Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

Title: Advisory Committee on Reactor Safeguards
Open Session

Docket Number: (n/a)

Location: Rockville, Maryland

Date: Wednesday, June 5, 2019

Work Order No.: NRC-0355 Pages 1-342

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

DISCLAIMER

UNITED STATES NUCLEAR REGULATORY COMMISSION'S ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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

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

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

+ + + + +

664th MEETING

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

+ + + + +

OPEN SESSION

+ + + + +

WEDNESDAY

JUNE 5, 2019

+ + + + +

ROCKVILLE, MARYLAND

+ + + + +

The Advisory Committee met at the Nuclear Regulatory Commission, Two White Flint North, Room T2D10, 11545 Rockville Pike, at 8:30 a.m., Peter Riccardella, Chairman, presiding.

COMMITTEE MEMBERS:

PETER RICCARDELLA, Chairman

MATTHEW W. SUNSERI, Vice Chairman

JOY L. REMPE, Member-at-Large

RONALD G. BALLINGER, Member

DENNIS C. BLEY, Member

CHARLES H. BROWN, JR., Member

MICHAEL L. CORRADINI, Member

MARGARET SZE-TAI Y. CHU, Member

VESNA B. DIMITRIJEVIC, Member

WALTER L. KIRCHNER, Member

JOSE MARCH-LEUBA, Member

DAVID PETTI, Member

HAROLD B. RAY, Member

GORDON R. SKILLMAN, Member

DESIGNATED FEDERAL OFFICIAL:

DEREK WIDMAYER

CONTENTS

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

(8:30 a.m.)

CHAIRMAN RICCARDELLA: The meeting will come to order. This is the first day of the 664th meeting of the Advisory Committee on Reactor Safeguards.

I am Pete Riccardella, Chairman of the ACRS.

ACRS was established by the Atomic Energy Act and is governed by the Federal Advisory Committee Act, FACA.

The ACRS Section of the U.S. NRC public website provides information about the history of the ACRS and provides FACA-related documents, such as our charter, bylaws, Federal Register Notices for meetings, letter reports, and transcripts of all full and subcommittee meetings, including all slides presented at the meetings.

The committee provides its advice on safety matters to the Commission through its publicly available letter reports.

The Federal Register Notice announcing this meeting was published on April 29, 2019, revised on May 24th, and provides an agenda and instructions for interested parties to provide written documents or

request opportunities to address the committee as required by FACA.

In accordance with FACA, there is a Designated Federal Official for today's meeting. The DFO for this meeting is Mr. Derek Widmayer.

Today's meeting -- at today's meeting, the committee will consider the following: Reactor Oversight Program Enhancement Project and Appendix D to NEI 96-07 and Associated Draft Regulatory Guide for Digital Upgrades under 10 CFR 50.59, NuScale Design Certification Application Chapters 3.9.2, 14, 19, and 21, and Preparation of ACRS Reports.

As reflected in the agenda, portions of the sessions on NuScale Safety Evaluation Report may be closed in order to discuss and protect the information designated as sensitive or proprietary.

Additionally, in tomorrow's session, we will be looking at the issue of open design items that are identified as part of the design certification application with a focus on unverified design assumptions.

There is a phone bridge line. To preclude interruption at the meeting, the phone will be placed in the listen-only mode during presentations and committee discussions.

We have received no written comments or requests to make oral statements from members of the public regarding today's presentations.

There will be an opportunity for public comment, as we have set aside 10 minutes in the agenda for comments from members of the public attending and listening to our meetings. Written comments may be forwarded to Mr. Widmayer, the Designated Federal Official.

A transcript of the open portions of the meeting is being kept, and it is requested that the speakers use one of the microphones, identify themselves, and speak with sufficient clarity and volume that they can be readily heard.

As an item of interest, I would like to introduce Dr. David Petti as a new member of the committee. Among the many achievements, Dr. Petti is an expert in coated particle field technology. Welcome, Dave.

(Applause.)

CHAIRMAN RICCARDELLA: It's not on my script, but would everybody please silence their cell phones so we don't have interruptions at the meeting?

I would like to ask Mr. Dick Skillman, Chairman of the ACRS Subcommittee on Plant Operations

and Fire Protection, to provide any desired opening remarks.

Dick?

MEMBER SKILLMAN: Mr. Chairman, thank you. For those of you who may remember, there was once a process called SALP, the Systematic Assessment of Licensee Performance. And, fortunately, that system has been displaced by the Reactor Oversight Process, and over the course of years the staff has refined and refined and refined the ROP. And I think it's fair to say with the transformation initiatives that are underway, NRR is still transforming and improving the ROP.

So today I thank the members from NRR to come and brief us. I've got to say up front, I must say up front that credit goes to Derek for driving this. I've been a passenger on this effort. So, Derek, thank you.

And I'm going to turn the presentation over to Mr. Russell Gibbs. Sir, please proceed.

MR. GIBBS: Thank you very much. Before I begin, Billy Dickson, the Deputy Director of Division of Inspection and Regional Support, will provide some remarks.

MR. DICKSON: Good morning. My name is

Billy Dickson. I am the Acting Deputy Director for the Division of Inspection and Regional Support in the Office of Nuclear Reactor Regulations, NRR.

So the purpose of today's briefing is to provide an overview of the Reactor Oversight Process, the ROP Enhancement Initiative.

Today's staff presentation represents NRR's effort to -- in addressing a number of recommendations received from the NRC transformation team in May of 2018 for enhancement of ROP.

The team also addressed a number of recommendations for enhancement of ROP from NEI, the Nuclear Energy Institute, in a letter to the NRC dated September 2018.

The ROP Enhancement Initiative started in October of 2018, and from the start of this effort we have continuously received feedback from both our internal and external stakeholders that the element -- the key elements of the ROP are sound.

The Baseline Inspection Program is a mature program that has had a demonstrated period of success over the past 19 years or so. The infrastructure is good. The focus of this initiative is continuous improvement.

So throughout this process, the team has

worked extensively with the regional offices during the disposition of all the recommendations, especially those dealing with the Inspection Baseline Program. In fact, under the advisement of the project's executive sponsor, Ho Nieh, the Director of NRR, a regional advisory panel was established. And Ho Nieh is in the -- in the audience here. So we have also conducted monthly public meetings with NEI since October 2018 to discuss the outcomes of a staff evaluation for each these recommendations.

Before I introduce the staff that will be giving the presentation, which is Russell Gibbs, who has already been introduced, I would like to say that most of these initiatives, this is not a one-and-done effort. And we -- there is an expectation for SECY paper to be delivered to the Commission at the end of this month, with the EDO's approval.

With that said, again, I wanted to introduce Russell Gibbs. He is the project manager for the ROP Enhancement Initiative, and also Ami Agrawal, who is the acting branch chief in the Division of Inspection and Regional Support.

Thank you. Russell?

MR. GIBBS: Okay. Good morning, everyone.

MEMBER BLEY: Before you go ahead, you

mentioned the SECY that will be going out. Are the presentations today pretty much in line with what you expect to have in the SECY?

MR. GIBBS: That's correct. Yes, sir.

MEMBER BLEY: Okay.

MR. GIBBS: Okay. Good morning, everyone. It's a pleasure to be here to talk to you about ROP enhancement. Thank you, Billy, for those -- for those opening remarks.

This first slide here on the background, let me just say a couple of things about these recommendations. The 72 we received from the -- mainly from the staff were very good. Some of them were, frankly, really transformative in nature. At this time, we don't believe the ROP is in need of a transformation.

Now, back in 1998 and 1999, as Mr. Skillman said, indeed, we did need to transform our oversight program. At this time, indications are, based on feedback from our internal stakeholders and our external stakeholders, that the ROP is a sound program. We believe it is doing what it should be doing in providing effective oversight of nuclear reactors in the United States.

Having said that, we can always improve.

So, really, what we're going to be talking today about are some of the -- we'll call it the first phase of ROP enhancement, some of the improvements that we believe are necessary to continue this journey of maintaining and growing our oversight program for nuclear reactors.

The Commission has been very interested in this. In fact, in the fall of last year at an operating reactor business line meeting, of course, a budget meeting, and the staff's presentation on transformation, ROP enhancement was discussed.

So I think the Commission is very much looking forward to receiving our paper with the recommendations that we have to further improve this project. As we indicated -- as Billy indicated, the program -- this project began in October of last year. A lot of work has been done in the last several months. And so it has been a very busy time, but we believe we have gotten much accomplished.

So let's reflect back on the goals of what we're doing here. One is to make this ROP even more risk-informed and performance-based than it already is. You know, over the years, our understanding of risk has improved. Our tools have improved. Our knowledge of risk information has improved, both with

industry and with staff.

So we see a few opportunities to make it even better. With respect to being performance-based, again, a fundamental shift in what we did from the old SALP program.

We believe there has been enough experience over the last 19 or 20 years to indicate that, for example, the TR inspection program could be revisited to determine if there are some efficiencies in that program taking into account the performance of the nuclear industry over the last 20 years.

Secondly, and really importantly, as we go through this project, the first phase of ROP enhancement, and whatever we do in the future, we need to keep our principles of good regulation at the forefront of what we do. And we have a number of examples I think that will indicate that we are, in fact, doing that.

We have examples of showing that we continue to need to be an independent regulator. We have examples of improving the clarity of the oversight program.

With respect to openness, as Billy indicated, there is many, many exchanges between ourselves and industry about what we're doing. And so

we continue to be open about that.

I don't know if you know, but we meet with the industry every month to talk about the reactor oversight process. Reliability, of course, is very important. It's an interesting situation between reliability and efficiency. It's very important that we balance those two -- those two principles within our oversight program.

We need to get it right. We need to come to the right answer, but we need to do it in an efficient manner as well.

Yes, sir.

MEMBER BLEY: What's ICORE?

MR. GIBBS: Okay. ICORE, independence -- it's our acronym for the principles of good regulation, which are independence, clarity, openness, reliability, and efficiency.

MEMBER BLEY: You started by saying you had 99 recommendations from inside and outside. Were they all substantive?

MR. GIBBS: Indeed. Some of them were quite transformative in nature. For example, our nuclear industry suggested, for example, that we eliminate the problem and identification/resolution biennial team inspection. We don't agree with that.

That's would be a substantive change to the program.

However, because, as you know, the PI&R program, problem identification and resolution, is fundamental to an effective oversight program. But could we make improvements? Indeed, we can.

And so what we plan to do, as I'll mention later, is to do a more in-depth, comprehensive review of the problem identification and regulation -- resolution inspection program to see if we can make it even better.

That's more about efficiency and reliability with respect to our principles. Does that answer your question?

MEMBER BLEY: Look forward to hearing what you have to say.

MR. GIBBS: Oh, good. Anyone else?

MEMBER REMPE: Well, when you're talking about some of these transformative, out-of-the-box thinking recommendations, a couple of them caught my eye in the table. There was the one about eliminate the regional offices and bring it all back to the headquarters.

And I am aware of the complaints that inspections vary from region to region in what -- how it's classified. And that would actually possibly

promote some consistency. Obviously, the downside would be less familiarity with plants and a lot of travel costs that -- are those going to receive the same type of scrutiny in the future?

Or another one was to get rid of the SPAR models and use industry models. And so some of those have some -- you know, they're pretty significant, and I'm just curious on how they will be addressed.

MEMBER BLEY: So, and they don't seem part of this program to me.

MEMBER REMPE: Well, I think it's the longer term is what I'm hoping to hear.

MR. GIBBS: Well, a couple of things. SPAR models, let me -- let me comment on that with respect to our principles of good regulation and independence. We believe our SPAR models are necessary for us to do our job.

They are very helpful for us in understanding, for example, the risk significance of a licensee performance deficiency; us performing our own evaluation, using our own tools, to come to a regulatory decision. Not to say that we don't engage with industry -- we do -- as part of that solution.

MEMBER REMPE: And I think more about it, I did like their comment, if you don't want to get rid

of the models, they know and you know, a few inputs are what drive the results.

MR. GIBBS: Of course.

MEMBER REMPE: And coming to consistent inputs to me before you waste time to do the analysis seems like a common sense resolution. And I, again, don't see that addressed yet, and it seems like that one would have been a quick fix.

MR. GIBBS: We will talk about that.

MEMBER REMPE: Okay. But you hit the nail on the head. The influential assumptions that go into a risk calculation are paramount. And, you know, we may agree or we may disagree with industry about what those influential assumptions are.

They would typically be, for example, how long the performance deficiency has been in effect with respect to the degraded condition. It could be a modeling of common cause failures, which is a really important aspect of a probabilistic risk assessment.

