nuclear site -- I am sorry, $1 billion investment in the Oconee nuclear site that addressed both regulatory concerns and increased the -- the safety margins associated with the station -- provided a lot of additional options in terms event mitigation.

Also there was an issue relative to external flooding associated with the Oconee site. And worked with the NRC to come up with the appropriate plan and approach to that. We worked aggressively to complete the modifications even before the issue has been completely resolved in terms of the approved analysis for flooding. And so we -- the Oconee site, Duke Energy, took that on ourselves to go ahead and execute those modifications. Those are all complete now as well.

Specific to this issue, the cable separation issue that came out of a -- a 2014 CDBI inspection. There were issues that were raised in that were specifically associated with how cables were routed inside of a trench that comes from our emergency power supply, which is the Keowee hydro station, and the type of cables that were used in that application. We recognized and accepted the concerns that were presented through that -- through that inspection. And we have -- we have already taken actions to actually resolve or eliminate some of the design concerns that were expressed through that inspection and the exchange that we've had since.

That -- that's the -- was the primary issue that was originally documented in the TIA. Now interwoven in the TIA, we believe, are a number of other issues that really get -- get into some of the original design and licensing basis for the station. So what we present today -- we will go through and very specifically address the actions that we have taken in response to the concerns with bronze tape cable and how it was used. We will talk about the modifications and actions we have taken to eliminate or -- or what we believe to address the concerns of the NRC -- very specific to how that cable is routed and the use of that specific type of cable.

What we really want to focus on today -- and the heart of our presentation will be around four issues that we believe -- that are really part of the fundamental and original design and licensing basis for the site. These are interwoven throughout the TIA draft response as we read it and as we understand it. So we have attempted to pull those out specifically. We want to present those to the committee for your consideration and provide our perspectives, relative to what we believe is the original design and licensing basis for the station to -- to -- with the desired outcome that we can come to agreement relative to how the positions -- or what the implied positions in the TIA may implicate -- those original design and licensing basis.

So with that, if there's no questions relative to the opening, I will turn it over to Ed Burchfield who will begin our presentation.

MR. BURCHFIELD: Thank you, Scott. If we will move to slide 5. I would like to reiterate our commitment to safely operate the three Oconee units as -- as Scott mentioned the protected -- the protected service water modification was installed and one of -- and completed within the last year.

One of the reasons it was installed was to support the transition to NFPA 805. That was a significant investment by the company -- in excess of $1 billion and also resulted in a very significant reduction in plant risk. Approximately a 20-percent reduction in core damage frequency for internal events and it reduced our fire risk by approximately half.

That investment is a tangible action -- it is a reflection of our commitment to safety. Conversely, if you look at the risk associated with the issues raised in the draft TIA, our risk analyses determined they were on the order of 1E-09 in core damage frequency. We also had a senior reactor analyst from Region II visit the site, perform his assessment, and he concluded that if a violation were to evolve out of the unresolved item, that it would end up being green in terms of its significance.

We have been responsive to the staff's concerns regarding our cable design. We have performed testing, modifications and engineering analysis. Some of these changes were proactively submitted to the NRC under 10 CFR 50.55(a) as an alternative submittal. And as Scott mentioned, we -- we are less concerned with the very specific issues of the underground trench and much more concerned about the broad-reaching implications on our design and licensing basis with some of the positions that are documented in that TIA.

So if we move to slide 6, I wanted to provide a little bit of perspective on bronze tape. The -- just to -- to give a little bit of background. Oconee has two emergency power sources. They are the two Keowee hydro units. One of those units feeds the plant through our switch yard, through what we call an overhead path. And the other feeds the plant through an underground path.

The original design of the plant used bronze taped cable for both the 13.8 kV main power supply and then also a 4 kV cable for auxiliaries. That was direct buried cable in the original design. About 15 years ago we undertook a modification from an equipment reliability perspective to replace those cables. As part of that we installed an engineered concrete trench that ran from Keowee up to the plant -- that's over 4,000 feet length.

And looking at that design, the alternative that was superior from an equipment reliability and safety perspective was to continue to use the bronze tape cable. And the reason is that with that cable design we did not need any splices along that 4,000-foot run. And typically, you know, the probability of a failure in a cable goes up when you -- we get splices in it.

We did use engineering judgment rather than testing to support that -- that design change as it related to documenting the adequacy of bronze tape in the underground trench. And we previously communicated that shortcoming to the Region. As Scott has indicated, we have been proactive in addressing potential safety concerns that have been raised by the staff. We did testing at KEMA facility in Pennsylvania. That test was on bronze tape cable and it attempted to create a multi-phase fault from an induced ground fault.

We were not able to produce that result and demonstrated that a fault in one cable would not propagate to another cable. We also completed a number of modifications at the plant. Those completed earlier this year. We abandoned the control cables in trench 3. That's the trench that runs from Keowee to our underground -- to our transformer, CT 4, which is the transformer for the underground power path.

So all of the control cables in that trench have been abandoned in place, not used, and we only have power cables running through the trench. That eliminates any power-to-control cable interaction that could possibly occur. We also installed enclosed raceways in accordance with industry standards at Keowee in the power house, as well as in our protected service water building in its cable spreading room. That provides the protection between power and control cables -- and additional margin in that area.

There's a commercial power line that comes in and can power up the PSW system -- and we call it the Fant line. That is a non-safety line that -- that provides that power to the PSW building normally. And it was originally run through what we call manhole 6. And that was one of the concerns raised during the CDBI and in the TIA is that that -- interactions between that commercial power cable and the other cables in our PSW duct bank -- we have abandoned that power cable and we re-routed it underground up to our protected service water building, where there's no way it can interact with any of the cables associated with our emergency power system.

We also resolved DC interactions in our Keowee emergency start panels. But the other item that we have pursued is we -- we proactively submitted an alternative under 10 CFR 50.55(a) to obtain NRC approval of the use of the bronze tape. So we have expended considerable efforts in addressing the uses of bronze tape and have provided information to the NRC staff for review and approval.

However, the -- the draft TIA goes far beyond the specific issue of bronze tape. And there will be four issues that we want to address in some detail today that we believe have some far reaching implications with respect to our licensing basis. One is the crediting of armored cable for electrical separation. Another is the single-failure criteria that's applied to separate cables. The third item is single-failure considerations regarding equipment quality classification. And the remaining item is the timing of the single failures for emergency AC power system.

Oconee would request that the committee consider these issues individually. At the end of this process we would like to achieve clarity in the TIA's position on the Oconee licensing basis. As we read it right now, we could see it interpreted in a number of different manners. So if there aren't any questions for me, we will go into the specific issues and I will turn it over to Todd.

MR. GRANT: All right. Good afternoon. The first item I would like to speak to, as Ed has mentioned, is associated with crediting cable armor for electrical separation. So I've got a sample of a interlocked armor cable that's here. It's typical to the design that's used in our plant and just to orient you with this, since I will be talking about some terms associated with cable up -- for this afternoon.

So it's a typical plant cable. You can see this is a three-conductor cable -- inside the shiny copper is the three conductors that carry the electricity. On the outside of each conductor itself there is a strand -- a conductor shield. You have the insulation material and insulation shield around each one of the conductors.

The black material in here is -- it's basically fill in there -- filler material for the cable construction. This little conductor here without the insulation -- it's basically a grounded conductor -- grounded cable that runs the whole length. And when we talk about armor, we are really talking about this outside metal barrier, right, that encompasses all three of the conductors of this particular case. Okay.

So cable armor is mechanically strong. It's a flexible sheath which can be applied over a variety of different cable core materials. And it's there to protect from the failure of nearby cables. So it's a barrier. It acts as a barrier to protect the failure -- from the failure of nearby cables.

A little bit later on I will talk about -- and I will use the word conduit, all right? And so this is a piece of conduit, right? It's a metal conduit. It's flexible. It's mechanically strong sheath. It can go over a variety of different types of cables. It can be pulled inside flexible conduit. And it there too -- it is to protect from the failure of nearby cables as well. For just a point of reference.

So the use of armored cable for Duke Energy was approved by the NRC. Right? For Oconee and really for McGuire and Catawba as well as those plants were designed and licensed. Documentation through the years of the NRC's approval of the use of armor in its cable design -- as we went through the seven -- the three sites, the seven different units, became increasingly more. So there's more detail in the McGuire licensing, right? Their FSAR and Catawba than there -- than there are in ours. But the concept was there from in the beginning and carried forward.

There's an excerpt from the original FSAR. It's from March of 1972. It's Chapter 8 of the FSAR, Section 8.2.2.13. There's a statement that says there in part -- says, it's our intent wherever physically possible to utilize metallically armored and protected cables in our cables designs systems. So it was known, communicated from the beginning.

So the cable armored design along with the routing paths that we took in addition to the separation requirements that are prescribed, right, in the UFSAR section that I've talked about -- shared with the staff, detailed with the staff and was a part of our review and part of our safety evaluation that we received.

McGuire similarly, our sister site, they used the armored cable design as well. In addition, as a part of their licensing basis, right, increasingly more documentation involvement. In 1975 there was tests performed -- it was basically fault testing on the armored cable design. It was performed by Westinghouse at their power labs at the time. The test reports and involvement -- the NRC has reviewed that throughout the years, right?

And basically that testing demonstrated that no fault propagation or impact to adjacent cables when using the armored design -- as McGuire was using -- as we were using. NRC approved McGuire's SER in 1979. Catawba as well -- our third generation of plant -- used the same armored cable design and their safety evaluation was approved in 1983 as well.

The design standards utilized by Duke Power at the time was oversaw by our chief electrical engineer. His name was Mr. C.J. Wylie. Mr. Wylie was recognized as an industry leader and an expert with respect to cables, cables designs, and is also an IEEE on nuclear power standards -- actually was the chairman of IEEE subcommittee. Mr. Wylie served as a member of the ACRS as well for a little over a decade -- from 1984 to mid-1996.

He wrote in an industry paper -- he was reviewing a peer's proposed cable design guidelines. In 1976 he wrote a paper, and I would like to share some of the excerpts from that paper with you -- really in the context of showing that the armored design was intentional. It just didn't happen, right? There was a purpose behind it. And it was intentional not only for Oconee's design, but for McGuire and Catawba's use as well.

In that paper he cited how armor prevents the spread of fires and protects the cables from outside influences or damage. In order to mitigate common mode failures of redundant safety channels. He surmised in that report that he wrote that with armor essentially each cable is within its own steel conduit. That's it -- ties back to the conduit example that I showed. So with armor, it basically -- the cable has its own built-in conduit. That's the point that he was making there. Right.

Therefore it reduces the concerns for elaborate segregation designs and complexities. He also later on in that report talked about the extensive testing that I mentioned in 1975 where Duke had conducted -- and basically concluded -- that with an armor cable installed properly, even cable -- he used the word blowups, but cable faults of maximum intensity will not have an effect on adjacent power cables or adjacent instrumentation or control cables directly above or below the cable. So that was shared.

The use of armored cable, as I mentioned, it was intentional. All right, it came as a large investment to Duke Power Company at the time. All right? It is a great expense or cost over what the rest of the industry what the industry was typically using -- unarmored cable. But thought to be very prudent in our design by efforts -- in licensing efforts going forward for our stations over the non-armored cable designs.