Or it could be human error probability, for example, how much time does the operator have to perform the recovery of the degraded condition. The more time, the less likely of failure. Sometimes we do not agree with the -- with the industry in these areas.

But you're exactly right. With respect to the regional offices, where are we going in the future, number of inspectors, et cetera, combining offices, whatever that might be, that is out of scope of ROP enhancement. We are not evaluating that. That is for a future NRC initiative to address that.

MEMBER REMPE: Okay.

MR. GIBBS: So we will be --

MEMBER REMPE: It will be thought about in the future.

MR. GIBBS: Absolutely. We will be essentially taking those recommendations and transferring them to the -- to the executive director of operations for operation there, so an assessment that they may doing in the future.

MEMBER REMPE: Thank you.

MR. GIBBS: Yep. you're welcome.

MEMBER SKILLMAN: I'd like to make a comment about the SPAR models. I spent over 10 years as a director in engineering at TMI-1, and there were a number of times we had an exigent issue. We were in communication with the region and our PRA specialist in GPU, were communicating directly to the region PRA specialist.

And what I found remarkable was the

contrast and sometimes support between our PRA specialist and the NRC staff at King of Prussia, they are having the SPAR models at their instant access, allow them to give a very good first cut understanding of significance to the regional administrator, because we knew that the next action would be our leadership with regional leadership.

And so I would be one who would say don't get rid of the SPAR models because that independence sometimes challenged us to be better at what we were doing at the site. But I would say the flip side was also true. We might have had risk insights that the region did not appreciate that allowed them to adjust their SPAR model.

So this was not inside trading. This was not collusion. This was two independent groups of individuals who really knew their -- knew their tools and their technology, and we were able to avoid, in some cases, a violation. In other cases, it became abundantly clear that we were out of the box, and there would be no surprise for what was going to be occurring.

But that relationship I thought was one of the strongest and most beneficial ones that I experienced up in Region I. The relationship between

the corporate risk specialists and the NRC staff region PRA -- there's a special name for those individuals, but --

MR. GIBBS: Yes. Senior reactor analyst.

MEMBER SKILLMAN: The analysts, the analysts in region. That was really invaluable.

MR. GIBBS: Yes, sir. In fact, our SRAs or senior reactor analysts are fundamental to the significance determination process, a process we used to determine the significance of licensee performance deficiencies.

But let me add to the SPAR model just one thing. Sometimes people forget that SPAR models are also very useful in event response, which is, by the way, one of the primary responsibilities of NRC. If something happened at a plant, we need to know if we need to respond to that plant or not.

So we use those models to help us in a very timely manner, as Mr. Skillman indicated, to respond to the plant.

MEMBER BLEY: Just a note for the committee. I don't know if everybody got wind of it, but last week there was a Commission meeting with the research staff. And there was fairly extensive interaction between the Commission and RES and with

the industry on the SPAR model issue.

And some of the others I included that -- high-energy arc faults, which don't seem to have disappeared, but I think that webcast is probably available, archived, if we need to take a look at it.

MEMBER SUNSERI: Russell, I just have one question. I want to make sure I'm on the same page as you. When you talk about efficiency, does that include timeliness of the identification of issues?

MR. GIBBS: Yes, sir.

MEMBER SUNSERI: Because it seems like we would lose focus if we're working on things too far in the past versus -- I mean, so timeliness is part of your model?

MR. GIBBS: Indeed it does. That's important for us as regulators, to be timely, such that we know the problem -- about the problem and what the licensee is going to do about it. Otherwise, we don't know exactly what's going on, and has the issue really been addressed.

So it's important to return that facility back to its, if you will, normal or nominal plant risk. And so timeliness is indeed an important feature of efficiency; of course, resources as well.

MEMBER SUNSERI: Thank you.

MR. GIBBS: I will mention one other thing. We'll maybe get to it. I'm just -- you know, this communication between licensees and NRC in the midst of determining significance of inspection finding or the significance of a plan event, but primarily with respect to inspection, we have taken some action to improve those communications early on.

It's called inspection finding resolution management. It's a relatively new process change we made where the NRC engages with industry very early -- very early in the process to make sure we have some alignment on those influential assumptions that we -- that we talked about earlier, because like you said, if you go down that path of doing all of the analysis and you're not -- you're totally misaligned on those inputs, then that's, of course, going to create some disagreement, frankly, about the solution that you might reach some weeks later.

MEMBER REMPE: Clearly, you can't always come to agreement. But if you understand that, you'll understand the output you get and what's causing it, and so I hope that is done.

MR. GIBBS: Exactly. Yep. Okay. A few of the --

MEMBER RAY: Wait. I was waiting for a

pause, but it wasn't working. I, too, have been a licensee, and I guess there is one thing that I'd like to ask, which is, if you have a lot of very low significance issues, as determined by the significance determination process, does the fact that they're repetitive make a difference?

MR. GIBBS: Indeed.

MEMBER RAY: And how do you incorporate that into the process?

MR. GIBBS: So that question is part of the problem identification resolution program. So if -- even if a problem is of very low safety significance, and it keeps repeating, that's a problem. And so we need to identify that as part of our PI&R program, but we also have another program. It's called the cross-cutting issues program.

The cross-cutting issues program that we will speak about in a moment is one of the areas that we are going to be doing some work on to see if we can -- we are going to do an effectiveness review to make sure it's doing what we want it to do, to capture those issues of very low safety significance.

MEMBER RAY: Well, yeah. And that's fine. You're going to get to it, and I will probably keep quiet then. But I just want to say that, to me, is

the most important thing is whether you recognize the symptoms of an underlying problem.

MR. GIBBS: Right. Absolutely.

MEMBER RAY: Okay.

MR. GIBBS: By the way, about 95 percent of all of the inspection findings in the United States are very low safety significance. That's -- it sounds like a very good thing to me. But those items that are not of very low safety significance, we need to make sure we get those right, and as they will become more and more significant, even righter, so we -- because we need to make sure that those are corrected.

MEMBER SKILLMAN: Russ, is that 95 percent a gratuitous 95 percent, or are you -- are you repeating fairly close to dead-on accurate 95 percent?

MR. GIBBS: It moves anywhere probably from -- over the years, it has actually become more -- less significant. So I think more recently it has moved possibly even higher than 95 percent, because we're receiving -- we're seeing less risk significant inspection findings over the last several years.

MEMBER SKILLMAN: So the 95 might really be 97 or 96 or --

MR. GIBBS: Could be.

MEMBER SKILLMAN: -- 98.

MR. GIBBS: It's a very high number. That's the point.

MEMBER SKILLMAN: Thank you.

MEMBER BLEY: That number doesn't give me as much confidence as it sounds it gives you. Maybe even talk about this a little bit.

MR. GIBBS: Sure.

MEMBER BLEY: I have a valve that an inspection finds is in a condition so it's likely it wouldn't operate properly. I look at my PRA model, and this particular valve and this particular system is backed up with lots of redundancy and diversity, and, therefore, it has no real impact on risk.

But if the same problem that affected this valve affected this valve over here, it would have very high --

MR. GIBBS: Sure.

MEMBER BLEY: -- risk significance. Do you look for that?

MR. GIBBS: Yes.

MEMBER BLEY: Do you look for that connection, and how do you do that?

MR. GIBBS: We look -- it's called extent of condition, and the more significant an item is, the more we look to see if there are other problems. We

look -- by the way, this is the responsibility of the licensee. They are responsible for this -- for this search, and, of course, we're going to be making sure that they -- that they do that. That's part of our problem identification and resolution inspection program.

MEMBER BLEY: You kind of answered me in the same words you started with.

MR. GIBBS: Okay.

MEMBER BLEY: If it's a significant one, then we get deeper. It's this idea of potential significance that I was hanging on there, and, you know, maybe it's due to a maintenance problem. And, really, the issue is it's a maintenance problem, and that could have high risk significance, even though this particular event does not.

MEMBER BLEY: Yes. Indeed.

MR. GIBBS: So --

MEMBER BLEY: Okay.

MR. GIBBS: -- the inspections try to expand on it.

MEMBER RAY: Well, Dennis, you're right. But even more subtle common cause or extent of condition is lack of effective oversight in general. And a lot of small problems can be indicative of the

lack of oversight of things that are taking place.

And I just want to feel confident that you would recognize that in assessing extent of condition of a small minor issue like Dennis mentioned.

MR. GIBBS: Right. The reactor oversight process is risk-informed and performance-based. And that is a very powerful goal of what we're trying to accomplish. Let's, again, reflect upon the licensee's responsibility. It's their responsibility to maintain these plants, meet the regulations, and maintain these plants in a safe manner. We're there to make sure they do, right?

And for more -- as an issue becomes more and more significant, we engage more and more. This is a graded approach to regulatory oversight. But you make good point. If -- and, by the way, it's a current issue that we're thinking about.

Suppose a plant is in column 1 of the action matrix. They're not -- they're not proceeding down the path of reduced performance with respect to our system process. But what if there are a number of low, very low, safety significant issues? What should that -- what does that mean to us? And how should we respond to that?

This is a question we're asking ourselves

at this time.

MEMBER RAY: Well, I'm glad to hear that. We don't need to dwell on it anymore, in my standpoint. But I'll just tell you, again, from an experience standpoint, it often reflects a lack of I'll call it management oversight or licensee -- whatever you want to call it. But it produces these symptoms for a long time, and then all of a sudden the same problem results in something much more significant that could have been avoided.

So I think you should keep a focus on that in my comment.

MR. GIBBS: We agree. Thank you.

MEMBER SUNSERI: Well, that would be -- my experience is that would be reflected in the trending program, which is a subcomponent of the PI&R, right? So Dennis' issue, while that behavior that caused that value failure on an insignificant valve might be considered lucky, the plant probably wouldn't take any action unless there was a trend of those kind of failures, right?

MR. GIBBS: And, by the way, they are supposed to be looking at other plants as well, as part of operating experience.

MEMBER BLEY: There's a thing I've noticed

a lot. If you look at really severe events that have happened that have generated higher levels of inspection following the event, they almost always have a link to a corrective action program that isn't working well. Is that part of the inspection process, looking at their corrective action program?

MR. GIBBS: Indeed. It's one of the most fundamental parts of our inspection program. Every inspection procedure that we perform, there is about a 10 percent effort on problem identification resolution. That's one aspect, and we perform a great deal of inspection.

We also look at the problem identification resolution program every six months, sort of collectively, and every year. And then we go back as a team and we go look at it currently every two years.

And so one of the questions that we are asking ourselves now, can that entire process be optimized?

MEMBER BLEY: Okay. And I'm just thinking about finding the problem and problem resolution in the corrective action program. That's a little tricky to reflect into the risk measures that we usually use for this program. So how do you do that? Is it just more a judgment process looking at those things?

MR. GIBBS: Okay. So a risk-informed program doesn't mean that we are overrelying on PRA calculations. It also has other aspects of how we assess performance. And one of those critical areas is the health of the PI&R program. We have to have confidence that the PI&R program at a licensee is robust and healthy. If we don't, then we can -- we can take action.

We can go as far as a deviation from our program. In the current program, we can deviate from the program if we believe there is sufficient evidence to show that we should. So we have flexibility in our process to deal with these situations. Okay?

MEMBER BLEY: And if we bring up anything that you've got slides on later, just tell us.

MR. GIBBS: Glad to have this discussion with you.

Objectives of the ROP enhancement project, as we have been talking about quite a bit, we try to focus on issues of higher safety significance. When I say "focus," I mean we spend more time and energy on those areas.

We want -- however, we want our program itself to be able to deal with those issues of lower safety significance as well, particularly in a

collective manner with respect to PI&R and human performance, which is also very, very important in the risk profile of a facility.

In terms of enhancing the significance determination process, we have made great strides over the years, but we believe we can do better. In fact, currently, there are a number of issues -- infrastructure issues that we're looking at to further improve the program, and so we're looking at treatment of human error probability.

Common cause failure modeling is another area. We're looking at our tools, particularly the phase 1 screening tools and the significance determination process, to make sure they're doing what we want them to do, that they're not overly conservative or vice versa.

We do not want something to screen as very low safety significance if, in fact, it's of higher significance.

MEMBER CORRADINI: Does research help you with that? Does RES help with you with that sort of improvements of the tools?

MR. GIBBS: Our main source of that is our Division of Risk Assessment in NRR, which has a very close relationship to research. Research is our --

MEMBER CORRADINI: So you go through -- you go through that division if you need help.

MR. GIBBS: Yes, we do.

MEMBER CORRADINI: Okay. Fine.

MR. GIBBS: Yep. Of course, we talked about improving the inspection program. We believe it's a robust program, but we do believe that there can be some efficiencies gained in the program, particularly in light of what we've seen with respect to industry performance over last -- over the last 20 years, and, frankly, what we have learned implementing this program over these -- over these years.

We talked earlier about improving communications with industry. We just want to make sure in the final determination that at least we have an understanding of their position and that we document that as needed.

A few guiding principles. You know, we do a reactor oversight process self-assessment every year, and it's a very robust program. So ROP enhancement is in addition to what we're already doing. I think there are some -- I see Bob Kahler in the room here for emergency preparedness. Thank you, Bob, for coming.

Our Emergency Preparedness Division, they

have -- they have been performing a great deal of work with respect to a focused self-assessment of emergency preparedness. So what we did -- what we have done is we try to leverage what Bob is doing in emergency preparedness as part of ROP enhancement.

Security -- same thing. The security area has spent a lot of time improving their program.

So we're trying to take advantage of some things that we're already doing.

By the way, we want to maintain the strengths of the reactor oversight process. The inspection program is a strong program. We believe the significance determination process is strong. Our assessment process is strong, and we continue to get feedback in that regard.

But as I said, can we improve? Of course we can. And so what we're trying to do is make some of these -- some of these improvements to the program and maintain the strengths of what we do, because we do believe, not just us by the way, again, industry believes it's a strong program.

In fact, our program has been -- has been a model for several countries around the world. In fact, Japan is the most recent member or regulator who is adopting some of the ROP principles, because of

this robustness.

But anytime we make a change to the program, we need to understand the basis of what we're doing, the basis of what we do now, and how we're impacting that basis. It's very important that we do that. We need to articulate that to help all of our stakeholders understand why we're making the change.

The question is: what's the problem? What are we trying to correct? And then why is that different than what we had originally assumed?

We have a couple of examples in ROP enhancement in that regard. As Billy indicated, many, many meetings that we've had with industry, I think we've had over 10 public meetings since ROP enhancement began. Again, we meet with industry every month, and we've had other meetings as well, to try to gain some understanding about their views, tell them what we're thinking, we get feedback from them.

And one of the things that we're doing very carefully as part of this project is taking into account these alternative views, and we're actually documenting those in the commission paper that we will present to the Commission at the end of this month.

On project infrastructure, I just wanted to give you a sense of some of the things that we have

been doing. Ho Nieh, our director, is our executive sponsor, and, Ho, it has been -- it has been fabulous that you have been working with us.

I think the notion of the development of a regional advisory panel -- Ho's idea -- was great, because as we reach out to the regions, the regions need to understand what we're doing, and we need their input, and we've been using the regional advisory panel, which are SES executives, to help us in that regard.

With respect to the recommendations received, the 99, the ones that were in scope, we put them in various -- into various themes, such as inspection, SDP, significance determination process, performance indicator program, emergency preparedness, security.

Also, sort of an add to the program that we somewhat did not expect was the -- our inspection programs for independent spent fuel storage installations. So that's a part of the program. We are working with our office of NMSS to help us in that regard.

Each thematic area has a team leader. We maybe have a few here today. Hope so. And so they have -- they are essentially -- oh, Ami was a team

leader for ROP inspection, for example. I was -- I am the overall team leader for this effort. It has involved a lot of people, a lot of staff, a lot of interactions with industry.

We are taking this very seriously. It's one of the most, if not the most, important initiatives within the office of NRR.

There's a public website, lots of management tools, because what we find in this project, it has been moving fairly quickly. We need to have very good tools to help us manage this program, and we believe we do.

As Billy indicated, we are -- we are close to getting this commission paper ready for the Commission. I believe we are going to -- Dan Merzke is here, our primary author of this paper. Thank you, Dan. It is with our OGC, Office of General Counsel, now, and we expect an NLO, no legal objection, from them tomorrow.

And then Ho Nieh will take a look at the paper, and then -- and then we're going to submit it to our EDO we hope on the 17th of June. If that goes well, we'll meet this end-of-June deadline.

MEMBER BLEY: I don't mean to be insulting. All you're saying sounds good, but it's

very high level and it could mean almost anything. The SECY paper, does that get very specific about the changes you are proposing to make?

MR. GIBBS: Absolutely.

MEMBER BLEY: Okay.

MR. GIBBS: Let me -- I mean, let me tell you something about that. We will get to it in a minute, but I'll just -- I'll say it now.

The Commission has on multiple occasions commented in public meetings that they believe the ROP is a strong program. In fact, they believe it's sufficiently robust that if we elect -- if we're going to change the program, they issued a staff requirements memorandum that they need to be either -- they need to either approve certain changes or they need to be notified of certain changes prior to the change.

There are some changes we are making that fit that -- that fit that. So, yes, and we're going to get into some of those details in just a moment about some of the things that we're going to be changing. Yeah, we'll get to it.

All right. So here are some completed actions already. Now, these items did not require Commission approval, nor notification, but just to let

you get a sense for some things we've already done.

Industry believes -- has provided comments to us that they do not believe we should issue a press release for a white inspection finding. A white is a finding in the -- and it's currently of low to moderate safety significance. We're going to suggest that it be changed to a finding -- inspection finding of low safety significance, and we'll talk about that in just a moment.

MEMBER BLEY: Okay. Because I'm not sure what the distinction was you just made.

MR. GIBBS: The distinction is is that we have guidance about when to issue a press release for a white finding. We have, on very rare occasion, not adhered to that guidance.

One or two examples. Okay? Now, what we're doing is we want to -- we have reinforced that guidance with our Office of Public Affairs, because they own this guidance. It's really their program. Okay?

Appendix M, Appendix Mike, this is a procedure we use in the SDP process. We use it when we don't have a tool to determine significance of an inspection finding or we use it when we're finding that the tool we have is not working very well. It's

not used that often.

We were earlier trying to revise this procedure to make it more robust with respect to entry conditions, with respect to, you know, what are the decision-making criteria which are, by the way, Reg Guide 1.174, which is a risk-informed approach to regulatory decision-making.

But also, to integrate the results of those decisions we make about the individual elements of Appendix M into a more holistic, comprehensive decision. We went down that path and decided that we needed to pause and really focus on the entry conditions and give guidance to the analysts and to the decisionmaker about how to assess each of the decision attributes. And that's where we landed with this revision to Appendix M, and the industry agrees that that is a good revision to this procedure.

Initially, you know, one of the recommendations was to just stop work on Appendix M. Well --

MEMBER BLEY: Well, there was -- we saw a little bit of this a few years ago. And I know from industry, and maybe from Congress and a few other places, there was some real concern about moving away from quantitative and back to qualitative criteria.

So you're actually changing the guidance to people for when they -- when it's appropriate to go to qualitative criteria.

MR. GIBBS: Yes. And giving them guidance on how to assess those attributes, to make it as objective and predictable as much as possible. Okay?

Improving communications with licensee about inspection results. I had mentioned that earlier. This is the inspection finding resolution management program. We believe -- it is already -- we have already seen some improvements in this program.

A few years ago, we were seeing inspection findings that were greater than green. That would be white, yellow, or red. They were taking us a really long time to come to resolution, and we were trying to understand why. Some of it was about our communications with the licensee, not really getting alignment about what's going on, an understanding at least. And so we have made some changes in that regard. That procedure I think was issued in 2016.

Here are some early opportunities. Some feedback we got from industry, in terms of right sizing inspection follow up specifically for white inspection findings. This is a supplemental inspection, inspection procedure 95001. Two things

that we're focusing on right now.

One, do we need to spend the level of resources on that supplemental inspection as we have over the last few years? We believe that we can, but more importantly, I believe, is that this procedure has spelled out -- has indicated that licensees perform a root cause evaluation for a white inspection finding when, indeed, in a risk-informed program, a causal analysis is sufficient.

And so if a licensee is performing a root cause for every inspection finding that is of white significance, this takes a lot of time. The question is -- and takes a lot of resources. The question is, in a risk-informed program, is this necessary?

So we're going to -- we are right now in the process of revising inspection procedure 95001 to address this item.

Another thing with respect to clarity, right now, a green inspection finding is a very low significance. We are not changing that. It makes good sense. A white inspection finding right now says from low to moderate. It's the only one that has a range, if you will. We don't believe that's good in the spirit of clarity. We want to change that to low safety significance.

A yellow inspection finding in this program is right now considered substantial. And a high -- or a red is considered high. I don't know about you, but "substantial" sounds more important than "high." We're actually changing the substantial characterization of a yellow to moderate, and then we will not do anything with red.

So we will end up with very low for green, low for white, moderate for yellow, and high for red. We believe that's more understandable.

MEMBER BLEY: Makes sense to me. Dick, two things. Didn't we write a letter on this issue of not attacking every white finding on --

MEMBER SKILLMAN: Yeah. About two years ago we did.

MEMBER BLEY: That's what I thought. And I think the concern we were left with was it seemed reasonable, as long as if that same white finding crops up multiple times, then we ought to be elevating it.

MR. GIBBS: Then that will fit into our assessment process. Multiple times would indicate that that licensee will shift to the right on the action matrix, and we will be doing a more in-depth inspection.

MEMBER BLEY: Is it possible for you to do like a two-minute summary of the action matrix? Because I'm not sure all of the members are familiar with that.

MR. GIBBS: Sure.

MEMBER BLEY: Some are, some are -- haven't gotten into that in great detail.

MR. GIBBS: So we consider the action matrix a strength of the ROP. One of the big differences between SALP and the ROP, one of the big ones, is the action matrix. It's a very predictable regulatory oversight tool.

There is no question where a licensee is going to be with respect to performance, our assessment of their performance using this action matrix. It has several columns.

When a licensee is taking care of business and there is no, if you will, greater-than-green inspection finding or performance indicator, they are in column 1 -- column 1 of the action matrix.

Column 2 happens when a greater-than-green inspection finding is identified. White, for example. If a white inspection finding is identified, we will move into a column 2, which requires a regulatory response, which is a supplemental inspection.

And then as it goes to the right, you get into what is called the degraded cornerstone column. And I think what you're mentioning, there is about, you know, with repetitive failures, then the licensee might move into column 3 of the action matrix, which could be from three white inspection findings or performance indicators, or it could be from a yellow inspection finding.

And then the column 4 is for one single red or when multiple cornerstones are degraded. So it's a very graded approach to our oversight.

MEMBER BLEY: And it defines what NRC's response will be once you're in one of those columns.

MR. GIBBS: It defines our communications with a licensee; it defines our public involvement; it defines, most importantly, our response with respect to supplemental inspection.

As you can imagine, a licensee that is in column 4 of the action matrix is a significant -- a significant inspection activity.

MEMBER SKILLMAN: And then there's one more column.

MR. GIBBS: It's 0350.

MEMBER SKILLMAN: 0350.

MR. GIBBS: And that's where you lose your

keys, and that's on the far far right.

MEMBER SKILLMAN: Yeah.

MR. GIBBS: We don't see that. Thank goodness. I mean, overall, you know, nuclear power in the United States is very safe.

MEMBER KIRCHNER: But could you give us an update on the current fleet versus your action matrix? Is there anyone on the right-hand side of the matrix?

MR. GIBBS: Is anyone in column 4? No. That's done. Column 3, Dan Merzke, I don't think -- zero. Over 90-plus percent are in column 1. Five units in column 2. That licensee response column where we will go do a supplemental inspection to make sure that they're addressing the issue, including extent of condition, which is very, very important.

Again, as regulators, I was an inspector. I think we've had some inspectors in the room here. You know, what is near and dear to us as regulators is that licensees identify and correct problems. If they're doing that, then we have reasonable degree of assurance that the facility is being operated in a safe manner. Okay?

Okay. Commission approval. With respect to SRM COMSECY-16-022, these are the items that we are requesting the Commission to approve. One of those

items is optimizing the baseline inspection program.

Ami here led this group, did an extensive assessment of all of the baseline inspection programs for the reactor safety cornerstones, minus emergency preparedness, and we found some opportunities to optimize the program.

Now, individually -- individually, if we wanted to change an individual inspection procedure, we would not need to ask permission for that, unless it was a really substantial change, like eliminating the procedure, but collectively, because of the work we've done and where we -- where we recommend that we land, which is a reduced inspection program from what it is today.

It's comparable to about where it was when this program began in 2000. Comparable. So, you know, we're trying to eliminate unnecessary overlap and redundancy. Really, what we're doing is we're not -- we're not removing inspectable areas. What we're doing is looking at the number of samples, inspection samples we take, and also the number of hours we spend.