Slide number 9. So the draft TIA position -- specifically the response to Question 2.j, states the cable armor cannot be credited for preventing short circuits or limiting fault currents and voltages. We believe that this is a new regulatory position for Oconee in that armored cable may not be credited with respect to cable separation.

The draft TIA position documents in Question 2.j -- it doesn't address Duke Energy's licensing history or accept the practices with respect -- with regards to the armored cable. Oconee's cable design, it's installation practices, including the routing and separation distances, were based upon the NRC's accepted use of armored cable not only for Oconee, but as I talked about, for McGuire and Catawba as well.

Slide number 10.

MR. MONNINGER: So Todd, this is John Monninger from the staff. If I could just ask maybe a question or so. So, you know, in Duke's assessment of the issues out there, you know, it's clear that this is part of, you know, your licensing basis. And the failure -- you know, can propagate to adjacent cables, et cetera. So why do -- and I assume the staff -- I mean, this issue has been out there for three-plus years, which is a pretty long time. And I know Duke has probably spent significant time in it and the staff has also.

So does the staff have access to all the same information? And if they do, why do you believe that different conclusions are made with regards to the exact same information? Why is there a disconnect?

You know, if both parties are privy to the same information, you know, what is it that leads Duke to one conclusion and the staff to another?

MR. NOLAN: John, this is Chris Nolan. I will just start and Todd can finish. So for the past number of years under the TIA process there has been hardly any -- maybe no interaction between the staff and Duke. So in many ways we can't answer your question. We know the CDBI was extended beyond its normal five-week period and it went on to -- I don't want to guess, but it was less than 20 weeks. But maybe somewhere along 15-weeks long.

And in the terms bronze tape and armor became commingled. So they mean very different things to us, and that's one of the reasons why we're here. And one of those is on our presentation. So in this document -- referring to the draft TIA -- it's very clear to us that the staff is taking a position that cable armor -- which Todd showed and is part of the integral design for Oconee -- cannot be credited for electrical separation.

So we are not sure if the basis for that is reflected on the staff's position on bronze tape, which Ed talked about, or whether that was a conscious decision. But that was -- the intertwining that we see, and because the TIA process is deemed pre-decisional, we can't answer your question about the staff's knowledge or what the staff was thinking because we're not really -- this is really the first public forum we have had to talk about it in a number of years.

MR. BURCHFIELD: So let me just try to add a little more perspective on that, John. We are -- there is alignment, I think -- technically -- that the use of the bronze tape when you go look into the details of it from an engineering perspective of -- when we move from direct buried over into the trench, we should have had a sounder basis testing analysis to demonstrate that it was acceptable. And we agreed with the team that that was a gap we needed to address. And we've addressed that through our modifications in the submittal that we've made.

The part that is concerning to us is extrapolating that out to a conclusion that the armored cable used throughout our power plant -- that we based the entire -- all the cable -- I mean, thousands and thousands of cables -- that that is flawed -- that design and licensing basis is flawed.

And one could read the TIA to reach that conclusion, which is what we really want to make sure does not happen.

(Pause.)

MR. MONNINGER: So maybe just a follow-up. And I recognize it's a pre-decisional process, but with that, I would assume -- and it's an assumption, because I said I would assume -- you know, the staff through the inspection or through Region II or Headquarters, documents have been requested. You know, and it doesn't just end with the exit of the CB -- you know, the inspection back in 2014 until you get a TIA. I would assume that somehow there's interactions back and forth on documentation -- a history of the licensing and design basis. Whether there's a explicit -- not an RAI, but, you know, whether -- you know, it's the residents or regional-based inspectors -- or a question coming through the PM.

MR. NOLAN: So the last interaction we had with the staff on this issue was August 2016. And prior to that I don't believe we had any interaction after the TIA was put in place formally. We did have a lot of interaction with the CDBI team --

(Simultaneous speaking.)

MR. NOLAN: Before the TIA was put in place. But there were strong opinions and vocabulary issues about the distinction between bronze tape and armor. If you call bronze tape armor, then you get one conclusion. But you understand what we refer to as armor, and you can draw another conclusion. And since armor and bronze tape are both discussed, you know, that's the intertwining and the confusion -- the potential for multiple interpretations that were discussed. If you read it that the staff's sole discussion is about bronze tape, well then that would give you a different conclusion than the one we are reading because cable armor is different than bronze tape.

MR. MONNINGER: Thank you.

MR. McDERMOTT: This is Brian McDermott just to -- to dig a little deeper into that issue. So the -- I believe coming out of the inspection there was an assertion perhaps initially or early on in this activity that the bronze tape was equivalent to the armor. And that was kind of at the beginning of this --

(Simultaneous speaking.)

MR. BURCHFIELD: This is Ed Burchfield. That is correct. And I mean, that's our engineering position. We've done -- like I said earlier, we used engineering judgment originally to say that it was acceptable moving it from direct buried into the trench, but we followed that up with mechanical testing, follow-up testing, engineering calculations. And from our perspective it demonstrates an equivalency in terms of the function it performs.

MR. NOLAN: But at the time we didn't have that information. So at the time we believed that bronze tape can perform its designed function for the applications we used it. So it could perform its safety function. Armor is different than bronze tape.

So yes, we made an equivalency and we've done a lot of work to demonstrate that after the fact -- that we didn't have that information at the time the CDBI team exited.

MR. McDERMOTT: And the staff has been provided that testing data?

MR. NOLAN: We submitted it under the alternative.

MR. McDERMOTT: Under the alternative -- okay.

MR. NOLAN: And that would have been February, twenty --

PARTICIPANT: Sixteen.

MR. NOLAN: 2016.

MR. McDERMOTT: Thanks.

MR. BATSON: So Brian and John both, I mean I want to make sure we are providing you the answers that you need in terms of the committee's review of this. But I also want to point out that in terms of the questions and the dialogue around bronze tape, we believe that we have addressed the issues even though we have a different technical opinion in terms of the use of bronze tape by the modifications that we've done where it was applied since the time the issue was originally presented.

Our concern is how the terminology in -- of armor, whether it is bronze tape or metal-jacketed interlocked armor -- how those were being intertwined and how conclusions about the capabilities of armor or armored cable implicate the original design of the plant and how it's used throughout the plant.

MR. BURCHFIELD: And just to be clear, so we will -- the resolution of the bronze tape questions is a combination of the modifications we have already implemented as well as the 50.55(a) alternative submittal. Those two together we believe would bring closure to the -- to any issues with our use of the bronze tape.

MR. McDERMOTT: Thank you.

MR. GRANT: All right. On slide 10. On slide 10 -- first of all it says that separation is accomplished -- talking about Oconee -- separation is accomplished through the use of distance and barriers. Information on cable routes, separation distances, cable construction -- we've talked about including the armor -- as a barrier has been contained in the FSAR sections -- I mentioned earlier chapters 7 and 8 -- since the initial license. This -- the FSAR information is available to the NRC. Obviously received a -- an SER and found it acceptable for Oconee's design.

If you look prior to the SER just the concept and the use of armor. There was a -- in December of 1970, Oconee correspondence between the Atomic Energy Commission described the philosophy around the use of armored cables that Duke was employing. It says that the Duke Energy design incorporates cable armor to serve as a protected barrier that acts much of the same manner as flexible conduit -- that I have showed you here.

Essentially it's -- each cable has its own conduit built in by the armor. Slide 11. Some more standards -- an endorsement of a barrier such as armor, right, as a separation barrier. So on this slide there's -- there's a couple of pictures. The picture on the left -- down at the bottom on the left is basically conduit -- all right, the two pieces of flexible conduit -- metal conduit, right, without the jacket. The one has the black jacket on the outside. Right? It's very -- very similar, right, to what I'd showed earlier. Piece of flexible conduit.

The picture on the right is armored cable. Very much like the piece that I am holding here, right, where you have the conductors inside. And then the armor -- the barrier that's on the outside as well. All right.

With respect to the standard, the NRC -- the standard referred to is IEEE standard 384 is endorsed by the NRC in Reg. Guide 1.75. It reaffirms the principle, right, of separation being accomplished through distance and barriers. For example in the standard it makes reference to an enclosed -- enclosed configuration, which is basically two conduits. Right? Two conduits side-by-side.

And it basically says that the guidance prescribes a separation distance as -- as low as 1-inch is what's approved for that. So when you compare the Oconee design with the use of armored cable, right, it's much like the use of conduit -- it has its built-in conduit. Additionally, the Oconee -- if you look into -- in the power plant, the design of its cable systems, we maintain a 5-inch cable tray rail-to-rail separation for our trays.

Slide number 12. We have identified other incidences where the function of cable armor, right, has been acknowledged and shared back and -- between staff and Duke. In May of 1993 there was electrical distribution system functional inspection. There was a report that issued. And the basis for the comment that's captured here, during that inspection we found two trains of an LPI -- discharge valve -- that was routed -- a portion of its route, right, two separate trains was in the same cable tray. Right, and that was contrary to our standards, so we corrected that.

But the NRC made the statement in -- in the EDSFI report it says the safety significance of running two cables in the same tray is mitigated by a unique design feature at Oconee of installing cables in armored jackets. That was 1993. More recently in 2010 as a part of the NFPA 805, by transition the safety evaluation, there's an excerpt from that safety evaluation that says that the NRC staff finds the Licensee has adequately addressed the issue of grounding of the armored cable. The armor is grounded, right? What I've talked about.

So we've addressed the issue of grounding and of armor to preclude inter-cable shorts -- or basically cable-to-cable shorts. The fact that you ground that armor -- we've addressed that.

So based upon the licensing information -- right, that surrounds Oconee originally and long-standing practice of the use of armor, Oconee requests that the CRGR recommend reconsideration of the draft TIA response with respect to crediting of armor for cable separation on the basis that it represents new regulatory position to us. That's all that I have for position number one. Questions?

MR. ROBERTS: This is Darrell Roberts from NSIR. Going back to your slide on page 12 where you made reference to the safety evaluation from the NRC for your NFPA 805 transition -- the quote there that the NRC staff found that the Licensee had adequately addressed the issue of grounding of armored cable to preclude inter-cable shorts. Is that the only fault for which that was -- the only type of fault for which that cable was evaluated or reviewed for this purpose?

(No audible response.)

MR. ROBERTS: Was it just inter-cable shorts that were evaluated for this purpose? Or were there other electrical faults that were also looked at?

MR. GRANT: As a part of the 805? Or just a part of our initial --

MR. ROBERTS: As a part of the 805.

PARTICIPANT: You want to answer that, Ray?

MR. PRICE: Ray Price, Duke Energy. That -- that was one issue brought to it. But all in all, throughout the -- the review, armor was used as a basis to look at the inter-cable shorts. There were some other shorts analyzed. I'd have to go back through the entire license in places to fully answer your question.

MR. ROBERTS: Okay, thanks.

CHAIRMAN HACKETT: Todd, I guess I had -- this is Ed Hackett -- I had a similar thought, just more for understanding. So the -- the preclusion of the multi-phase short is strictly a function of the barrier? It's a function of the armored jacket and the -- and the -- I guess the flexible jacket on top of that.

MR. GRANT: You use the word the preclusion of the multi-phase?

CHAIRMAN HACKETT: Right.

MR. GRANT: All right, so I think what the document is saying here is that cable-to-cable shorts -- it precludes the cable-to-cable interaction. Within this cable there's multiple conductors so you can have a multi-phase fault within this cable. But the use of the armor and the fact that the armor is grounded as well as each of the conductor shields. It precludes the cable-to-cable interaction.

CHAIRMAN HACKETT: Got you. And now where does IEEE -- I'm not an electrical engineer. I think most of us are not. And we have gotten a lot of -- we have the benefit of a lot of discussion with the staff on this. But nevertheless, where is IEEE on that determination? They -- they clearly agree with that's the case with conduits but not with armored cable? Or they agree that there's this equivalence that you guys are maintaining?

MR. GRANT: The -- the IEEE standard 384 that I made reference to, it has the enclosed enclosed, right? Which is basically two conduits makes that example. And that can be the required separation for two separate safety trains. Right? You can have 1-inch separation. So that's where that's endorsed.

MR. BATSON: But just to make sure, and Ray you guys and -- make sure that I don't misstate -- misstate this from a technical standpoint -- your question was how does the IEEE standard align with the conclusion that Todd has presented about a cable-to-cable interaction, or consequential interaction?

MR. GRANT: Correct.

MR. BATSON: And the IEEE standard would

align with what Todd said. That as long as it's within a conduit or armor, that you would not have consequential interaction.

MR. PRICE: A barrier.

(Simultaneous speaking.)

MR. PRICE: The IEEE 384 -- and Ray Price, Duke Energy -- I am actually a member of the working group for IEEE 384 as well. That standard speaks to flexible metallic conduit. The position being stated here is if you look at these technically the -- the flexible metallic conduit versus the armor, it's the same material properties. And so the standard does endorse that concept of an enclosed barrier, enclosed raceway, precluding short circuits and minimizing separation processes.

So with that information -- and the standard also allows for you to add your own analysis and so forth on top of that. So they talk about the standard allows the flexible metallic conduit, grade material you're seeing from it -- and look at that and compare the mechanical properties to the armor, it's an extension there.

MR. NOLAN: To summarize it, our design and licensing basis is that we have two adjacent cables. The failure of one will not prevent the other cable from providing, performing a safety function. So they would be two independent failures.

MR. BURCHFIELD: Separated by five inches, that's our requirement for.

MR. MONNINGER: This is John Monniger. Maybe a follow-up question. You know, the SER on NFPA 805, you know, the transition to risk-informed fire protection program. You know, the context of the review or the context of this write-up, you know, this fire movement to risk-informed approach, you know, and fire PRA.

I'm not, I wasn't involved in the review, but I'm asking, you know, you can have an issue that is addressed and resolved differently in traditional design basis licensing basis, versus an issue that is addressed in appropriate, resolved in a risk-informed framework.

You know, there may be things that are within PRA space viewed to be too low a frequency or inconsequential, etc., so they are adequately addressed within a PRA or a risk-informed approach. However, they don't, they may not necessarily meet your deterministic licensing design basis approach, you know, your Chapter 7 or Chapter 8.

So with regards to whatever was evaluated or said with 805 in the context of this SER, is it in terms of the risk-informed approach, or is it in terms of your traditional licensing and design basis? Do you understand the distinction I'm trying to make there, or?

MR. BURCHFIELD: We do. And we would agree, this is Ed Burchfield, we would agree with your characterization, John. The point that we were trying to make in this slide is more another source, a technical reference that wasn't technically what we're doing.

But we come back to from a design basis perspective, we go back to the stuff Todd described, which is what we originally submitted, the history of our reliance on armored cable, the five inches of separation that's documented in our design basis.

And when you look at this IEEE 384 standard, of which we're not licensed to, but if you look at the technical aspects of it, go through the thought process Todd just described, it supports why that original design for a cable was a safe design. That's really the point we're trying to make. And then you would not have a multi-phase fault in an armored cable propagating over into another one.

Now in a minute, we'll talk about a different scenario, but this is the one that has broad-reaching implications with respect to the overall design of the Oconee Nuclear Station.

MR. NOLAN: So John, the point of bringing this up is to show that from Duke's perspective and as communicated to the NRC, it is our design, and the NRC was aware of that design. The specific approval that was done under that SER was in a fire context.

But in the late 60s and early 70s, fire and faulting weren't separated. And so the fire was from fault. And so our original design basis and our licensing basis is that the armor protects one cable from the fault of another cable.

MR. ROBERTS: Chris, on that note, this is kind of where I was getting a little confused. I certainly don't have access to the original licensing documents for Oconee. And I heard a lot during the presentations referenced to NRC having approved the use of armored cable, and having approved the use, and having approved the use. I heard that a few times.

And maybe you can correct me if I'm going off on a bad path here, but approving something for use and approving it for use with the explicit intent to do X or to accomplish or to protect against X, whatever X may be, to me are two different things.

And so I guess I'm trying to get some clarity or some understanding as to when you say that the NRC in previous licensing documents had approved this for use, use of armored cable for use, that it's not just a descriptive sort of reference, if you will, in your final safety analysis review or report. Versus it was approved for use and provides the following protections, or meets the following regulatory requirements.

MR. NOLAN: It was our method of providing electrical separation. One of the challenges both of us face is that the level of detail on the Oconee FSAR is commensurate to the state of the art at the time. But as licensing of plants evolved, the level of detail increased.

So to answer your question, I would point to the McGuire FSAR, where the same electrical separation arrangement was approved, and the staff observed the testing that we performed, where we actually put two cables adjacent to each other, created a fault on one to show the other one would still be able to perform its safety function.

And in the McGuire FSAR, I believe it talks about faulting induced fires. And so if you look at the consistency of the staff decision making through the multiples licenses that, as approved by Duke, or approved by the NRC for Duke, it's hard to ignore those subsequent approvals, because it's a consistent application of the same theory, right.

You know, Duke was able to design and, it built, designed, and operated its own plants. It decided to go to the armored cable as a way of providing enhanced protection. It is our method of separation.

MR. BURCHFIELD: And Darrell, this is Ed Burchfield. I'd just like to elaborate a little bit on a point, which is the original design and the current design for the cables. The cable trays were installed five inches rail to rail between redundant trains with armored cable.

And we can go, we will not be able to provide, here's all the documentation that describes it in detail, either from the AEC or Duke Power at the time. But we believe, from a technical perspective, if we had not used armored cable throughout the power plant, we would have ended up with a different separation criteria besides the five inches.

So our separation is a combination of armored, jacketed cable, and the separate, the distances that are described in our licensing basis.

MR. ROBERTS: Thank you for that. Appreciate that.

MR. PRICE: Mr. Roberts, Ray Price. Just kind of expand upon your question. If you walk through when those words entered the FSAR -- the RAI --- it was in response to questions about cable routing separation, protecting cables. So if you follow that stream, you do get that interesting point.

MR. MONNINGER: So maybe a follow-up question. Duke designed, constructed, built, etc., Oconee, McGuire, and Catawba. I recognize all three received their licenses at different times, and you know maybe six years or so. But in terms of the original application maybe between Oconee and

McGuire, were they in the same time frame and just significant delays?

So you're trying to, you know, make some type of argument that additional insights on the licensing basis or design basis from Oconee because of a smaller FSAR, etc., could be gleaned from McGuire or a Catawba.

But in terms of the original construction permit or the operating license of Oconee versus McGuire is time frame, or I mean years apart, or? Do you understand my question?

MR. GRANT: I think you're asking me is the chronology of the licensing issuance, is that the same as the chronology of the design and the operation of the plant?

MR. MONNINGER: Well, was there a huge gap due to construction issues at McGuire versus Oconee or Catawba? Were they all, you know, one year apart and it just so happens due to the AEC and the NRC back then, you know, they end up being nine or thirteen years apart? You know, some plant, like Watts Bar, you know, 30 years to be licensed.

But you know, so I'm just trying to question about -- are you trying to make some type of argument that additional details of the design basis or licensing basis for Oconee can be gleaned from McGuire and Catawba?

I'm just wondering in terms of the original design and licensing construction permit, or same people or same organization as within a year apart, or you're a generation apart?

MR. BATSON: I don't if there's, I think, bottom line, we need to know when the license was approved for Oconee and when it was approved for McGuire.

MR. WASIK: Slide 8. Chris Wasik. You have it all --

(Simultaneous speaking.)

MR. MONNINGER: That's what it construed. But the original design, I mean if Duke originally undertook all three of those plants within a year of each other, or as a, you know, a fundamental, you know. It's clear that when the licenses were issued is 13 years apart, you know, ten years and three years.

But their original design, are they within the very same short window?

MR. NOLAN: So John, the same design

organization worked on all their different designs, Oconee's a B&W design, Catawba and Westinghouse -- I mean Catawba and McGuire are Westinghouse designs. It was sequential, but I don't know the exact spacing, and we can get you that information.

MR. MONNINGER: I mean we can find it from our regulatory digest.

MR. NOLAN: But I think the NRC was going through a lot of change when you look at those periods, when you look at the FSARs for the plants that were designed and came online in the late 60s/early 70s, versus mid-70s and late 70s, you know. Their licensing documentation's very different.

MR. GRANT: But throughout that time period, Mr. Wylie was the chief engineer, right, who was over the engineering organization responsible for these aspects that we're talking about.

PARTICIPANT: Yeah.

MR. BURCHFIELD: We had a civil engineering department and design engineering, a mechanical, and then an electrical. And they covered all three, Oconee, McGuire, and Catawba.

MR. GRANT: All right, issue or Topic 2. I'm on slide 13.

MR. McDERMOTT: I guess I just want to make, before we leave the first position here, I just want to make sure I have it clear in my mind.

The TIA question 2.j, the NRC headquarters attempted to address questions that the inspection team had relative to the equivalence that was asserted between the bronze tape and armor. And that's what they were trying to address in here, right, if you look at the question.

Because at the time, Duke had asserted that the two were equivalent, and so they're walking through an argument as to why they're not equivalent, that shielding and armoring are two different things.

So I understand your concerns about the implications for armored cable in other areas, but what this is also asserting, if you will, is that, you know, bronze tape isn't armor. So from a testing perspective and demonstration, they point to some of the information that was provided. I guess the inspection team, not as part of the more recent licensing request.

Is there a, other than separating the two issues, is there still an issue where these things come together, other than the exemption? In other words, you've removed the shielded cable from the equation, I thought, right. By taking it out of the trench, it only crosses in the manholes. That's the subject of your license amendment request.

MR. NOLAN: So I'll answer your question in two ways. The first is there are statements where, you know, interlocked armored cable are not acceptable. That is not bronze.

MR. McDERMOTT: That would be, I understand, you --

MR. NOLAN: And the second is in the last four years, this issue has evolved quite a bit. And the understanding of the issue has evolved, and we've taken a lot of actions. The TIA is asked and answered based on what was known at the time.

So inherently, it's very confusing because the configuration that it's talking about doesn't exist. Also inherent is an intertwining of issues, cable and bronze tape. And so one of the feedbacks that we're giving is the structure of the questions combined with the answers that aligned along the structure create inherent confusions for two reasons.

One, it intertwines concepts that are

separate. I mean, we were drawing an engineering equivalency. They both provide the same function. We believe bronze can do its safety function, just like armor. They are not equivalent. One, they're very different mechanical constructions, right.

So equivalency and equivalence are different words. And so what we're really asking for is clarity. So what is the staff's position based on the Oconee configuration today? And I guess the question I would ask the CRGR is does the structure of the, does answering the region's questions along the same structure serve the regulatory purpose?