If you're going to reduce samples in an area, you're going to spend less hours on that procedure. So what that's going to do is have an

overall impact. The baseline inspection program will decrease. That needs Commission approval.

The next item, I will say -- so let me back up. Optimizing the baseline inspection program, what problem are we -- what is the problem? We're trying to address efficiency. So getting back to those principles of good regulation, the elimination of the four-quarter requirement for closure of green inspection findings and the option, which we recommend, to establish a requirement that PIs remain inputs until the supplemental inspection is complete.

We believe this is an important change, primarily to encourage licensees to correct problems in a timely manner. Our data that we -- Dan actually did the work on this, in the room. The data suggest that we believe licensees could take more timely corrective action for these greater-than-green inspection findings and also for these performance indicators.

So we want to change the program as much as we can to encourage licensees to take these more timely action. That's -- from a very high level, that's what we're doing.

Also, because the inspection findings and the performance indicators are treated differently in

the program, it's unclear, it's complicated, and we want to -- we want to make that simple. So it's really helping us with respect to clarity of the program, really a basic understanding of how this works. That's the second item requiring Commission approval.

MEMBER SKILLMAN: Russell, what allowance is given for the fuel cycling? For instance, let's presume for a minute that there is a finding, it's greater than green, it's in the primary shield, the plant is on a 24-month fuel cycle, and you're two months in. So you're not going to get into that primary shield area for the next 22 months unless you take a shutdown.

So what allowance is given for the licensees to address a greater than green? They are certainly not going to get it in the next four quarters if they're on 24-month fuel cycle. It's probably not raging safety significance, but it is important.

So what is the -- what is the allowance that is given for the -- if you will, the structure of the plant, its fuel cycle, and, quite candidly, radiological exposure?

MR. GIBBS: So if the licensee identifies

a problem that is affecting the reactor shield wall -- shield wall? Is that --

MEMBER SKILLMAN: So let's say I've got -- I can't reliably understand my lubricating oil levels in my reactor coolant pump motors. It's really not a safety component, but it certainly is a reliability component and maybe a fire issue.

But I really am not going to go anywhere near those reactor coolant pump motors if I'm on a 24-month fuel cycle. If I'm two months in, I'm not going to get into that area for the next 22 months. But it's a greater than green, for whatever reason.

So what allowance does the inspection protocol allow for that licensee to say, "I'm confident I'm not going to have a fire problem. I've dealt with this problem in the past. But if you force me to go to closure, I'm going to have to shut the plant down, and that brings risks that I really prefer to not take."

MR. GIBBS: Right. Well, the first thing is, licensees have to meet their technical specifications. So if this problem is affecting operability, they would indeed need to take action to address the problem.

MEMBER SKILLMAN: I understand that. But

here is one that is kind of goofy. It really isn't covered by tech specs. It raises the question of operability, but the plants definitely say, "We've dealt with this before. Even though we can't see those levels, we're comfortable that the oil is there, the lubricant is there."

MR. GIBBS: So if a licensee -- of course, they've identified this problem. They've entered it into their corrective action program, and they will establish a plan to correct that. And we look at that plan and we're satisfied with it. That's how this program would work.

MEMBER SKILLMAN: So that might be the allowance that the licensee is granting, even though there is a greater than green that might last for more than four quarters.

MR. GIBBS: Well, you know, interestingly, as -- depending on -- when you say "greater than green," there is a difference between red and white, right?

MEMBER SKILLMAN: You betcha.

MR. GIBBS: So we may have some very serious conversations with the licensees if they do not believe, for example, they need to shut the plant down and correct the problem, if it's indeed an issue

of high safety significance.

MEMBER SKILLMAN: I understand.

MR. GIBBS: I suspect that they would do the right thing.

MEMBER SKILLMAN: Yeah. I do, too. I was just wondering, are there -- are there areas where the inspection team, the NRC inspection team, would say, "We understand what you're dealing with, and we will flirt with you for a certain time period until this is taken care of."

MR. GIBBS: We actually have an office instruction in NRR. It's -- I think we call it license -- it's LIC-503 or 504 -- 504. We actually created this document after Davis-Besse. Similar situation where, what is our decision as a regulator for these -- for these situations that could involve some degree of risk, some degree of high risk.

This procedure is very helpful for us to inform us about what our regulatory action should be.

MEMBER SKILLMAN: Fair enough. Thank you.

MR. GIBBS: Okay? All right. Significance determination process for emergency preparedness. There are 16 planning standards in the regulations. Some are more important than others. There are four that are risk significant planning

standards, like licensee making the emergency declaration, very, very important.

The licensee notifying the local officials about what that emergency classification is. Very important that the licensee makes a protective action recommendation in a timely manner. That's a third one. And the fourth one is dose assessment, performing dose assessments of the situation. Really important.

No change is being proposed to the treatment of those four planning statements. So, of the 16, right, 12 remain. Of those 12, three are -- actually could impact the licensee's ability to meet those four risk significant planning standards, such as staffing of the emergency response organization, equipment used in the emergency response facility to help the licensee, you know, do what they need to do in an emergency.

Those items could become greater than green or white is if -- if you have a cap on those. The remaining nine -- and this is where I think, Bob, you may want to comment further. Those will be considered not to be of greater-than-green significance. They are more compliance-based, and so this is a big change in the program.

So it gets back to risk-informing the program. Better risk-informing the program, using risk information to make the program even better than it is.

These three items require Commission approval. Does that help you all understand some of the -- we are at 9:30 right now, so I'm trying to --

MEMBER RAY: Well, we're going to have to pause for just a second still, notwithstanding that.

Okay. Risk-informed. But, again, I find myself wondering, what is the basis of risk? Is it the event itself or the condition itself, or is it the extent of condition? Is it a result of something that could, if it happened in another location, have very significant consequences? But because it happened in this location -- to use Dennis' example -- it had very low significance. Well, then, it has low significance and we will treat it as such.

I'm not clear on how you factor in the risk significance of something that is systemic or it has an extent of condition that could affect other things in what you're describing.

MR. GIBBS: Again, and maybe I was not clear enough, but, again, our program -- risk-informed and performance-based -- using a graded approach, if

a more risk-significant or greater-than-green inspection finding occurs, we perform a supplemental inspection.

In that supplemental inspection, we perform an extent of condition. Actually, what we're doing is looking to see what the licensee did in their own extent of condition review. Of course, as it becomes more and more important, we may do our own inspection, you see, so we're treating -- we're treating the program in a manner that's graded approach with respect to risk.

Now, when you talk about risk in -- you know, in very simple terms, and try to keep it really simple, it's what can go wrong at a facility. We call those initiating events. What can go wrong?

The second part to the risk triplet is, you know, how likely is it? I mean, we have an understanding of these initiating events.

And then the third item is, what is the consequence? Your question is about consequence with respect to possibility of other areas. The answer lies in the supplemental inspection.

MEMBER BLEY: Let me turn it around just a little bit --

MR. GIBBS: Okay.

MEMBER BLEY: -- if I could. I'll get back to -- you said something earlier that I think is the key. one thing one might do is rely on Appendix M and some qualitative approach to address this kind of issue. Another is I thought you said you had guidance that actually deals with these extent of conditions.

MR. GIBBS: It's in the supplemental inspection procedure.

MEMBER BLEY: It is in the --

MR. GIBBS: Yes.

MEMBER BLEY: -- inspection process.

MR. GIBBS: Yes, it is.

MEMBER BLEY: I don't know if that helps.

MEMBER RAY: Well, it has to be greater than green. I was really triggered off what he said was the change was just describing -- maybe just if you'll repeat that again, it will answer my --

MR. GIBBS: Which one?

MEMBER RAY: Well, just before I interrupted you, you had talked about a change occurring. Actually, I think Dennis spoke, and then I did. And in thinking about it, maybe I misunderstand what you were saying is change effective. I can't repeat it back to you now at this

point.

MR. GIBBS: Right. The one that comes to mind is our work we are doing with respect to the treatment of white inspection findings in our supplemental response. That's what comes to mind, I believe, with respect to your question.

We believe we can spend a bit less resources on uncomplicated, for example, degraded conditions, those that are uncomplicated, a single white issue, for example, and that we do not believe -- and regulations, by the way, do not require that a licensee perform a root cause evaluation for those situations.

MEMBER RAY: Well, you won't find anybody who wasn't more glad to see SALP go to me. But it did include the assessment of what are the implications of this minor event that happened. And I guess I'm still trying to gain confidence that there is some aspect of that that is preserved here in the changes that you're making.

MR. GIBBS: Yeah. Let me reach -- let me throw out a lifeline here. I want to make sure that -- and Billy or Ami or anyone here with NRC, I want to make sure we capture that question and we give a satisfactory answer to help you understand that.

Really, but the short answer is problem identification and resolution, and our inspection of that -- of the licensee's identification and correction of the problem, including extent of condition, which could involve multiple issues of various safety significance, is really -- is really the program response.

I don't know if anyone -- Billy, did you want to add to that?

MR. DICKSON: No.

MS. AGRAWAL: I guess your point is that, how are we capturing the low safety significant issues? Is that the gist of the question?

MEMBER RAY: What are the implications of a low safety significant event? I had to go to so damn many regional meetings to talk about things that were insignificant because the implication of it was that, well, if this had happened elsewhere, it would have been significant.

So I understand not wanting to overdo that. That's really what caused SALP to be so strongly criticized. But it's -- there is a degree to which I am concerned about going too far in the other direction, which is, yeah, these are little minor things that are happening. It doesn't rise to the

level where we look at what the extent of condition is.

And so we don't see that until something significant does happen. And that's all I'm trying to say, and I've taken too much time, so --

MR. MURPHY: I'm Marty Murphy. I'm the Director of Regulatory Affairs at Xcel Energy, and I'll presenting here shortly.

So maybe I can help with that. So I think -- you know, Russell, I'll try to throw you a lifeline here. So there is a number of things that licensees do within the corrective action process where we'll assign a causal evaluation for something, and in some cases it may be a fix.

But if there are generic implications where that component is used in other places of the plant, you know, we will look at it for, you know, those aspects of common cause or other -- you know, if that degradation could be impacting more safety-significant areas.

So that certainly happens, and that happens through the cap screening process where there is a collection of, you know, subject matter experts that review all of the caps and then screen them for the various actions that are required to assess those

corrective actions.

I think the other thing that you've got to consider, too, is the residents every day look at all of the caps. And if they see a component or something that has a generic application in the plant, they would likely be asking those same questions about what we were going to do relative to its use in other areas.

And if you get into operability, and you start to question operability in those other areas, then you may have tech spec issues which would then rise to the level of trying to understand the safety significance.

So there is a number of things that happen on a daily basis through screenings and assessments to look for those very issues, the trending that gets done by the PI&R program, the trending that happens by the residents themselves, so, again, there is a multitude of layers of defense there to look for those variables.

Does that help?

MEMBER RAY: I think we should go on.

MR. GIBBS: Fair enough. As Billy indicated at the beginning, the ROP enhancement project is not a one and done. Essentially, we just

are towards the end of phase 1 of ROP enhancement. ROP enhancement will continue. We're not real sure exactly how long, but there are a few next steps for us, some longer term actions.

We are going to be looking at some possible revisions to performance indicators, specifically, the mitigating systems performance index PI. Industry believes it has basically kind of run its course. It is actually a fairly complicated PI. It involves a lot of resources, and they are wondering if they could change that, the MSPI performance indicator. More work to do in that regard.

Remember that the performance indicator program and the inspection program work hand in hand to assure that licensees are operating their plants safely.

I mentioned to you before we're going to be performing a comprehensive review of the problem identification and resolution program to make sure that it's accomplishing what we want. It's early to know exactly what that is going to look like, but we intend to kick that off in the July timeframe. We're making preparations for that.

Also, we're going to perform an effectiveness review of the cross-cutting issues

program. And, Mr. Ray, this may actually address some of your questions. The cross-cutting issues program is a program that focuses on three areas -- human performance, problem identification and resolution, and safety conscious work environment -- to see if -- if things are happening at a lower level of significance, it actually has some -- collectively a more risk-significant potential. Okay?

MEMBER RAY: Yes.

MEMBER KIRCHNER: Before you go on, if we could go back to 10, since you put it up. It's so blurry, I can't --

MR. GIBBS: Oh, I'm sorry.

MEMBER KIRCHNER: Can you explain what you're illustrating there?