Or would approaching it the way we have approached it, which is breaking out into the component parts, provide more clarity? Because from an extent of condition standpoint, it's much easier to apply if we know the staff's positions on each one of these issues.

MR. McDERMOTT: Thanks, Chris that's all.

MR. GRANT: All right. The Topic number 2. Topic 2 deals with a single failure for separate cables. Single failure for separate cables.

So Oconee analyzes all failure modes applicable to the design, design of the component, design of the system, since we're talking about cables and electrical. We analyze for phase to ground faults, we analyze for multi-phase faults or three-phase faults, or where the design deems applicable.

We also consider the effects of faults, or consequential faults, as a part of our analysis. And what I mean by that is that you have a fault in one component, right, and the effects of that, there's an adjacent component there. What's the effect, what's the consequence on that? We consider that as well for the design that we have.

The draft TIA position, the response to questions specifically, 2.b & e, implies that Oconee is required to analyze for combinations, or multi-phase short-circuits, as well as ground faults in separate cables to meet the single failure requirements of the IEEE Standard 279, and then clarified by the subsequent 77 SECY.

We believe this is a new regulatory position, in that Oconee's required to analyze for cable-to-cable multi-phase shorts in separate cables to meet single failure requirements.

The issue's not about the IEEE standard. Oconee agrees that the single failure criteria about

IEEE 279 is part of our licensing basis. It has statements in the IEEE Standard 279 that says, Include such events as shorting or opening of circuits, which I've described that we do analyze for both, the circuit goes away or the circuit shorts, of interconnecting, right, from the component to component.

It also has words in there speaking to the credibility of single failures. IEEE 279, it doesn't prescribe, it's a very short document, so it doesn't prescribe very detailed, right. For example, for cables, these ten things, go consider that. It's a higher level document, talks about consider the plausibility of the failures, the items that I just have mentioned, short circuits or open circuits.

SECY 77-439, obviously a 1977 document, it was issued after the licensing basis, so the benefits of its clarification or understandings at the time was beyond the licensing basis for Oconee.

Oconee believes that design attributes can preclude certain failures modes from occurring or consequentially impacting equipment. So the design attributes can preclude failure modes for system or components that you have in place.

Slide number 14. On this slide at the bottom is a picture, an illustration, of there's five separate cables that are here. The cables on the right picture is three conductor cables, much like the one that I have here. Right here is an example we talked about earlier. It has three individual conductors inside of it.

The three separate cables on the left are examples of single conductor cable, like the example that I have here.

So with the single cable with multi-conductor design, like the one I have in my hand or illustrated in one of the cables, right, in the picture at the right, like Ed said, this is like the majority of the cables that are in our plant.

What we analyze or assume with this single cable is that it fails, right, it fails in every way possible. It fails with single failure at its end component, right, both ends component, it failed. We assume that this cable fails internally, right. It has three conductors inside, so we would assume that this device, those conductors failed together, resulting in multi-phase or three-phase fault.

So we analyze for those failure modes. We also consider the consequential failure, right, the consequence of this failure and the impacts that it would have on an adjacent component. So we analyze for that.

For the three cables that are on the left, here's an example, right. So it's a cable, it's a device, it's a component. It has one single conductor inside, right, one current carrying path that's inside.

When we analyze all the failure modes of this device as well, we analyze the failure of this device at its end component, right, both ends. We analyze the failure whether it be an open or a short inside of this device anywhere along its route.

And for this cable, it's a different design than the one that I just had. There's only one current-carrying conductor in here. So when it fails, it will fail, and it will short to its shield or to its barrier, if it's on the outside that's grounded, resulting in a phase to ground fault. We consider and analyze that.

We analyze that, as well as the consequential impacts of this component failing.

When it fails and faults, what effect is it going to have on a neighboring component? We consider that.

When you have two single conductors that are side by side, right, in a design, so the simultaneously failing, I've talked about how we analyze for this device failing in every shape, form, or fashion that it can fail, right.

But for these two cables, right, to both fail, they both have to fail to get this conductor and this conductor to intertwine, to result in a phase to phase. Or if it had three, a three-phase fault.

So this cable would have to fail, its insulation, its shield, its barrier go undetected. This device would have to fail as well, its insulation, its shield, its barrier, to create in this design a phase-to-phase or multi-phase fault.

And so that's two failures. So my point is that's two. That's beyond the concept of the requirements of a single failure, to get a multi-phase fault. In this design you can preclude failure modes based on your design.

MR. ROBERTS: Just a quick question. In this discussion, is the context that you're using that both of those cables, the single conductor cables, safety-related or Class 1E? Is that the context that you're describing this in?

MR. GRANT: Yes.

MR. ROBERTS: Okay.

MR. McDERMOTT: Can I ask, just for clarity? So when you're saying they were evaluated, the single conductors are evaluated for failure being immediately adjacent to other phases. In other words, there's no spatial separation between the single conductors.

MR. GRANT: That's correct.

So it's our perspective that the way the TIA's written, the verbiage is in that, that the staff is requiring us to have coincident failures, multiple failures, as opposed to just the single failure for our design.

Slide number 15. Slide 15 has a number of words that are on this slide. The design attributes we have considered is an accepted staff position, right, the design attributes. You can design your system such that you preclude failure modes.

From our perspective, the new regulatory position that I've just described is in conflict with the verbiage that's in NUREG 6850. The, it's two sections here, the first one, first section in 7.2.1.1, especially talking about bus ducts and cable ducts.

Cable ducts basically is where you use cable in place of bus work, right, along the length, where it doesn't have any transition point. So it's just the cable, cable lengths in transition there. No transition or termination points, other than at the end devices. This says, No treatment of bus duct faults, right, or fires independent from the treatment of fires at the end device is required. So it aligns with that concept that we were just describing.

In the plant-specific section, the second paragraph or second bullet there, 9.5.2.2, Plant-specific design features can preclude certain circuit failures from occurring.

For example, the use of grounded metallic armored cabled, even rugged shields, are considered in most cases to preclude internal hot shorts from consideration. So it, basically when you have that design, it excludes the cable-to-cable interaction that we're talking about.

So what it described, it basically, it's a simple concept, really, or application that we're talking about.

But we do believe, and we ask that Oconee request that the CRGR recommend reconsideration of the draft TIA response with respect to the analysis of faults of separate cables, separate cables, on the basis it represents a new regulatory position for us. That's what I have for Topic 2.

Any further questions on Issue 2? Okay.

CHAIRMAN HACKETT: Go ahead and proceed.

MR. GRANT: Okay.

PARTICIPANT: Guess it has been awhile, hasn't it. Yeah, why don't we do that. Ten minute break, and we'll reconvene.

(Whereupon, the above-entitled matter went off the record at 2:14 p.m. and resumed at 2:24 p.m.)

CHAIRMAN HACKETT: So I think Chris had an excellent suggestion for a break, I think that was much appreciated. So I think we're now reconvened enough. Let's recommence.

MR. GRANT: All right, John, I was just going to give you feedback. One of the questions you asked was a chronology of the difference in time for Oconee, McGuire, and Catawba.

We looked at the license application, and there was four years' difference in the applications for, like Oconee was 1966. For McGuire, Unit 1 is 1970. So it was time difference. Likewise for Catawba, Unit 1 is 1972.

MR. MONNINGER: So they're pretty compact in there, compared to the actual OL date, yeah.

MR. GRANT: Six years.

MR. McDERMOTT: Before we get into Issue 3, this is Brian McDermott, just to go back for a moment on slide 14 when we talked about the difference between the three conductor cables and the single conductor cables. You said you did an analysis.

Is there some evaluation that you performed of the failure of the single conductors to show that they wouldn't propagate into failure of the other conductors? You talked about you analyzed it shorting to ground, but consequential failure, cascading failures of the adjacent --

MR. NOLAN: So Brian, we're not, what we're doing here is we're trying to talk about the difference between consequential and independent failures.

So irrespective of the bronze tape and the staff's view on its adequacy, the staff also told us that the IEEE standard requires us to take a three-phase failure. And that our method of routing the individual phases in separate cables was not an allowable method to prevent having to take a three-phase failure.

So we believe that they're independent failures, but, and the staff could believe they're concurrent failures for two reasons. One is because a challenge is to the adequacy of the bronze tape to provide electrical separation. One is because the IEEE standard requires a three-phase failure, and you just have to do it.

And so we're interested in clarity on that point, because we believe that if the separation is adequate, let's say that it was armored cable versus the bronze tape, that they would be independent failures. And so the TIA presents both views, and we're just, as we opened, we understood the staff's issues with bronze tape.

But we don't understand the feedback that says the IEEE standard requires those three cables to all be considered to fail because they're part of the same power path. So we would consider them independent failures if the question about the bronze tape --- so if they were armored, we would consider them three independent failures.

So what we're really looking for is your viewpoint on the theoretical IEEE standard requires you to take a three-phase failure and you're not allowed to use that design arrangement to preclude it, versus bronze tape, which we address separately.

MR. McDERMOTT: Okay, so your position is the tape would preclude you from having to consider the, sort of that cascading failure.

MR. NOLAN: So you're looking at the specific interaction. We're talking about theoretically.

MR. McDERMOTT: Right.

MR. NOLAN: If the separation were adequate, just because there are three separate phases at the same power path does not mean we have to consider concurrent simultaneous failures.

MR. McDERMOTT: So was there any testing done to look at the single phase?

MR. NOLAN: So for the specific

application, we've done the testing and we submitted it per the alternative. It was not available at the time that the TIA was written.

MR. McDERMOTT: Okay.

MR. BATSON: But Brian, I think it's extremely important here, the point that's being made is not whether or not the bronze tape would provide the protection or whether we've done adequate testing.

The key point that we're trying to make is as you read the TIA and as others that we have had independently review the TIA draft response would say that regardless of what type of conduit, shielding, armor a phase is in, if it's part of the same power supply, you're required to assume a three-phase fault.

MR. McDERMOTT: Even if they're in three separate conduits.

MR. BATSON: Even they're three separate, correct, conduits.

MR. BURCHFIELD: And we would agree at the bolted connections or at the terminal ends we do that. But not along the run where they're separated.

MR. McDERMOTT: Thank you.

MR. BURCHFIELD: Yes, sir. Ready to move to Issue number 3. It starts on slide 17. When we reviewed the TIA, it states that all commercial non-quality related, for example, not QA-1 or QA -5 electrical components, are assumed to fail in the most limiting way possible.

It also states that these failures must be considered in addition to the single failure of Class 1E equipment, and that we may not credit any non-safety equipment unless it is specifically evaluated and approved in the licensing basis.

Our perspective is that the requirement to consider the single failure in the most limiting way of all non-QA equipment coincident with the single failure of Class 1E equipment is not supported by the Oconee's licensing basis for single failure analysis. I'll provide some additional information on that. We move to slide 18.

We put together this figure to try to portray our licensing basis, as well as our understanding of the new regulatory position in the TIA. I want to start out with a little bit of background information.

QA-1 equipment at Oconee is equipment

that meets all of the criteria in 10 CFR 50, Appendix Bravo. That would include engineer safeguards, reactor protective systems, systems like that.

In the mid-1990s, we went through a fairly significant licensing interaction with the NRC to address the original design basis of the facility and the licensing basis of the facility. And the issues that we rely upon non-safety equipment to mitigate design basis accidents.

As part of that evolution, we established a QA-5 augmented quality assurance program. And to give you some perspective, the engineering work that we did, we determined about 80% of the equipment that we rely upon to mitigate events is QA-1. The remaining 20% is non-safety.

This QA-5 program was developed and communicated to the NRC in 1995 when we received a safety evaluation on it that year. And what we did was we applied QA-1 procedures to perform testing and maintenance of that non-safety equipment to ensure its reliability.

And that program was initiated in 1995, and it's carried forward to today. So that's the second category.

Now, there are some exclusions. If you have non-safety equipment that's credited in event mitigation, it can be excluded from this QA-5 classification, if it normally operates in the same manner that it would operate during an event, and that provides a strong basis for its reliability.

Or, another exclusion would be if our probabilistic risk analysis determines that the risk significance or importance of that equipment is very low. So those are two things that would say this QA-5 equipment, we're evaluating this equipment that's non-safety for QA-5, but it doesn't need to have the QA-1 procedures applied to it.

The third general category is in Section 15.1.9 of our UFSAR. We document certain non-safety components or systems that are credited in our safety analyses.

And an example of that would be we assume the rod control system is automatic or a manual. If it's in automatic, the rod control system at Oconee is a non-safety system, it's assumed that control rod overlap and control rod withdrawal rates occur per the design of the control system. That we don't assume additional failures in the control system, except for the specific events when rod withdrawal, you know, dropped rod accident.

But that's just an example of where control systems are assumed to be in manual or automatic, whichever gives the worst consequence. But we don't assume that those control systems fail in the most adverse manner for every event.

And the last category is all of the remaining non-safety equipment in the plant. We apply the single failure criterion on a system basis, and we ensure that in the mitigation of any event, it can be as appropriate by the licensing basis, it can be mitigated with the worst single failure.

The new position that we see documented in the TIA is that we must assume all of the non-safety equipment fails in the most limiting way, and that we apply single failure only to QA-1 and QA-5 components. And that is, you know, that position is from our perspective in direct conflict with our licensing basis.

If we move to slide 19. The Oconee, original design and licensing of Oconee predated the application of the term safety-related. Initially, we established the full criteria of 10 CFR, Appendix

Bravo, to equipment that was listed in our FSAR as necessary to mitigate a large break LOCA coincident with the loss of offsite power, and that was our design basis accident.

Mitigation of other events in our UFSAR relied both upon QA-1 and non-QA equipment. That issue was reviewed by the staff during our response to generic letter 83-38. We had interactions with Region II, as well as NRR, in the mid-90s that led to a submittal in April of 1995.

And in that submittal, we stated that some SSCs required for accident mitigation were not originally procured per 10 CFR 50, Appendix Bravo. And that qualification and single failure are separate criteria, and that the scope of our QA-1 program was not required to encompass all of the structures, systems, and components that required seismic design or single failure design.

On slide 20. The safety evaluation from the NRC was issued on August 3, 1995. It was clear that some seismically designed single failure-proof systems were not classified as QA-1 when Oconee received its license. The safety evaluation acknowledged that Oconee is an early nuclear plant design, and our requirements had some differences from current day standards.

The single failure criterion for Oconee is that one singular component failure, and its consequential failures, will not preclude the safety functions from being performed. Our preliminary design criteria specified that single failures applied at the component level, irrespective of the quality assurance classification of the system.

I would also want to point out, as we were reviewing the presentation made to the Committee on September 26, 2017, and it states in the submittal that our 13.8 KV PSW power cables from Keowee to our PSW building, which is transformer CT-6 and CT-7, are non-safety related cables. Those cables were procured, installed, tested, and are maintained in full compliance with 10 CFR 50, Appendix Bravo.

So they are QA-1 cables. The presentation is correct in stating that the commercial line, the FANT line we refer to that provides normal power to the PSW building, is a non-QA, non-safety cable.

So this particular issue, one other point we would like to make is the first version of the TIA that we responded to in August of 2016 I believe is the date, it did not have any caveats in there regarding this particular issue.

But the most recent version we reviewed a few weeks ago included a statement that says, The licensee may not credit any non-safety equipment unless it is specifically evaluated and approved in the plant licensing basis.

And we are unsure of the basis for that statement, because it is inconsistent with the licensing basis of the facility and the manner in which the classification of equipment was addressed in 1995.

So Oconee requests that the Committee recommend reconsideration of the draft TIA response to Question 2.g with respect to requiring the failure of all non-safety equipment in the worst way, in addition to a single failure of the Class 1E equipment, on the basis that it represents a new regulatory position.

So are there any questions on this issue?

MR. ROBERTS: This is Darrell Roberts from NSIR. So back on slide 18, when you broke it down with a graphical representation of what you'd call QA-1, QA-5, and so on. In your consideration of QA-5 components, is there any distinction between electrical and mechanical or active components?

MR. BURCHFIELD: No, sir, there's not. We went through, the way that we approached that is there were some issues raised by Region II back in the 1990s. An example was on our intake structure and the safety, the classification of that, that we were working through those issues with the NRC.

And we went to a meeting in Atlanta where we described a new program we were going to put in place, which resulted in that April submittal and the August safety evaluation. After that safety evaluation was issued, part of what committed was we were going to go through and do the engineering work to identify the population in QA-5.

The point I wanted to make was that at the time the NRC did the review, they were more reviewing the approach that we were going to take to address the non-safety equipment, and not reviewing the entire list of non-safety equipment and concurring.

So what we did after that was we went and we created event mitigation calculations for every event in our licensing basis and identified what equipment was required, electrical, mechanical to address that.

One thing we excluded was structures, and we excluded the pipe. But all of the electrical equipment and mechanical equipment required to mitigate the events was listed.

Then we went through the process of, all right, is this normally operating in the same mode that it would be during the accident. For example, if it's a pump, is it delivering the same flow rates that you would need during an accident, and there's really no difference in its performance during an accident as during normal operation, and it's operating all the time.

If the answer to that is yeah, there's no difference, then well, an augmented testing and maintenance we wouldn't see as really having a big impact on the reliability of that. So we'll screen it out of putting it in the QA-5 program.

And we also looked at the risk significance, and if it had a very, very low risk significance, we would exclude it from the QA-5 program. The rest of that was all incorporated in our QA-5 program, and we do implement all testing and maintenance on that equipment using the safety-related procedures. So it does include electrical and mechanical.

MR. ROBERTS: And does that approach, is this QA-1, QA-5 designation something that's consistent across all three of the sites for Duke?

MR. BURCHFIELD: No, sir, the --

MR. ROBERTS: Just Oconee uses this approach.

MR. BURCHFIELD: This is an Oconee-specific QA classification.

MR. ROBERTS: Designation.

MR. BURCHFIELD: And it's tied back to the original design and licensing basis of Oconee being different. And you know, at the time, McGuire, Catawba and now at the other plants.

MR. NOLAN: So we have a QA topical for all three of the plants that is a single document. But the requirements for each plant are based on the licensing basis at the time of the original.

Just a couple clarifications. And correct me if I'm wrong, but the cable we buy at Oconee is all safety-related. So we buy all the cable to the highest degree of quality. We use it in different applications, but if there's a question about the quality of the cable we buy, whether it's a safety-related or non-safety related, like QA-1 or non-QA-1 application, it's is bought to QA-1.

The staff on slide 5 of their presentation to you earlier listed some non-safety related cables. The first one in that bullet is an error. It is a QA-1 cable.

MR. BURCHFIELD: Any other questions on this issue?

MR. McDERMOTT: Just one, on page -- thanks, Ed, Brian McDermott. On page 20 of your presentation, the second major bullet. Is there anywhere in your licensing basis documentation or in the NRC SE from 1995 that articulates the thought that's in that second major bullet?

MR. BURCHFIELD: The thought that's in that bullet is that we take a single failure during an event based on those systems that are required to be single failure. And I would offer it is not crystal clear in the original documentation, either from Duke Power Company or from the NRC, that position is not crystal clear.

It is supported to some extent by when you look at the design basis for Oconee, which is a large-break LOCA-LOOP in the correspondence back and forth between Duke Power and the NRC, I made it clear that we assumed a single failure during that event.

MR. PRICE: Brian, Ray Price, Duke Energy. That statement is actual a direct quote from the SE. Just to put that in context.

MR. McDERMOTT: Thank you.

MR. BURCHFIELD: Any other questions on Issue 3?

All right, the last issue that we wanted to discuss this afternoon starts on slide 21. The TIA position states that based on IEEE 279 1971, and is clarified by SECY document 77-439, Single failures must be assumed to occur at whatever time produces the most limiting conditions.

Our position is that the single failure criterion is predicated on failures occurring on the time of demand in the components. Also, the SECY document 77-439 is not part of the licensing basis of Oconee, and that the emergency power system at Oconee is robust, both in its capacity and its capabilities.

And that introduces a level of uniqueness within the industry that has been reviewed numerous times throughout our history, and I want to provide some more perspective on that as we discuss this issue.

On slide 22. First, a little perspective on the emergency power system at Oconee. When you look at our design, we have the two Keowee hydro units that are each rated at 87.5 MVA. So they have a very large capacity. And one hydro unit is tied to an overhead power path through our switch yard that feeds the plant.

The other hydro unit is tied to an independent underground path into the plant. If we had an event and either of those power sources failed, either Keowee Unit 1 or Keowee Unit 2, the remaining Keowee unit would carry both trains of safety systems for all three units.

That's a fundamental difference between your typical design where you have an alpha diesel generator feeding an alpha train, a bravo diesel generator feeding a bravo train. You assume the alpha train fails, whether it fails at the beginning of the event, ten seconds into the event, 50 seconds into the event, the other train's unaffected.

Our design is a power-seeking design. And based on priority, the unit that is carrying, the Keowee unit that is carrying the loads for the unit at Oconee that's having an accident will carry all trains.

So a strength of our design and something that makes it unique is the fact that a single hydro unit will carry all of the loads, all trains, both trains on the unit that is having an event, as well as carrying required loads on the other units.

MR. MONNINGER: So just for clarification, the other units are just the safe shutdown, not accident.

MR. BURCHFIELD: Correct, correct. We have the double bus, double breaker distribution system that results in redundancy there, to where you can take a number of postulated single failures and you still end up with both trains of safety equipment being supplied.

Except for, and I'll talk about, really the single failure that really, when the ECCS, when the order was issued in 1974, in December of 1974, that all licensees address, when we addressed that at Oconee, the information in the LOCA analysis reports, it was BAW-10103 had a generic single failure assumption for the B&W class of plants.

That was a failure of a diesel generator, failure of one train of safety equipment. When we looked at that, we said, Well, that really doesn't apply to us. Because if we take a failure of either Keowee unit, we're still going to supply both trains.

So you have to go much further down into the electrical distribution system and postulate the failure of a 4 KV switch gear, and that could take out one train of safety-related equipment.

And that was what was assumed and that was communicated to the NRC in response to that, that order was reflected in the March 5, 1976 safety evaluation report that the worst case single failure for the LOCA analysis was a loss of the 4 KV switch gear.

So there's a fundamental difference between your typical emergency power system at a plant with two diesel generators and the Oconee design.

I want to provide a little bit more perspective on that. On slide 23. The Oconee design, including failure on demand, has been reviewed by the staff in numerous forums over the past 50 years.

The original safety reports to ACRS in 1967 and 1970, the safety evaluations for the three units associated with our operating licenses, the EDSFI report in May of '93, a license amendment request that was submitted in 1994, as well as the emergency power system review that was conducted in the late 1990s and resulted in NRC issuing a report in January 19, 1999.