MR. GIBBS: This is just an example of a performance indicator -- oh, I see that, it is blurry -- unplanned scrams per 7,000 critical hours. You can see -- well, I don't think you can see, but there are thresholds. This is, by the way, one of the -- one of the areas that is a really good indicator of plant safety, if there are unplanned scrams.

This typically means that there are problems. And so this indicator across the industry, I think right now they are all green. Dan, I don't --

I don't know -- Brunswick has one. Okay. But, yeah, that's right. That's right. But most of the performance indicators are in the green range.

So, again, you kind of get back -- are the performance indicators telling us what they need to tell us with respect to oversight? Could they be enhanced? Could they be improved? These are some of the questions we're going to be asking.

Apologies on the slide there.

MEMBER KIRCHNER: Well, clearly, that was an important one for the industry from an operability/reliability standpoint. How many of your performance indicators run green all the time?

MR. GIBBS: Ninety-nine percent.

MEMBER KIRCHNER: So then do you have the right performance indicators?

MR. GIBBS: That's the question.

MEMBER KIRCHNER: All right.

MR. GIBBS: That's the question.

MEMBER KIRCHNER: Because if you're just checking the box, after a while it's --

MR. GIBBS: We understand that comment. Absolutely. And so we intend to look at the performance indicators. And I can assure you industry will be very interested to be involved in this

dialogue, because, you know, the whole performance indicator program was the notion of industry back many, many years ago. And so we -- but we believe it's a good program. But could it be improved? Possibly. Okay?

A few next steps. I mentioned to you earlier optimizing the spent fuel storage installation inspections that we do. We do those a bit differently across the regions. The question is: are we spending too much time on these inspections that some believe are not that risk significant? That's a question we're asking.

We're also looking at radiation protection inspections to see if we can do some further optimization in that particular cornerstone.

The significance determination process is an ongoing evolution. Of course, we talked about the emergency preparedness SDP, some of the changes that we're going to be making there. But the SDP is one of those area, very important part of our program to help us understand the significance of licensee performance deficiencies. And as we get more experienced, we go back to the SDP to make sure it's giving us the right answers for these degraded conditions caused by a licensee performance deficiency.

Indicated earlier Bob's group is going to be assessing additional actions identified in the emergency preparedness focused self-assessment. I think that, Bob, there are over 20 -- over 20 different activities in that area. Some are, frankly, more important than others, but there is a lot of work to do in that area.

These are some out-of-scope items we mentioned of ROP enhancement. Those regional structure and organizational issues, we're not -- we're not addressing that as part of ROP enhancement.

Early on, we got some feedback from industry about low-risk compliance issues and backfit. That is no longer part -- it was early, but that is no longer part of ROP enhancement. NRR has formed a separate group to address that, and the fundamental question is, if there is a compliance issue and it's of low risk with respect to the licensing basis, how do we -- how do we treat that as a regulator? We're trying to answer some of those questions.

Inspection reports streamlining is another area. We're calling it ISTR -- inspection, scheduling, and tracking, reporting. Dan is -- Dan, you're doing a lot of work here for us. He has been involved with ISTR. It's one of those areas that, you

know, if you spend a lot of time documenting, you're not inspecting. So we want to make sure that we have the right mix with respect to inspection and documentation, and ISTR is one of those items to help us there.

MEMBER RAY: Well, but, of course, compliance issue is an example. There are compliance issues, but we disregard them because they're not significant. I mean, the consequences are not significant as we observe them. That's a question that takes a long time to discuss. And we don't have that time here, but it's an example of what I was referring to.

MR. GIBBS: Well, I'll say that if there is a non-compliance, we don't disregard them. Licensees must enter those into the corrective action program. And we, on a selective sampling basis, will make sure that they correct the problem, even if it's of very low safety significance and they're documented. Not much, but they're documented in a lighter -- lighter way.

MEMBER RAY: But that point needs to be made along with the "we don't want to waste time on this stuff" comment also, which is what I heard you say before.

MR. GIBBS: Okay. The last thing I'll say is all of these 99 recommendations, 72 we received as part of transformation initiatives, 27 from the Nuclear Energy Institute provided those by letter. All of those we're going to be putting together in a memo from Ho Nieh to Dan Dorman, the Deputy Executive Director for operations, here in the very near term. And you will be able to see how we actually dispositioned every one of them. Many of them are out of scope, and they were transitioned to other areas for resolution. Some of them are open. Some of them are closed with no action. Just to have you aware that that is also something to do.

MEMBER BLEY: That won't be in time as -- to be an attachment to the SECY.

MR. GIBBS: It will not be attached to the SECY, but certainly the office of the EDO and the Commission will be aware that it exists. And it is publically available.

Apologies for going over. Appreciate all of your questions. I think I'm a little late.

MEMBER KIRCHNER: I have a question. Is this ICORE logo, is that adopted now by the Commission?

MR. GIBBS: Yes, sir.

MEMBER KIRCHNER: And the E stands for what?

MR. GIBBS: Efficiency.

MEMBER KIRCHNER: Not effectiveness.

MR. GIBBS: No, sir. Reliability -- you know, efficiency and effectiveness.

MEMBER KIRCHNER: Two different words. I've been in the government 40 years. Efficiency in the government is usually measured by taking people out of the loop. I'll be blunt. That's what transformation usually is in the government.

MR. GIBBS: That's not our goal.

MEMBER KIRCHNER: Well, then, pick your words carefully. Your job is to be effective, not efficient. Efficient is expected to carry out the job, but effectiveness is the measure.

MR. GIBBS: Well, it is one of our principles of good regulation. It's hard for me to argue that. Reliability, I think, and efficiency, you know, when we -- when we are both reliable and efficient, that we are, therefore, effective. Not real sure about the -- why we landed there, but that is -- that is where we are. Yeah. Thank you, though, for the comment.

Anything else? No?

MEMBER SKILLMAN: Billy, Russell, Ami, thank you.

Let's change out to Marty. Marty, we're going to ask you to go quickly, please.

MR. MURPHY: Hi. I'm Marty Murphy. I am the Director of Regulatory Affairs for Xcel Energy, and I am here representing both NEI and Xcel Energy. And we're going to touch base and talk about industry's understanding of the changes that we have a current understanding right now of what will be included in the staff SECY paper for ROP enhancement. We'll touch base on that.

First, I think I'd like to echo some of the information that Russell identified. We, as an industry, do feel that the ROP works well. That what we're looking for is some enhancements, and that it has served industry well to date. But we do believe that there is areas for improvement and continuous learning. So from that standpoint, I'll try to move through quickly.

I think one of the things we really want to focus on is there's a lot of alignment. We have had great dialogue with the agency and the staff with regard to the changes that they are proposing and how quickly and timely they worked through the proposals

that they had relative to enhancing the ROP.

So with that being said, we're going to talk a little bit about just the very high level -- Russell touched on this -- that the industry performance to date right now is supporting some of these changes in -- to the ROP to enhance it and optimize it. We're going to talk a little bit about our understanding of what will be included in the staff SECY paper. We do not have a lot of details. We've had a lot of dialogue, but the details we are waiting to see and eagerly anticipating.

We are very happy to hear, and we agree that this should not be a one-and-done effort. The staff has repeatedly stressed that, and we are completely aligned that there is more to do after this SECY paper.

But this is an excellent start, and the timeliness with which the staff -- I really can't stress that enough -- the timeliness with which the staff has worked through this has just been, you know, excellent from the standpoint of the amount of information they took to prioritize it, and then roll it into potential recommendations to the Commission for changing and enhancing, optimizing the ROP.

We'll talk about challenges, and I think

that is what you really want to hear about from me is where we're not aligned with the staff on their proposal or where we're waiting for additional information to truly understand what their proposal will contain. And then some future opportunities that we see with regard to the next steps for the ROP enhancement effort.

So, next slide, please.

So at this point -- and Russell touched on this -- industry is performing at an extremely high level, on the highest levels that it has ever had. If you look across multiple metrics on performance, reliability, safety, the industry currently is at its highest.

I think one of the key points -- and you talked about it a lot -- that underlying that and underpinning that performance and safety is a very exceptionally strong safety culture and performance improvement culture that the industry has where we find, identify, and fix issues to enhance and improve safety and performance.

So that really sets up the underpinning for why we believe we can continue to enhance and optimize the ROP at this point.

Next slide.

This is just simply a trend graph of the change in CEF since the start of the ROP. You'll notice this says a five times reduction. The previous slide said a 10 times reduction. It's just simply different time periods. The previous slide took a much longer look at the change in CDF over that time.

Next slide, please.

MEMBER KIRCHNER: I can't let that go by. So would you explain how that happened? Did the people sharpen their pencils and get better at doing the PRAs or --

MR. MURPHY: So, no. What happened is that the --

MEMBER KIRCHNER: What substantively changed?

MR. MURPHY: Well, it's the use of the PRA tools to then understand the design and then go make either design or modification changes, procedural changes, and continuously look for those changes where we can improve our risk profile.

MEMBER KIRCHNER: So that's a steep drop in the curve there. And so what substantively changed in the industry to achieve that?

MEMBER CORRADINI: I guess Walt is asking, is it a lot of little things? Is there a couple of

big things, as you point out, around the 2000 timeframe?

MR. MURPHY: Yeah. And I am not a PRA expert, but I can tell you from my personal experience it's many little things and where we went and looked at making modifications in those changes to improve our risk profile.

For instance, at Prairie Island, one of my plants, we installed low leakage reactor coolant pump seals. That had an impact.

At Monticello, we had some condensate demineralizer valves that had an impact on flooding. We pinned those valves closed, and that had an impact on the risk profile. We made different -- go ahead.

CHAIRMAN RICCARDELLA: No. You go ahead.

MR. MURPHY: Okay. We have made different procedural changes where we've staged equipment and written procedures to allow a thorough understanding of some actions that would be taken in the event of a loss of power and needing to supply alternate power to our batteries.

CHAIRMAN RICCARDELLA: And how are those changes related to the ROP program?

MR. MURPHY: Well, so this is setting up our underpinning, and the performance change in the

industry, which then we believe supports an understanding of how to optimize the ROP and look for that change in the risk-informed nature of the ROP.

MEMBER SKILLMAN: I'd like to offer a contrary view. I believe that what you see there is accurate. I believe this is the tail-end effect of 50.56, the maintenance rule, coupled with an almost-militant view by industry to make sure their corrective action programs are extraordinarily thorough, coupled with what has been a recognition that the work management program is the glue that makes it all work. And those three components -- 50.65, people -- system health reports, material condition of the plant, coupled with a very, very strong and disciplined corrective action program, coupled to a no-nonsense "we're going to get this work done" work management program, is what has driven that.

I think some of the modification issues that you point to assist to some degree, but I think it's really problem identification and work execution that has driven that down, and it's through the lens of what has come out of the maintenance program -- maintenance rule.

MR. MURPHY: I won't disagree with that.

And I think if you looked at the -- another slide, it would identify the maintenance rule as driving that and just have it partitioned slightly earlier. So at the tail end, as you say, I would agree with you.

MEMBER SKILLMAN: Thank you.

MR. MURPHY: As well as those other additional items.

MEMBER SUNSERI: Marty, I think maybe I can share some industry experience because I was in the industry at the time of the implementation of ROP, and I know at the time there were several plants that when we implemented particularly the performance indicator part of the program. There were some performance issues identified in the systems where they performed that there was very little margin to changing thresholds, going from green to white or yellow.

And so at the time -- and this is relevant to the ROP -- so risk capture was put in place to help those plants stay within the green while they worked out adding additional margin.

So Marty pointed out when I was -- you know, I'm familiar with one where reactor coolant seal modifications were made, enhancements to the auxiliary feed water system were made, enhancements to the

electrical power supply system were made, and all of that was done in an effort to reduce the importance, if you will, of the central service water system, which gained margin there, which reduced the overall core damage frequency. So it kind of worked hand in hand.

Now, what was the driver for that? The driver wasn't necessarily a recognition that we need to improve core damage frequency. The driver was we got low margin on this ROP, so -- which resulted in improved safety overall. So I think that's the tie that at least I saw to -- between the curve Marty pointed out and the ROP program.

MR. MURPHY: Thank you. I appreciate that.

So we'll touch base on the -- what our understanding of the proposal is, and as Russell pointed out, there is really three key areas in the staff SECY paper and that is the response to white findings, baseline inspection program changes, and the efforts that the staff has been working on, the significance determination process.

With regard to the response to white findings, we are aligned with where the agency is, with the need to align that response or rebase that --

align that response to the safety significance of a white finding. Over the years, the expectations and the level of response necessary to address a white finding has gone up and is not necessarily commensurate with the safety significance of the findings.