On slide 24. If you look at the original safety evaluation for Oconee Unit 1, it acknowledged that we had three 4.16 KV busses that served engineering safety feature loads. This was associated with Unit 1. And that they are connected to both of the Unit 1 main feeder busses.

And the sources of power that would be applied to those 4 KV switch gear would be, in order of preference would be the start-up transformer from the switch yard, which if you don't have a loss of offsite power that's what would power the safety loads.

If you had a LOOP coincident with an engineering safeguard signal, we would preferentially select the underground unit, a Keowee unit that is aligned to the underground power path, and it would carry all the loads of both trains of equipment on that unit.

If that unit were to fail, then after a time delay, our emergency power switching logic would see if the overhead unit was operating and had voltage. And if it was, it would close into that. So it goes into hierarchy for the order of priority of where it's going to get the power from if we've had an engineering safeguard signal.

We do not have sequencers at Oconee. When we have an event and the Keowee that starts up all of the loads from an Oconee unit are loaded on the Keowee at the same time because its capacity is much greater than the loads required to be carried that it has no effect on its performance to, we call that block loaded.

So I wanted to discuss a couple of specific interactions. Yes, sir?

MR. ROBERTS: I was going to wait till he finished, but since you mentioned that.

MR. BURCHFIELD: Yes, sir.

MR. ROBERTS: All the electrical loads are provided by one Keowee unit for all the units for all three of the Oconee units. Does that require any manual action of any sort?

MR. BURCHFIELD: No, sir. And let me clarify. I'm saying if there was a single failure. Normally, let's take an event without any failures of equipment. Let's take an engineering safeguards actuation on Oconee Unit 1.

What's going to happen is Oconee Unit 1 is going to be supplied by the Keowee unit aligned to the underground power path. Oconee Units 2 and 3 will be supplied by the Keowee unit from a overhead power path. That's with no failures or anything.

Now, what we were saying is if one of those hydro units fails, the remaining hydro unit can carry all three units. Does that answer your question?

MR. ROBERTS: The last scenario you described requires a manual --

MR. BURCHFIELD: No, sir. That all happens, we have what we call emergency power switching logic. And it's a voltage-sensing, and it's all covered in our technical specifications in terms of the different sensing circuits that we have. But it's a power-seeking logic that will automatically make those transfers.

MR. ROBERTS: Okay. Thanks.

MR. BURCHFIELD: So said differently, it's very robust from a single failure perspective, but it's all very complicated because of the different configurations you can get in based on what failure occurs.

MR. ROBERTS: Thanks.

MR. BURCHFIELD: So on slide 25, I want to go back to 1994 time frame. And actually, one of the outcomes from the EDSFI was questions associated with single failures at Keowee.

We did some follow-up, we identified some issues, and we made a submittal to the NRC to revise our technical specifications in support of a modification that we were implementing to address single failure issue that was identified at Keowee.

In January, actually January 19, 1995, we had a meeting here at NRR's offices to discuss technical issues associated with that submittal. And in that meeting, both Todd and I were present at that meeting, and I recall that meeting. We talked about in detail the single failure analysis, the assumptions that failures occur at time of demand.

We included very detailed timelines that showed, kind of like we walked through, Darrell, when you postulate the event occurs, this is how the emergency power switching logic, you know, these are the time delays, this is when it's looking for a power source. If that power source fails, then there's another time delay and it transfers to the next power source.

And we walked through all that with graphs, described that to the reviewers present at that meeting and NRC management at that meeting. And the meeting minutes that were issued on that stated that the licensee had stated single failure was assumed to occur simultaneous with the initiating event.

Well, we responded to that in a March 8, 1995 letter back to the NRC that corrected it and said the meeting minutes should be changed to indicate that any single failure was to assume to occur immediately upon demand.

In August of 1995, that license amendment was approved and we received the safety evaluation and included references to our May 1994 response and the January 1995 submittal that was made.

MR. ROBERTS: Just real quick, Ed. Did the staff ever, NRC staff ever respond to the Duke letter dated March 8, 1995, to make the clarification that you referred --

MR. BURCHFIELD: No, sir, they did not.

MR. PRICE: Just to be clear along that line, in the SE they did reference the January 19 meeting. And in the January 19 meeting notes, they did make it clear that the concept of a singular timing failure was clear in the license.

MR. ROBERTS: A singular timing failure.

MR. PRICE: It was failure, it was called T equals zero. The single failure occurs coincident with the initiation of the event. And we corrected that to say no, it occurs when the equipment is demanded to operate. So that meaning is referenced in the safety evaluation for that license amendment request. Our correction to the meeting minutes provided by the project manager were not referenced in the safety evaluation report.

MR. MONNINGER: This is John Monninger. So what's the May '94 response? That's not the March '95, correct? What's the May '94 response, in your last sub-bullet there? I first thought it was a typo to be the March '95 response.

MR. PRICE: It was a response to additional RAI. It was included in that. It's not in this particular meeting, but there was some additional discussion to the subject for that.

MR. MONNINGER: So all right, so then that is correct. It's not intended to be the March.

MR. PRICE: Correct, that is a separate.

MR. BURCHFIELD: So, the one point Duke would like to make on this is that the TIA does not address this licensing interaction, or acknowledge the clearly communicated failure on demand design basis for Oconee that was submitted to the NRC in March of 1995.

One other major evolution that occurred in the 1990s, starting on Slide 26, was there was a very extensive review of the emergency electrical power system at Oconee, as well as of the standby shutdown facility.

The purpose of that review that was performed by NRR, the purpose of that review was to assess the overall reliability of the emergency power system as it currently exists, and determine whether any additional Staff actions might be required to address unacceptable vulnerabilities or risks that exist in the design or operation system.

The report recognized the unique nature of the Oconee design and it stated it is important to emphasize that the Oconee emergency electrical power system was designed, reviewed, and approved, in the 1960s, prior to the development and implementation of most of the current requirements and guidance, related to emergency electrical systems.

There was a particular open item associated with that review that dealt with the failure of a governor or voltage regulator at Keowee.

And we communicated back to the team that was performing this extensive review that the original licensing and design basis of Oconee consists of postulating the voltage regulator or governor failure at the time of initial demand.

Again, we've communicated that design basis.

On Slide 27, in January of 1999, after several years of performing this review, the final report for the review of the emergency power system was issued.

And in it, the Staff acknowledged that a plant-specific single failure practice is employed at Oconee.

It says that there is no reason, and I quote, there is no reason to believe that Oconee does not continue to be in compliance with the requirements of 10 CFR 50.46 and 10 CFR 50, Appendix K.

With regard to single failure, Oconee uses a plant-specific definition. This licensing interaction in our communication to the NRC of our design basis is not acknowledged in the TIA.

MR. ROBERTS: So, I have a question.

What type of report was this again, this NRC Final Report?

MR. BURCHFIELD: It was not characterized as a safety evaluation, Darrell. I went through that whole thing, I was very involved in meetings.

But it was called the Final Report, and it was issued -- there were some follow-up items that we took as the licensee, but it brought closure, in terms of providing the whole historical perspective, there were a number of very good issues identified through the EDSFI inspection.

There were some operational events that

occurred, tied to our emergency power system back in that timeframe.

And this review was performed to look at the aggregate of all that, and make a decision of, hey, does -- my understanding, living through that, was the NRC was looking at do we need to impose any additional requirements on the licensee, based upon the design and operation of our emergency power system?

MR. ROBERTS: Did any of those issues, either that were identified in the EDSFI report, or E-D-S-F-I Report, that were explicitly looked at by the Staff to develop this final report, specifically address the cabling issues that we're talking about today?

MR. BURCHFIELD: No, it pre-dates that. At the time all this was done, if we're talking about -- we still had all of our cables direct-buried --

MR. ROBERTS: That's right, this pre-dated the mod.

MR. BURCHFIELD: Yes, this pre-dated, and it was probably three or four years after that, that we actually installed the concrete underground trench and the new cables.

MR. BATSON: But that's specific to the trench. The plant design relative to the type of cable used was already present.

MR. ROBERTS: Was already in place.

MR. BURCHFIELD: Yes, that's been there since the original design.

MR. ROBERTS: And so along that line, did either of NRC's Final 1999 report or the EDSFI inspection address the use of this type of cable, or these types of cables at all explicitly?

Or was that an issue that they were adjudicating, I guess?

MR. BURCHFIELD: There was the one issue, where through the inspection, two cables were routed in the same tray, which we said, well, that doesn't meet our standards and Todd talked about that earlier in this meeting.

We resolved that issue by rerouting the cables, but the inspector concluded it wasn't a significant issue based on our design.

The emergency power system review was looking more at the overall -- I'll just throw out a handful of issues to give you some perspective.

It was looking at is it acceptable for

Keowee to generate to the grid as an emergency power source that is unique in that respect?

So, there a number of questions that were asked about what happens if you have these types of faults on the switchyard? How do you make sure it doesn't propagate into the emergency power system?

And there were questions raised about failures in our governor control system occurring, there were questions asked about how the unit would respond after a load rejection.

There were issues associated with operator training. It was a pretty broad review, but it really didn't have anything tied to, relevant to, the specific issues we're talking about in this TIA, other than the generic nature of failure on demand.

And that was directly relevant because some of the single-failures that were discussed and resolved through this interaction and through that other license submittal I talked about, we were very clear that we were assuming the failure occurred on the demand of the component.

MR. NOLAN: So, Darrell, the reason we're bringing this up is that through our engineering change process and our application of 50.59, we maintain our licensing basis.

This is a history of our licensing basis, and the basis on our design at a number of points and times that we communicated that design to the NRC.

And the NRC has concluded whether it's in the licensing space, inspection space, or in this Final Report, which seems to be in between those two, an acknowledgment of the Oconee position.

The TIA takes challenge with that, and from an extent of condition, applies it to the entire plant, maybe intentionally, maybe un intentionally.

But the concept is we've maintained our licensing basis through the modification application in 50.59.

So, our point is this licensing history is relevant to the Staff's position on single failure and it's foundational to the design of the electrical distribution system.

MR. ROBERTS: Thanks.

MR. BURCHFIELD: The last point on Slide 27 is that the TIA -- if one reads IEEE 279-1971, Todd mentioned that it was at a fairly high level and it would require some interpretation to conclude that failures must be assumed at any time.

Because it's not clearly documented in there. It's an inferred position out of there. The SECY document, 77-439, does provide that clarity.

However, that document is not part of the Oconee licensing basis, and in fact, it was issued after we had communicated to the NRC that we met IEEE, we meet IEEE, 279-1971.

So, on Slide 28, in conclusion, the draft TIA response to Question 2.c represents a new regulatory position, is generic in nature to the Oconee plant and it's not specific to this cable trench.

And we request that the Committee recommend reconsideration of the draft TIA position to Question 2.c with respect to the timing of failures, on the basis that it represents a new regulatory position for Oconee.

Now, I'd like to provide one other point of perspective.

Based on the robustness of the Oconee design, and we've talked about the ability to swap alternate power supplies, the safety significance of this timing of single failure is very low.

We'll contrast that against the cost of

implementing a change to our licensing basis to revise all of our engineering calculations. There will not be a commensurate benefit in plant safety.

So, we would ask that the Committee consider that. Is there any questions on this issue? John?