There is a broad range of findings, as Russell pointed out, some relatively straightforward and simple, some more complex. Adjusting the 95001 procedure to incorporate that understanding is vitally important to us as it will help enhance our use of resources to align them in the most safety-significant area.

We are aligned with the changes that the staff is going to make in the action matrix to help better convey that a white finding is of low significance, and that a yellow finding is of moderate significance. We did provide a much more detailed look and integrated change to the action matrix, and the staff has looked at that.

We believe we -- you know, more dialogue should be had on that, but we are aligned with the changes that the staff is making right now, because we do believe that will help rebaseline that understanding of a white finding as a low safety

significance issue.

Russell touched on the flexibility in the 95001. We are aligned with that, that there needs to be greater flexibility, and we -- I say I would applaud the staff's desire to go and look more holistically at lessons learned on 95001 as a next phase to have a true understanding of what that 95001 procedure should look like, so that we can assess the white findings properly.

And then we'll talk about the change in the closure of the white performance indicators in a little bit more detail in the challenges section because we are not aligned with the changes that the staff are proposing with the white performance indicators.

Overall, with the baseline inspection, we are aligned with what the staff is proposing. The change to the PI&R team inspection from two years to three years we believe is being done in the right direction. There is much duplication in the PI&R inspection. The entire process of PI&R is inspected as Russell laid out, and we can certainly attest to, at multiple points and by multiple groups within the agency to ensure licensees have a strong PI&R.

And, you know, licensees I think we have

a thorough understanding of the need for that strong PI&R, because it ensures that we remain reliable and predictable and that we are operating at these high levels of safety and reliability.

MEMBER BLEY: You went a little fast for me. It sounds like the place so far that you have -- you're not aligned with the staff is on the white findings. Can you expand on that just a little?

MR. MURPHY: Yeah. I will in the next slide.

MEMBER BLEY: Okay.

MR. MURPHY: Okay? And I think we would also -- and I'll touch base in the next slide on some of the challenges that we think exist. The staff has done a lot of work -- as Russell pointed out and we agree with -- in looking at the SDP, the security SDP, and the EP SDP. That work started before the ROP enhancement effort, and we applaud that effort. The staff is doing a, you know, really solid job of looking at that holistically.

One of the SDP changes that the staff is looking at is merging the mitigating strategies SDP with the at-power SDP. We had suggested in industry that you would merge the mitigating strategies SDP with the B.5.b SDP, because they are both design basis

events.

We'll touch base on that. We just truly don't understand the basis for merging the mitigating strategies SDP with the at-power SDP, because we think it blurs the lines between beyond design basis and design basis issues as well as how you would make that gradation in a greater-than-green finding.

MEMBER BLEY: Over the last several years, we had interactions with NEI and others before the final rule was put out on making a strategy on beyond design basis events. And a number of plants with gradual staff agreement started moving toward incorporating the use of flex equipment into before core melt kind of events.

For me, that kind of hints at maybe a reason why staff is talking about merging those. We can talk about that with staff. Any thoughts on that?

MR. MURPHY: Well, I think we understand that, and the staff has made that same point, that that's -- you know, from a certain standpoint, that is part of it. But we really believe that there is -- there is just a better fit between the mitigating strategies and the B.5.b SDP. If you're going to -- if you're going to merge them and make a single SDP, it makes sense to us that those two would be merged,

rather than the mitigating strategies and the at-power.

MEMBER BLEY: No matter how one merges, is there any real impact to such a process?

MR. MURPHY: Again, we don't have the specific details, and I think, you know, we'll be waiting to see what that looks like.

MEMBER BLEY: Okay. Fair enough.

MR. MURPHY: I would imagine that if it's, you know, transposing what is in one and putting it there, likely not, but, again, it's just the potential to blur the distinction between design basis and beyond design basis.

And then, lastly, improving the interactions with licensees during the SDPs. This is the inspection finding management process, and this has been a very important and good change from the licensee's perspective. The improved communication that we have with the region, when we are trying to understand what the performance deficiency is in order to understand what the SDP outcomes are, is vitally important.

And as Russell identified, and I think somebody else touched base -- I think it was you, Mr. Skillman -- with regard to the interactions

between the PRA group and the SRAs in the region, that does happen. And it continues to happen, and there continues to be very strong relationships there.

But the clarity of communication with station management from regional management on what the performance deficiency is is one of the enhancements of that inspection finding process, as well as making it clear when the clock starts, very clear to both the licensees and the NRC with the tracking of that process as the NRC staff evaluates it from a significance standpoint. So it's a positive change.

Okay. Some of the challenges that we see -- and the first one is with the performance indicators. Fundamentally, there's a difference between a performance indicator and a finding. You could consider the performance indicator sometimes may be a trend. There may be a number of discrete happenings that cause you to go from green to white. For instance, you could have a number of scrams that would transition you from a green performance indicator to a white indicator.

You understand immediately through the performance indicator when you've gone back through to baseline risk through the -- through the objective

evidence that is revealed by the performance indicator, whereas with a finding, you don't actually understand that until you've worked through your corrective action process, you've done your causal evaluation, and then they've been assessed and reviewed by the NRC.

So there's a fundamental difference there.

MEMBER BLEY: Do you or does NEI or the industry have a sense of whether or not the current performance indicators are really predictors of future performance, which was the hope for them to be?

MR. MURPHY: Well, I guess I'd point to Dan, because Dan did a look at that, I think it was, right? Well, with the background information -- I'm sorry, I'm confusing it. But I think with -- with an understanding of what those performance indicators are, and that those performance indicators were tied to an understanding of what was adequate protection, and a lot of work was done to baseline them to either safety, risk significance, or an understanding of adequate protection.

You know, they are somewhat different maybe necessarily, and it gets to the question you asked about, are they the right performance indicators? And are they driving continuous

improvement? That's not their intent. That's INPO's function, to drive us to excellence and continuous improvement. The performance indicators are there to assess us and look at us relative to safety and adequate protection.

MEMBER BLEY: Okay. Ten years ago, someone from INPO implied that they have actually come up with some performance indicators that really work with it. I don't know if that's something that's open to talk about or if it's going on or if you can say anything about it. But if you can, I'd be very interested.

MR. MURPHY: Well, INPO, I mean, you know, all the stations are assessed by INPO, and INPO does have its set of indicators that they use to drive us to excellence. But excellence is different than safety, so, you know, obviously, what they -- what they ask us to do also feeds back into our ability to always be safe from that standpoint. Is that a --

MEMBER BLEY: Okay.

MR. MURPHY: Okay? So the staff has done some work and an analysis to support this change to the white performance indicators. We believe that additional work needs to be done on that analysis.

If you look at the performance indicators

from about 2006 'til present, there has been a dramatic decrease in the number of white performance indicators. From 2006 to 2010, there were 33. From 2011 to 2015, there were 23. And from 2016 to present, there's currently five.

There has been a change in what those -- what is causing the white performance indicators to really transition, and right now it's primarily based on unplanned scrams. And so when you look at analyzing what is driving unplanned scrams and those changes, you can have a number of discrete events.

The staff has indicated that the timeliness to complete the analysis and the 95001 associated with those indicators is trending upward, and we believe additional analysis needs to be done to thoroughly understand what is going on with that trend.

When you couple that with the changes to the expectations and white findings, you look at the difficulty that you can sometimes have with trying to look for causes and common causes between discrete events. You can get to very challenging causal evaluations, and they're difficult to finalize and then support through the 95001 inspection with the changing and growing expectations that have occurred

over the years with those 95001 inspections.

So our position is that additional work needs to be done on this proposed change. Additional dialogue with industry and a more thorough understanding of the analysis of the trend data that exists that the staff finds compelling in order to make this change to the white performance indicator from that standpoint.

With the baseline inspection program changes, we are aligned with that. We believe the staff can do more to look for efficiencies. What they have done is a very good start, but we believe that there is more efficiencies and duplication that can be rung out to help with the baseline inspection and allow us to be focused on the most safety-significant and important areas from that standpoint.

And then with the significance determination process, as we talked about already, the mitigating strategies and the B.5.b SDP, again, it's not clear to us why that change is really being made and what the benefit is.

And then, as we talked about earlier with Russell, EP has done a self-assessment. There is a number of recommendations in that self-assessment. And we believe some of the proposed changes -- and,

again, we haven't seen, you know, exactly what will be proposed -- that there is more room to go potentially in the EP area as well in enhancing the SDP. And that there has been some tempering of some of those ideas in the self-assessment from proposed changes that could be made to the EP SDP.

So moving on to opportunities, again, the staff has been very clear, and we are completely aligned that this is not a single effort, what will be contained in the SECY paper. There has been -- as Russell said, we have met monthly with the staff. We have had great dialogue.

We need to maintain the momentum and continue looking for additional efficiencies and optimization of the ROP.

We believe there are some areas in the second phase of ROP enhancement. The first item here is making the 95001 a smarter inspection, and that will be through leveraging the lessons learned that the staff identifies through its more comprehensive look at the 95001 inspection, as well as creating increased flexibility such that simple, straightforward problems can be addressed and corrected and assessed by perhaps the resident inspector with a limited amount of effort commensurate

with the safety significance.

We understand that there will be cases where there's more complexity, and the staff will have to rely on subject matter experts to support that 95001 inspection. So, again, it's the broadening and the flexibility that we see that needs to be in that 95001 inspection.

Streamlining the ISFSI inspections is another area. That is yet to start. We have had some initial discussions with NMSS, but that's an area where there is certainly efficiencies to be gained based upon the risk.

We believe that the staff has proposed some changes to the radiation protection program, but in that sense we believe a holistic, more aggregate look at the entire program needs to occur, much like has been done with security and EP from that standpoint. And we're eager to see the staff embark on that -- that more holistic look to look for efficiencies in the radiation protection area.

We touched base a little bit on improving the alignment on common cause failure and human error probability. That's the next bullet here is improving the realism in the RASP handbook. Getting that alignment around common cause and human error

probability is important for getting alignment in what the outcomes are on the SDP, and that effort is underway and continues.

Completing the holistic look, the PI&R program is very important to us. There is a lot of duplication in PI&R. I think Russell said that we have made -- the industry had made the proposal to do away with the PI&R. I will kind of couch that a little differently. Our recommendation was to eliminate the periodic team inspection, but keep it as a supplemental inspection, so that if you saw challenges within PI&R that the staff could invoke a supplemental inspection to be a team inspection on PI&R and address issues from that standpoint.

The staff has identified that they are looking for additional performance indicators or new performance indicators, and we believe those need to be looked at, not just from adding additional performance indicators but performance indicators that could be used in place of inspection to, again, increase our overall effectiveness and efficiency from the staff's perspective and the licensee's perspective.

MEMBER BLEY: It seems like that would take some real proving --

MR. MURPHY: I think --

MEMBER BLEY: -- some research to convince folks that the indicators were indicating the right things.

MR. MURPHY: Yes. I think you're spot on. I think that will become the most crucial part is making sure that, if you have an indicator, that it's giving you insights into the adequate protection of safety and that we're not using an indicator to drive excellence or some other driver.

MEMBER BLEY: Thanks. I have a question. Both the staff and you have referred to the tools for looking at security as well. We had a session here a while back on safety and the security interface where some of the same tools that are used in risk assessment are being used or disbanded and vulnerability assessment that would let you go beyond the kind of simple-minded response to results of, say, drills, exercises, to really understand what the problems are and probably saving a great deal of effort in responding to those kinds of issues.

Has that made it into this program at all? And is the industry pushing that?

MR. MURPHY: I don't know -- well, I don't believe it has made it into this program. Industry is

continuing to expand its use.

MEMBER BLEY: Okay. So it's going to more and more licensees.

MR. MURPHY: Correct. And at both of my plants we use the tools and we use them to help develop our strategies and help look at the effectiveness of those strategies. So --

MEMBER BLEY: And they also seem to be extremely useful for evaluating the effects of deficiencies that show up in the force-on-force exercise.

MR. MURPHY: Right.

MEMBER BLEY: So instead of layer and layer of less effective responses, you could save a lot of money and effort and improve your performance. And you're trying that.

MR. MURPHY: That's correct. And, yes, we are -- we are using it actually at both of my plants right now.

MEMBER BLEY: Does it -- but it doesn't really help you respond to issues that come up.

MR. MURPHY: Not at this point.

MEMBER BLEY: Okay. Too bad.

MR. MURPHY: And then the last opportunity that we see is the staff has identified that they want

to spend time going back and looking at the cross-cutting program. And we believe that as the staff goes back and looks at the cross-cutting program, they need to look at it from all aspects.