MR. MONNINGER: So, it's the 1999 report, I know it's been addressed that it's not clear the exact regulatory process we were in, but I assume the report was issued by NRR then, the project manager?

Or did it come from AOD or Research, the 99?

MR. BURCHFIELD: We'll pull it up and get an answer.

MR. GRECO: I got it right here. It was sent out by the acting Associate Director of Projects from NRR, Bruce Boger.

MR. MONNINGER: And the intro didn't talk about this as a response to bulletin or --

MR. BURCHFIELD: No, sir. It was a plant-specific review.

MR. MONNINGER: Does it reference an MD on backfitting or anything like that?

MR. BURCHFIELD: But I would offer, just

having attended all of the meetings and having been involved in that entire evolution personally, that was a very significant evolution for Duke Power at the time.

We were having communications with Region II regarding progress. We had an emergency-power-system project that we had on site, that was making substantial upgrades in our maintenance operations training and design basis.

Todd was actually the power supervisor at the time and was very involved with it. So, it was a very significant -- just to provide some perspective, January 2nd to January 5th, 1997, we happened to have all three units shut down.

We did integrated engineer safeguards testing on Oconee Unit 3, loop testing on the other two units. There was no fuel in the core at the time, and we simulated seven different tests.

And we actually did all the engineering safeguards equipment, except we had the reactor building spray system racked to test, so we wouldn't spray down the containment.

But that's just an example of the level of review and testing that was performed during that whole interaction.

So, it was a very, very significant evolution for Duke Power.

MR. NOLAN: So, it wasn't an inspection procedure so it was definitely a regulatory position taken by NRR.

It wasn't a licensing amendment because we were demonstrating our existing design not changing.

MR. MONNINGER: A follow up question. So, I know the draft TIA response was provided to Duke and you responded.

So, for the four issues here and all the material on the various slides, is there any new material in here that wasn't presented to the Staff in your comments, et cetera?

Or does all this material in your package here, you more or less believe it's already been presented to the Staff?

MR. BURCHFIELD: I think it would be fair to say it's not been presented.

We provided it in writing, but as far as putting context around it and explaining what occurred during these different time periods, that has not occurred.

And one of the things that we struggle with is when we review the TIA response, in the comments resolution matrix, it doesn't acknowledge a number of these documents as being considered.

MR. NOLAN: So, in our response to the draft TIA, under the fact-check back in August of 2016, we attached a cover letter to our comments in which we identified a number of issues.

All of these issues are in that cover letter, identified as specific issues. So, the context of this issue was provided as feedback and the balance of the information was there.

We would have to do a gap analysis to say all of it was provided. But you understand that since the draft TIA was issued following the CDBI and now, the only interaction with the staff is that factor.

MR. MONNINGER: So, maybe the word presented wasn't for a verbal discussion. But in terms of the submittal, so if you were just to take -- so, we have the Staff's response in the table, et cetera.

But for example, the '99 Final Report, would your response come in and say, well, this was reviewed by the NRC in 1999? Or was there significant discussion as to what transpired in this?

So you provided a response to the Staff's draft TIA, and somehow you discuss the 1999 NRC review of it.

Would you have gone into details as to what that represented, similar to this? Or is it just a passing reference? The NRC has already looked at this back in 1999?

I'm not sure if you understand the question.

MR. PRICE: The design basis inspection talk was very lengthy, over 500 questions were part of the design basis inspection. This document was provided as part of that.

Additionally, in April 2014, the Staff came on site, not just regional, but NRR Staff came on site, a presentation was given.

It was a lengthy discussion, similar to what you've heard today on this topic of the report, excuse me, this Final Report. At that time, also, a copy was given to NRR at that time.

So, just to give you an example of what information is provided, and in every interface, we've given the opportunity for any additional requests.

MR. MONNINGER: Thank you.

MR. McDERMOTT: A couple questions.

On Page 25, going back to the January '95 meeting of the Staff and then Duke's letter to clarify the description of the timing on single failure, you indicated there was no response from the Staff.

But then the next bullet talks about the safety evaluation.

Does the safety evaluation reflect the information that you provided in the March letter?

Or does the safety evaluation in your mind, or in your review, reflect what was discussed or what was, as you say, incorrectly included in the summary of that January meeting?

MR. BURCHFIELD: I would offer it reflects it in this manner, Brian. It does not reflect it explicitly in written words in the safety evaluation report.

It doesn't say in the safety evaluation report time of demand, single failure time of demand.

However, there were certain single failures, to be specific, there was a zone overlap issue associated with interactions between overhead and underground breakers at Keowee, and a postulated fault within a zone, potentially disabling both Keowee units.

And we implemented administrative controls to resolve that, and then followed up with this License Amendment Request to address the tech spec changes and additional surveillances in the modification we would implement for that.

In addition, there were questions about the governor control system and the potential failures of that, that were peripherally related to this amendment.

And if you read the safety evaluation, it talks about how it also reviewed that issue as part of it, and it gets to the end, and it says, and we conclude that the design is acceptable, that the controls in place by the licensee are acceptable.

Well, fundamental in that is the assumption of time of demand failure. So, it is an implied acceptance but it is not explicit. That's the most accurate way I can describe it.

MR. NOLAN: So, based on the interactions we believe we communicated clearly.

When the Staff issued the meeting summary, they issued a phrase that wasn't exactly right. And
we believe we met our burden of communicating what was exactly right.

The Staff issued the SE. We can't answer your question about the knowledge of the people who were working on that, but we believe we communicated it clearly.

MR. McDERMOTT: So, would it be fair to say, then, that the SE doesn't necessarily reflect how the Staff stated it in January or how Duke stated it in the March letter, but that the conclusions or the way the issues were dealt with in the SE, you feel reflects the position --

MR. BURCHFIELD: Correct, that's an accurate statement, Brian.

MR. MOORE: This is Scott Moore.

You began by noting that you were less concerned about the main trench issue than these four issues.

Do you think it's possible for the Staff to construct a response to the TIA not dealing with these issues? Can the Staff respond to the TIA and

avoid these issues?
MR. NOLAN: So, we're not asking for the Staff to avoid them, we're asking for clarity. We've given you what our position is.
Our position is when we read the TIA, either you can interpret it multiple ways or you can interpret it as the Staff is taking a conscious review.
So, what we're asking for is clarity.
MR. MOORE: Okay, thank you.
MR. ROBERTS: So, just to expand on what Scott was asking, there's no way you can separate a ruling on these issues, as it relates to the trench, from any possible implications on other parts of the plant.
The message that we're sending is you make these decisions, they apply to the station.
MR. BATSON: I want to go back.
I think that you can respond to the TIA and answer the questions in the TIA without creating the questions that we are trying to address here.
I may be answering the question a little differently, Chris, but I do believe the questions in the TIA can be answered without creating the

conflicts or potential for misinterpretation for others going forward.

MR. MOORE: What I hear Chris saying is that's not necessarily what you're asking for.

MR. BURCHFIELD: Let me try to answer this one, just to be as clear as possible, which may be difficult on this subject.

Go back to the fundamental concerns and I'll put the perspective, our understanding the fundamental concerns raised by inspection team of running power and control cables in a concrete trench and creating the potential for interactions.

And although we have provided our perspective from an engineering perspective, that here's why we believe that design was acceptable, we absolutely acknowledge an understanding of the potential safety concerns associated with that design. And we've addressed it.

We have implemented the modifications, which were quite extensive, to ensure that interaction would not occur.

So, if you're looking at the TIA to say, you know what, the licensee put this mod in at their plant and it created a condition that we don't like and have concerns about.

We, the licensee, reflected upon that and we've resolved that concern.

Now, we don't want the TIA, in our opinion, to be issued in a manner that it allows that specific issue to be extrapolated into broad positions on our entire licensing basis.

The failure on demand, it would require us to go back and re-look at the design of our emergency power switching logic, very low safety significance. We are confident about that.

The armor cable, that would be a far-reaching issue.

So, these four issues right here, applied outside of the specific mod but to the entire plant, would have a huge impact in terms of the actions that would have been needed by Duke to address those for Oconee.

MR. ROBERTS: Can I seek understanding?

So, the four issues are at the root of what we're talking about today, as it pertains to potential generic applicability of the applications in your plant.

If you hadn't taken the actions that

you've taken since this issue was brought to your attention in 2014, to address the safety aspects of the trench issues, let's just say you hadn't done those things, if these four issues were ruled in your favor I'll call it, for lack of a better word, would those actions have been necessary for the trench?

MR. BURCHFIELD: Yes, sir, I would say the direct answer would be I think through the mods that we've done, it would be noted.

Because when we assess the safety significance of the issue, we had it as less than 1E to the -9 on CDF, and we invested an excess of $14 million implementing these modifications.

So, as a responsible licensee that wants to improve plant safety and has limited, we don't have infinite, resources or funding available to do that, I would not elect that modification, that change, over other things we could do to improve plant safety.

MR. BATSON: I don't know that we answered Darrell's question yet.

Darrell's question is had we taken no actions at the site relative to the Keowee trench, Trench number 3, in the PSW, the cable spread room in the PSW building, down at Keowee, at this point in time.

And the Committee made the recommendation I'll say in favor of what we presented here.

Would that preclude the need, or would it diffuse, imply, that the original violation or performance deficiency was inappropriate or not factual, not accurate? I would say that the answer to that would be no.

We really went back to, as we understand, the performance deficiency. It went back to how we did the modification and the use of bronze armored cable in this specific application.

It did not apply, it did not involve the four issues that we have presented here.

MR. ROBERTS: So then Duke, by extension, if I may, would have accepted a violation as it relates to how you modify the trench or did your cable placement in the trench on its face?

MR. BURCHFIELD: The fact that we didn't have adequate testing and a basis to support that change geometry --

MR. ROBERTS: Criterion 3 violation is I think what we're talking about.

MR. NOLAN: We've communicated that to the Region, that we understand that we used engineering judgment versus testing to do the equivalency for the bronze tape and that left us subject to question.

Those four issues are independent of that question.

The challenge is -- and raising that question, the Staff has intertwined these four issues. And because we designed PSW in accordance with our licensing basis, there's no way to separate it from the rest of the plant.

And so our concern is if you make these decisions on PSW, the extent of condition will translate them, and there would be an impact that might not be fully recognized.

So, the issues with bronze tape can be broadened to bear or can be raised by the Staff based on what we did at the time.

We believe with the alternative, we've addressed the Staff's concerns through modification and the testing.

MR. BATSON: So, as we understand the violation, the answer to your question very directly is yes.

We've acknowledged that, and I will tell you, as the previous Site VP of Oconee, we didn't wait on resolution of this issue.

We went and rallied the engineering organization, a number of your folks, the NRC folks, out of Region II are very familiar with the scope of work that has been performed at Oconee in response to that.

We spent in excess of $15 million in terms of labor and materials and all. If you guys have a better number please tell me. --

MR. NOLAN: That's about right.

MR. BATSON: Going back and addressing that single issue, our concern at this point is how these positions, as written in the TIA response, will be used on a broader scale.

MR. ROBERTS: Thanks, I understand.

MR. MONNINGER: So, John Monninger.

The whole notion of how these positions could be used or could inappropriately be used on a broader scope, so you talk about the Oconee site.

But then earlier, on the armored cable discussion, we talked about the licensing basis of

Oconee, McGuire, and Catawba, being the same.

So, that licensing basis being the same between those three sites, is it just for the armored cable or is it for all four of these issues?