We are aligned that the changes the staff made to the current -- to get us to the current cross-cutting program, that it works well, but we could see that, you know, because of our improved performance and the strong safety culture and performance improvement cultures that we have at stations, that the staff has the opportunity to continuously look at our PI&R programs; that you could perhaps do away with the cross-cutting process.

So as the staff does that assessment, we would ask that they make sure that they include all possibilities, not just increasing the application of the cross-cutting program, but if there is a way to do away with it.

MEMBER BLEY: I don't quite under that that, Marty, because the cross-cutting programs seem to get at those hard cases that could have very broad impacts that you don't see from just focusing in on a specific event, one at a time.

MR. MURPHY: They could. But I think when you actually try to work through a series of discrete

events and look for common causes, you can -- you can quickly become distracted if you have, you know -- I think six is the area, in this specific area, but it had been four. Licensees will typically at, say, the 50 percent point, start doing their causal evaluations at three.

So you may have three in an area and start doing your causal evaluation. They may be completely discrete and not necessarily independent. You can -- well, we can expend a significant amount of effort and become distracted trying to force-fit a common cause on those issues. So --

MEMBER BLEY: I could see that. But if you miss one, that's a pretty significant omission.

MR. MURPHY: Well, I don't know that I would agree that it is a significant omission from the standpoint you also have to consider what's the risk of that specific cross-cutting issue.

MEMBER BLEY: Yeah. No. I'm saying --

MR. MURPHY: And the underlying --

MEMBER BLEY: -- but if you're not looking, you're not going to see them --

MR. MURPHY: Well, so --

MEMBER BLEY: -- when they are significant.

MR. MURPHY: -- so the program doesn't make us look and trend. We trend as a function of our PI and our program. So we look and trend no matter what.

MEMBER BLEY: I'm not following you completely, but that's okay for now.

MR. MURPHY: Okay. And that is the extent of my presentation.

MEMBER SKILLMAN: Marty, thank you very much.

MR. MURPHY: Thank you.

MEMBER SKILLMAN: Colleagues, before we wrap up here, any other questions or comments?

MEMBER BLEY: I have kind of two related points.

MEMBER SKILLMAN: Please.

MEMBER BLEY: I take it since this was an information brief today, our -- have we been asked to do a letter on this?

MEMBER SKILLMAN: No.

MEMBER BLEY: I'm kind of uncomfortable with us not responding, at least once the SECY comes out, because this could be significant material in order, you know, we might be able to help in this area. But right now they're not looking for a letter,

and we're not looking to write one.

MEMBER SKILLMAN: Yes, sir.

MEMBER BLEY: I think we ought to look at that SECY paper.

MEMBER SKILLMAN: Okay. Anybody else? So I would like to thank Russell and the NRR team and Marty for your participation.

And with that, Mr. Chairman, back to you.

CHAIRMAN RICCARDELLA: Okay. Comments? We're a little behind.

MEMBER SKILLMAN: Do we want to go to public line? Is the -- Derek, is the public line open?

Good morning. Is anybody on the line? If so, would you simply say hello? Thank you.

Now, from anybody who might be on the public line, if you would to make a comment, please do so and state your name. Thank you. Hearing none, we'll close the public line.

Is there anybody in the room that would like to make a comment? Hearing none, Pete, thank you.

CHAIRMAN RICCARDELLA: Yes. So we're about 10 minutes behind schedule. I propose we take a 15-minute break and reconvene at -- huh?

MEMBER REMPE: We're 25 minutes late.

CHAIRMAN RICCARDELLA: Reconvene at 20 minutes to 12:00 -- 20 to 11:00.

(Whereupon, the above-entitled matter went off the record at 10:25 a.m. and resumed at 10:42 a.m.)

CHAIRMAN RICCARDELLA: We're getting further behind schedule on the break, so I'd like to ask Charlie to take over and initiate the meeting on digital I&C and 10 CFR 50.59.

MEMBER BROWN: Okay, this second part of our full committee meeting is going to be a briefing by the NRC staff on NEI 96-07 Appendix D, which is a supplemental guidance for the application of 10 CFR 50.59, changes to the plant for digital modifications, and the associated draft revision 2 to Reg Guide 1.187, which is the endorsing document for the Appendix D.

Obviously, NEI has requested that endorsement and today's briefing will not only be just from the staff, but we will also have NEI's participation and they will be able to provide their perspective as part of this overall presentation.

We did have a subcommittee meeting on April 16 where I think a large number of the members

were here. It was like eight or nine members out of the total number.

But we have asked the staff to address primarily a little bit of the history about why we're here, but primarily we want to deal with the issues and the differences between the NEI desires and the staff's clarifications and exceptions within Reg Guide 1.187.

So with that, I think, Bill, you were going to make some opening remarks?

MR. DICKSON: Yes, I was.

MEMBER BROWN: Okay.

MR. DICKSON: And again, I just want to again talk about the purpose of today's briefing, and you pretty much covered the purpose of today's briefing.

But the staff presentation represents NRC and the industry progress over a two-year period to provide clarity as industry performs 10 CFR 50.59 screening and evaluation for potential digital I&C plant modifications.

This work supports actions described in the integrated action plan for modernized digital instrumentation and controls, I&C regulatory infrastructure.

From April 2016 through 2017, the NRC staff and industry participated in monthly public meetings to resolve NRC's comment on the draft NEI 96-07 Appendix D.

In January of 2017, NEI and NRC staff mutually agreed to place the review of NEI 96-07 Appendix D on hold to dedicate resources to the issuance of a RIS 2002-22 Supplement 1. That's the clarification on endorsement of NEI guidance and design and digital upgrades for digital I&C.

The RIS was actually issued on May 31, 2018, and licensees are currently using the RIS to plan and perform digital I&C modifications in their plants.

So in July 2018, the NEI provided an update to NEI 96-07 Appendix D, and in August 2018, NRC provided a set of comprehensive comments, about 85 or so, to NEI, and again, to just begin the disciplined process of cataloging and tracking the comments.

There were five public meetings held with industry to resolve these comments. Over 90 percent of the comments were resolved using this process.

NEI submitted a final revision of NEI 96-07 Appendix D to the NRC in November of 2018 and

requested endorsement by January of 2019. The draft Reg Guide endorsing Appendix D was issued for a 45-day comment period on May 30 of 2019.

The ACRS subcommittee on digital I&C was briefed on Appendix D and Reg Guide 1.187 Revision 2 in April 2019 by NRC staff and NEI.

Members here today to discuss, to give this presentation are Michael Waters from the Office of NRR, the Division of Engineering, he is branch chief, Philip McKenna who is with NRR and the Division of Inspection and Regional Support, and Wendell Morton, who is also in the Division of Engineering and NRR.

We're ready to answer any questions you may have and look forward to the discussion. Phil?

MR. McKENNA: Okay, so I'll take over for the remainder of the brief. Good morning. Again, the purpose today is to discuss 96-07 Appendix D and our endorsed Reg Guide 1.197 Revision 2, and also to discuss the current process for documenting digital instrumentation and control modifications using the 50.59 rule. I do have --

MEMBER BLEY: Before you start, have there been any changes since the subcommittee?

MR. McKENNA: So the only changes were in

the wording, some revised wording in the Reg Guide, but nothing of substance, so all of the same, the one major exception, and all of the five other clarifications remain.

MEMBER BLEY: Okay, thank you.

MEMBER BROWN: Just to make sure, were you referring to changes, Dennis, after the 4/16 meeting?

MEMBER BLEY: Yes, I was.

MEMBER BROWN: Because the document we reviewed for the 4/16 of 1.187, it did change. You had input from --

MR. McKENNA: Yes, so we had input from other staff and we --

MEMBER BROWN: And they are not trivial. I mean, it was fairly -- I read the comparison of the two and they were not -- there were some very pointed differences.

MR. McKENNA: That's correct, but the major, the five major, the five clarifications and the one major exception remain the same.

MEMBER BROWN: Yeah, they remain.

MR. McKENNA: It's just the wording was changed.

MEMBER BROWN: It was just the discussion and the lead in had some more detail put into it --

MR. McKENNA: Yes, sir.

MEMBER BROWN: -- and some deleted.

MR. McKENNA: Okay.

MEMBER BROWN: Okay.

MR. McKENNA: So Billy already covered this. This is how we got to where we are today. I will just go to the next slide. I wanted to, as a refresher, give the 50.59 evaluation criteria because this is one of our major exceptions. It's one of the criterion in 50.59 for evaluation.

So again, a licensee can make a change to its facility based on the 50.59 rule. There's a screening part and then there's an evaluation part, and they can do that change without coming to the NRC if the change is not to a tech spec and they do not meet any of the following eight criteria, and I will not read all of the criteria. I'm just listing them here. I'll go onto the next page.

I have highlighted criterion six, which is what we are taking exception to in Appendix D, create the possibility for a malfunction of an SSC with a different result from any previously evaluated in the FSAR as updated.

MEMBER BROWN: Can I correct that? You're not arguing with the 50.59 rule words. What your

exception is to is to the interpretation by NEI to how you apply that?

MR. McKENNA: That's correct.

MEMBER BROWN: Is that correct?

MR. McKENNA: That's correct, how they're interpreting what's in Appendix D.

CHAIRMAN RICCARDELLA: I have just a clarification on what you said. You said they can make this change without coming to the NRC. It's without a license amendment?

MR. McKENNA: Without a license amendment, yes.

CHAIRMAN RICCARDELLA: It's not as if the NRC is not aware that the plant is making a change, right?

MR. McKENNA: That's correct. The rule also requires at a certain periodicity that they report all of the changes that they made under a 50.59 rule, so.

CHAIRMAN RICCARDELLA: But they don't have to report plans to make a significant change?

MR. McKENNA: They do not need to. If they're using the 50.59 rule to make the change, they do not need to report that they're going to do that.

CHAIRMAN RICCARDELLA: And in practice, is

that actually the case or --

(Simultaneous speaking.)

MR. McKENNA: We have inspect --

CHAIRMAN RICCARDELLA: We generally know. I mean, don't your inspectors know that --

MR. McKENNA: Yes, so we have resident inspectors at the site who are aware of the changes taking place. They inspect the 50.59 process and the modification process. They sit in on the planning meetings. They'll sit in on the final approval meeting if it's a major change, so the NRC inspectors are aware.

MEMBER BROWN: When you said approval meeting, you mean the licensee's approval meeting --

MR. McKENNA: The licensee's approval meeting.

MEMBER BROWN: -- not the NRC's --

MR. McKENNA: That's correct.

MEMBER BROWN: -- approval?

MR. McKENNA: Yes, so there are certain criteria that a licensee will have where a major modification will have to go in front of their PORC and, you know, resident inspectors will sit in on that meeting.

MEMBER REMPE: So just to be a little more

clear, there's a screening process, and the documentation of that screening process is also available if the resident inspector wanted to review it?

MR. McKENNA: That's correct, yes. Okay, so just to hop right in here to NEI 96-07 Revision 1, so this is the base document that NEI and the NRC has endorsed on how to do a 50.59 rule, a modification using the 50.59 rule, and there is five different sections in 96-07.

The first one is the applicability section. Next is screening where you're screening if the modification is adverse or not adverse. If it is not adverse, the licensee stops there and they can go ahead and implement the modification.

If it's adverse, they go on to the evaluation process where they evaluate the modification against those eight criteria I showed and I'll stop there. And then it's applying 50.59, the comp actions and dispositioning, the record retention of the 50.59 evaluations.

CHAIRMAN RICCARDELLA: Could you help me a little bit with the meaning of adverse and non-adverse?

MR. McKENNA: Yes, so it's basically a go,

no-go, so you can go onto the next step in the 50.59 process. So if the modification is, you know, fairly minor and straightforward, so risk-wise, it can be screened as non-adverse.

CHAIRMAN RICCARDELLA: Without even answering those --

MR. McKENNA: Without even evaluating it against the evaluation criteria in 50.59, yes, sir.

MEMBER BROWN: Who develops the criteria for determining adverse or non-adverse? Is that the licensee that figures that out?

MR. McKENNA: So that's in the guidance of NEI 96-07. It gives you the criteria for, which we have endorsed, for how to do a screening.

Okay, so what makes digital I&C modifications different in this process? Why are we endorsing Appendix D?

MEMBER BROWN: Before you go on, when you say they screen the quality, it's against the information in 96-07 Rev 1? You're not talking about Appendix D yet?

MR. McKENNA: I'm not talking about Appendix D yet. We're just talking about Rev 1, yes, sir.