MR. NOLAN: For the armored cable.

MR. MONNINGER: Okay. So, issues 2, 3, and 4 are different?

MR. NOLAN: The only reason we brought that connection up is because for the armored cable, there were challenges about what the level of detail in the original Oconee licensing basis indicated.

And the Staff raised some questions about a different analysis or a different approval for fire versus faulting, which we don't believe existed at that time.

And so what we tried to show is the Staff was consistent in its decision-making over the different plants over time, and the armor was credited for electrical separation.

It wasn't just credited for fire protection.

CHAIRMAN HACKETT: Other questions? Scott?

MR. McDERMOTT: I'm just trying to

understand these implications for other areas of the plant and the potential for confusion in terms of inspectors going out.

So, if you go out and look at your average nuclear power plant, not Oconee, I would never call Oconee your typical configuration, you find trays used for separation, right, and you have that spatial separation.

But when you talked about Oconee's design, I've not seen it in the plant, but would it look similar, in other words, to the inspector walking into your room with multiple cable trays in it that you have, by tray, separation of divisions?

MR. NOLAN: So, that's design philosophy. So, we used the armor to provide separation. Other plants use --

MR. GRANT: You would be able to see the delineation between the trays.

The cables are colored, you use color schemes to differentiate the three safety trains as they make their way to the end components.

MR. McDERMOTT: Okay, so it's not that as a matter of insulation you have two armored cables representing two divisions, sitting one inch apart?

MR. GRANT: No, sir. What you would be able to see is a layout with segregation. We usually feature the components routed in separate trays.

We can have power and control cables in the same tray, but there's a barrier between the two. Safety, non-safety, control cables can be routed together.

MR. McDERMOTT: Okay, thank you.

I was just trying to understand perhaps how some of these issues come up when folks have to do an inspection and what they might see at Oconee versus another station.

Thank you.

CHAIRMAN HACKETT: I'd like to, this is Ed Hackett, go back to one more issue of understanding, and obviously, there's been many today.

But back to your, I guess it's Slide 13, which is going back your number two main point, back to the IEEE standard, and maybe this should be simpler or it seems like it should be simpler to me than maybe it is, as to whether or not that standard requires you to consider a multi-phase fault regardless of everything you've told us here today with regards to the jacketing and the armor.

So, is that covered in the standard? If you have armored cable, you do not have to address that situation? Or is that an NRC position?

I wasn't clear on that.

MR. PRICE: IEEE 279-1971, the entire is single- failure criteria is two paragraphs in about a ten-page document.

So, there's a thing such as cable failures. It does not specify the cable failure.

CHAIRMAN HACKETT: Okay, got you. So, it's that broad in subject.

MR. PRICE: It is very high-level in terms of technical content.

MR. BURCHFIELD: We brought a copy we could show to you.

CHAIRMAN HACKETT: That's great, I've seen that today. Okay, thanks, that was just some grey area.

All right, any other --

MR. MONNINGER: So, not a question on any of the four issues, but broader, I mean, do you have any views on what's the root causes of the differences between the potential NRC Staff and Duke?

Why is it that the Staff potentially comes out to one position and Duke fundamentally comes up with a different position?

You go through a long time period and, you know, both organizations have experience. I mean, what is -- to cut to it, how is that we come to these positions?

MR. BURCHFIELD: I'll provide my perspective, just from having been involved with the design and licensing of Oconee for approximately 30 years.

We go back through and I think what we end up having is very knowledgeable, very competent, experts that are looking at a set of facts from two different perspectives.

And we have the Oconee Staff, the Duke Staff, that is very much, particularly at Oconee, very knowledgeable of the history of the plant, all of the calculations, all of the interactions with the Atomic Energy Commission.

We talked about this emergency power system review that was done in the '90s.

I can recall a lot of what occurred during that whole evolution, and we are coming at it from the perspective of how the plant was built.

We know the calculations, we know what the assumptions were, and I very much understand how the reviewers in Washington are looking at it because they've got that broad context of the whole industry.

If you look at this TIA response, it's saying, well, if you look at the SECY document, if you look at all these other documents, the position, you would conclude, is this. And this is Oconee's licensing basis.

But until we can get together and talk through and have a common understanding of both sides, it's very difficult to arrive at a position of common understanding.

And I think the fact that this was all pre-decisional in nature really never allowed that dialog to occur, so there could be common understanding of the facts.

And we end up with a TIA that's very much written from a broader perspective of this is what the standard says, this is how we've applied it to everyone else, and it doesn't really reflect some of the specifics of the Oconee design.

That's my perspective.

MR. BATSON: So, John, first, let me say this is a topic that I think deserved more discussion between the industry and the NRC.

I am aware, through some of the other presentations, we met with Brian yesterday and talked through a couple points.

One of the things that we're aware of is, in terms of how our industry has aged and that we have a broad scope of plants , in terms of their age. -- As we've talked through today, the industry has taken on an effort to better educate our folks, those that are within the industry and engineering and regulatory ranks, to have a better understanding of exactly what consists of licensing basis or original design basis,and to gives some view into the NRC's perspective on that.

So, that work is in progress. Chris has been very much involved in that.

I'm also aware that I think you have a pilot session this year for some of the NRC Staff that's focused on, and I forget the actual name of the training, that will be beneficial, that will help the NRC Staff in terms of having an appreciation for the history of our industry, original licensing basis, and how that would be used in inspection activities.

We actually heard from Victor yesterday that you all would be willing to share that with the industry, that is my understanding, once it's finalized and you've done a dry run on it.

I really think that would be very beneficial for us to have that as well as part of the industry just so that we're all working from a level playing field.

And we've got to improve, the industry has to improve its understanding of how the NRC views the licensing basis, design basis, original licensees design basis.

And then I do believe, based on what I've heard about the training that you'll be doing internal to the Agency, that will be beneficial as well. I think that's a key piece.

I think Ed's point, and it can't be understated, the fact that this was in a pre-decisional process. We went through a fact-check but it was simply an exchange of, as you know, where we were able to get the document, and we provided a written response back.

We were very constrained in the amount of time that we had to give that response back.

We tried to anticipate what we would see in the TIA, prepare documents, references and all that, but it was a very limited period of time.

14 days to provide a response on something that I think we have demonstrated is very complex.

And so our responses were turned around within the 14 days, but, again, there was not the opportunity for that dialog. It was really through written communication.

CHAIRMAN HACKETT: Scott, thank you. This is Ed Hackett again.

Thanks for that summary because I think it's well said and it speaks for what the EDO tasked us to do, which is also in progress.

And we are hoping that will be beneficial in a backfitting sense, but I think in conversations we've had with EDO, it's, as you said, beyond that.

There's licensing basis discussions, there's discussion of the Staff's access to detailed licensing basis information, information on sites.

There are a number of elements, knowledge management and knowledge transfer, and how well we all do that on both sides of the table.

So, hopefully, we're going to be making some strides there within the next year in response to the task.

Your summary, Scott?

MR. BATSON:

It was interesting listening to this last few minutes of dialog, before we get into closing comments, some of the causes and contributors for why we're here.

I made some notes; I had some prepared but I've taken some as we went through the discussion as well. Just as a closing, and you're going to hear several points that various folks have already made as we went around, but I do want to recap as we go through.

First, I want to say thanks to the CRGR for allowing us to come and have this dialog.

It's very important to Duke, it's very important to Oconee nuclear station that we have this dialog for many of the reasons that we've just discussed. I think the dialog was open, engaging, informed.

I hope, it's my desire, that we have presented the information that Duke had in a manner that will add clarity to some of the issues, but not in a confrontational manner.

But just trying to ensure that those that are in decision-making positions have the information and our perspectives on the issues.

I led off the discussion talking about a bias for action and things that we had done where we had issues that we worked through with the NRC previously with PSW, the external flooding and this issue.

I described the actions that we have taken, based on our understanding of the fundamental initial performance deficiency, and that we are taking actions to eliminate that issue within our abilities.

The real point for this discussion is really about the four issues, and our concerns in how those will be managed, how those will be addressed going forward.

Because all four of these issues, as we've tried to describe, are really part of the fundamental design of the Oconee nuclear station.

They're not associated with a period in time when we installed a concrete trench. They're not associated with a period in time when we installed the PSW system in the duct bank.

These issues go back to the original design and licensing basis of the facility, and they impact every aspect of its operation.

We've acknowledged and we've talked about the changes that we made relative to specifically PSW and the concrete trench.

So, this is about the fundamental design of the facility, whether intended or unintended, the responses in the TIA and how they read.

And we have had others, independent of Duke, review that response and look at how the information could potentially be used by other inspectors in the future as part of doing their normal inspection activities.

And that's the point that we've really tried to clarify here.

We want to ensure that if they are actually left within the TIA, that there's clarity on those points, and how the NRC is viewing those points and the responses that are there, because of the potential implications.

I'm not an expert in this area but I have reviewed the recent opinion that was issue by CRGR associated with the original design life of equipment and how it impacts, the risks associated with it.

I forget the exact title.

MR. NOLAN: Service life.

MR. BATSON: Service life, thank you, Chris. That I've reviewed that and the position there, while it was not determined to be a backfit issue, this Committee actually communicated in there the manner in which it was written would be open to interpretation and could result in some unintended outcomes, as folks take that document and use it in their inspection activities. That's really what I'm concerned with here, in terms of the TIA and how the responses are written.

So, in conclusion, we're looking for your opinion and how you view these interpretations as they're presented in the TIA going forward.

We do believe that if it's the NRC's position to apply the current NRC perspective on these particular issues as we understand it, or as we believe it can be interpreted, that there's other processes that should be used for that.

We're very concerned if they remain in the TIA as written.

So, we look forward to your response and follow up on each of these four issues. We are very open to continue dialog and discussion.

It's just we believe these are fundamental to the operation, to the design, to the license, of the facility, and therefore, the importance that we place on this interaction.

So, thank you again.

CHAIRMAN HACKETT: Thank you, Scott, and to the team.

I think we before we get to finalizing the meeting, well go ahead and first turn to anyone in the room that may have a comment on what they've heard today.

Would anybody like to come to the microphone?

Hearing none, we'll turn to the phone lines to see if anybody out there on the phone line has any comment.

Sounds like a no and it sounds like there aren't any out there either.

So, with that, I would say, echoing Scott's comments, first off, thanks to you guys for the, as I mentioned at the initiation, I know Chris and I had been talking for a while about this in advance, and I think that helped in terms of the preparations.

I think I can speak for the Committee in that this has been helpful for us and productive and I think has added clarity to the discussion.

I'll just mention a few things.

The meeting, as you noticed, is being transcribed, so the transcript, based on our last interaction, probably will be available in about a week.

So, if you want to request a copy of that, either from Nick DiFrancesco or Les Cupidon.

And our process going forward, I think we had hoped, Scott had referred to our commentary on the service-life risks. That took us longer than we had hoped.

This one could take some time. So, I wouldn't commit to a timeframe here.

We'll have a lot of interactions to have before we can go forward with our conclusions and recommendations, but we will try to engage that as expeditiously as possible, and appreciate your openness to any further communications if necessary.

And then I'll just turn to any of the Members. Any final comments?

MR. McDERMOTT: Thank you very much.

CHAIRMAN HACKETT: Very good. With that, I guess we're adjourned. Thank you so much.

(Whereupon, the above-entitled matter went off the record at 3:47 p.m.)