MEMBER BROWN: I just wanted to make sure

we understood that.

MR. McKENNA: Yes, we're building up to Appendix D. So common cause failure is the main reason why we need some more guidance for digital modifications. When we had, you know, the nuclear power plant built with hardware, it's easy to test hardware and have standards in there. We have -- we can tell if its degradation is slowly.

In this case, when you have software involved in a modification, you can have a single failure vulnerability or a common cause failure, so we needed some way to address that when you're evaluating a modification in 50.59.

So we issued the RIS 2002-22 Supplement 1 back in May to give some technical guidance on how to address if a modification has a low likelihood of failure or not. And the highlighted in yellow, the RIS 2002-22 is not for replacement. Yes, sir?

MEMBER BROWN: You've already -- I'm trying to get back to what I was asking you earlier.

MR. McKENNA: Yes.

MEMBER BROWN: You've gone through the adverse and non-adverse already now.

MR. McKENNA: That's correct.

MEMBER BROWN: Now they're evaluating, and

the RIS 2002-22 Supplemental 1 would be used for the evaluation?

MR. McKENNA: So, yes.

MEMBER BROWN: Now we're not in Section 4.3 in my terms --

MR. McKENNA: Okay.

MEMBER BROWN: -- my understanding.

MR. McKENNA: So you would not need to use the qualitative assessment, which I'm discussing right here, unless you screened the modification as adverse. So you screened the modification as adverse. Now you're into the evaluation section. We needed more supplemental guidance on how to answer those evaluation criteria for digital modification because of the common cause failure issue for digital.

MEMBER BROWN: Okay, so if I put a little line up at the top, I would say now screened as adverse. Then you go on and use --

MR. McKENNA: And do a qualitative assessment, yes, sir. So a qualitative assessment, which I have in a couple more slides, allows you to answer the evaluation criteria in the 50.59 rule.

But this RIS supplement is not for wholesale replacement of the reactor protection system or the wholesale replacement of the engineering safety

features, actuation system, or the internal logic portions of the --

MEMBER BLEY: We talked about that. Does it say that anywhere?

MR. McKENNA: It does say it right in the RIS.

MEMBER BLEY: It's in the RIS?

MR. McKENNA: Yes.

MEMBER BLEY: It's not in the Reg Guide?

MEMBER BROWN: Could you say that again, what it does? Repeat that because I want to make sure we understand what Dennis just asked.

MR. McKENNA: So right in the RIS, those words in yellow are right in the RIS. So it's not for the wholesale replacement of the reactor protection system or the engineering safety features, actuation system, or internal logic system.

MEMBER BLEY: But are those words in the NEI guide?

MR. McKENNA: No, no.

MEMBER REMPE: Or the Reg Guide?

MEMBER BLEY: Or in the Reg Guide? No?

MR. McKENNA: No. Well, we're -- so the RIS is still in place, so nothing cancels the RIS. The RIS is still giving the technical guidance on how

to do a qualitative assessment.

MEMBER REMPE: And if we go to the Reg Guide, will the RIS still be in place or will --

MR. McKENNA: Yes.

MEMBER REMPE: So there is no need to have such a statement in the Reg Guide?

MR. McKENNA: That's correct.

MR. MORTON: The Reg Guide is the general overall 50.59 guidance for all different discipline applications, mechanical, electrical, digital I&C too included. The RIS is specific to digital I&C applications.

MEMBER BLEY: So this is like NRC's Appendix D if one were to make that comparison?

MEMBER BROWN: This is all without Appendix D up until to this point?

MR. MORTON: Yes.

MR. WATERS: No, no.

MEMBER BROWN: We have not even started --

MR. WATERS: This is confusing. Let me tell you how we got here.

We've had Appendix D for endorsement review for quite a time, and we decided strategically to do the RIS in parallel to that given some of the issues we had with Appendix D to address the near term

obsolescent needs of industry for what we called ocular support systems where they had systems ready to go to install.

So we strategically developed this RIS to provide a roadmap of how to do it for that, and we noted not for RPS and things like that because we realized there are broader questions. This was done in parallel to the Appendix D. Appendix D was put on hold.

What we're doing now with the Appendix D endorsement review is applying some of the principles of the RIS, the qualitative assessment, into our Appendix D review so we have two products in parallel. So I appreciate the questions, but that's part of the confusion.

CHAIRMAN RICCARDELLA: In an ideal world, wouldn't Appendix D have these yellow words in it? I mean --

MEMBER BLEY: The NEI document is not controlling.

CHAIRMAN RICCARDELLA: Yeah.

MR. WATERS: Part of the challenge, let's be honest, is 50.59 does not distinguish between digital systems, non-safety systems, or safety-related systems. It applies to any plant change and we're

hesitant to put in a primary guidance document to limitation.

But we do talk about things like the qualitative assessment and what it would apply to and what it would not, and we want to look at endorsed technical guidance that would be applicable to different types of systems, so that's part of it.

But fundamentally, I don't think we can absolutely preclude the use of 50.59 for any type of system whether it be a nut or bolt or a major reactor protection system, so that's part of the issue here.

MR. MORTON: Excuse me, one of the clarifications we made with the Reg Guide endorsement for Appendix D is to specifically acknowledge RIS Supplement 1 as the staff's primary guidance when performing a qualitative assessment, so it's embedded within the Reg Guide endorsement.

CHAIRMAN RICCARDELLA: But you have to look at so many different documents it seems like, just to have it all in place.

MEMBER SUNSERI: But wouldn't anyone anticipate though that if you went through the qualitative criteria, that these wouldn't get through anyway?

MR. McKENNA: So one would anticipate that

it would not pass a 50.59, right. Any licensee can use the 50.59 rule for any modification they'd want, and it would anticipate that they would get -- it would not pass the evaluation section. That's correct.

MEMBER BROWN: One of the points in Appendix D, the very last, this is what got me confused when we were talking about this earlier. Appendix D, example 22, I believe it is, talks about an upgrade to a reactor protection system, and then they go through their whole Section 4.3 analysis and they end up that it doesn't pass. Therefore, you need to get NRC approval of it.

MR. McKENNA: Right.

MEMBER BROWN: And I guess my confusion was, well, gee, supposedly they're not allowed to do that, but number two, they include it in an example in the Appendix D which says, "We're going to do an evaluation," which leads or implies that Appendix D could be used as a vehicle for replacing the entire RPS and SFAS system by doing a 50.59 evaluation and running through the entire process.

So that's kind of a confusion example to have as an example in Appendix D and still know that by Supplement 1, you can't do this for RPS or --

MEMBER SUNSERI: I guess my point only is that these words are unnecessary if you truly believe if you apply the criteria correctly, they would screen out --

MEMBER BROWN: No, that's true.

MEMBER SUNSERI: -- of needed approval anyhow.

MEMBER BROWN: That's -

CHAIRMAN RICCARDELLA: And is that what happens with that example?

MEMBER BROWN: It was evaluated as the licensee cannot do it.

MEMBER BLEY: But not on this basis.

CHAIRMAN RICCARDELLA: Pardon me?

MEMBER BROWN: Not on this basis, but based on an Appendix B basis --

CHAIRMAN RICCARDELLA: Yeah.

MEMBER BROWN: -- which sounds like Appendix D can be used for evaluation purposes for a complete replacement, yet the supplement says not for any of these, so, to me, there's a little bit of a dichotomy there. That's all. That was confusing to me.

MEMBER BLEY: But just for us, the statement they've been talking about is on page two of

the RIS right up at the top full paragraph.

MR. McKENNA: Okay, I'll move on. So now I'm going to talk about the qualitative assessment, which we've already broached that subject.

So originally, there was guidance in NEI 01-01 on the qualitative assessment, but not enough, especially on how to do it, so that's what the RIS does. It talks about how to do a qualitative assessment, which I have in some more slides which shows the criteria.

And mainly you do a qualitative assessment so you can support the conclusion that there is not a minimal increase in four. It applies to basically four of the eight criteria in the 50.59 rule. And again, I highlighted the one which we are talking about in Appendix D as the exception.

So there's three things to consider in a qualitative assessment. The first one is the design attributes. How is the equipment built? What built-in features does it have, the fault detection, diagnostics, et cetera, and there can be some external features built in.

So the first one is the design attributes, and there are some typical design attributes that you would use in a system. The second one is the quality

of the design process, so the manufacturer, the software development, if it's safety related, what documentation is available for that component.

If it's commercial grade, you may not have as much documentation, so you rely more on the design attributes and any operating experience of that piece of equipment.

And then the last one is operating experience. I'll apologize for the typo in here. That's not medification. That should be modification, so any OE from the nuclear industry about the equipment in use.

So that's how it inputs into a qualitative assessment, and again, this happens after it's screened as not adverse, and now you're going to use the evaluation criteria.

So you do the qualitative assessment first, and if it has, this piece of equipment has a low likelihood of a failure, the licensee can stop there and implement the modification.

If it has a high likelihood of a failure, now they have to do the eval -- screen it again, so all of the evaluation criteria, and they won't be able to answer the evaluation criteria.

MEMBER CORRADINI: And how and low is

quantitative? That binary decision is quantitative as to what you pass or --

MR. McKENNA: So there is a definition of the low in 96-07.

MEMBER BROWN: Okay, so if I go back a slide, where would I say okay, now I've gotten through all of this Supplement 1 qualitative --

MR. McKENNA: So the --

MEMBER BROWN: -- your evaluation process, and you've determined that it's, what's the term?

MR. McKENNA: Low likelihood of failure.

MEMBER BROWN: Which slide would that -- where is the termination here? You don't have a termination.

MR. McKENNA: So the termination is -- well, these slides don't run through the entire --

MEMBER BROWN: I know, but it should be before you get into the Appendix D thing, right?

MR. McKENNA: Well, it's part of Appendix D, right? So Appendix D takes you through the screening.

MEMBER BROWN: Okay, so now we're including Appendix D in this process, not in the previous?

MR. McKENNA: Right, I'm about to go into

the Appendix D portion, so maybe that will answer your question.

MEMBER BROWN: Okay.

MR. McKENNA: Can we go back one slide? So now we're going to start talking about Appendix D. So a little bit of highlights about Appendix D, again, the RIS 2002-22 gives the technical guidance for doing a digital modification.

Appendix D gives the screening and evaluation guidance for the 50.59 process for digital modification. So nothing before talked about the screening process for digital modifications. Appendix D does.

The format of Appendix D, the paragraphs align with the base document of 96-07 Rev 1 for ease of use.

Some of the guidance in Appendix D is not digital specific, so it expands upon more than just digital, and Appendix D does incorporate the RIS 2002-22 supplement guidance on qualitative assessments, so it mentions in Appendix D that you do a qualitative assessment for the technical side of it.

MEMBER BROWN: Okay, why was the Section 3.15 --

MR. McKENNA: 3.15 is the definition

section, so it was just giving the definition of a qualitative assessment.

MEMBER BROWN: So that's just a definition. It was added to the NEI supplement.

MR. McKENNA: That's correct.

MEMBER BROWN: A new paragraph for 96-07 --

MR. McKENNA: That's correct.

MEMBER BROWN: -- without a rev.

MR. McKENNA: Right, exactly.

MEMBER BROWN: Appendix D kind of adds to that without --

(Simultaneous speaking.)

MR. McKENNA: Right, right, because that was not in the base document.

MEMBER BROWN: Yes.

MR. McKENNA: That's correct.

MEMBER BROWN: Okay, thank you.

MR. McKENNA: So I'm going to skip this slide. This is what was our introduction of how we got to where we are today in the development process.

So now I'm going to talk about our exceptions in Appendix D, and the one major exception again is the Criterion 6, and our exception talks about how NEI is interpreting safety analysis.

So they interpret it as to mean the Chapter 15 accident analysis of the FSAR. We interpret Criterion 6 as you have to evaluate is against the entire FSAR.

So Appendix D deviates from the base document and the guidance in that area, and again, we have made it an exception in our endorsement of Appendix D.

MEMBER CORRADINI: Since this is the crux, can you say that --

MEMBER BROWN: Go back again.

MEMBER CORRADINI: Can you say it again, please? I'm just trying to understand the difference between how you interpret it versus --

MR. McKENNA: Yes, I'll rephrase everything. So again, we start the process screening. It screens as adverse. You have to do a qualitative assessment to determine the likelihood of failure.

MEMBER CORRADINI: It's not low.

MR. McKENNA: It's not low, and you have to use the evaluation criteria in 50.59. There's eight criteria. In this case, this is talking about the sixth one.

MEMBER CORRADINI: Which was highlighted a few slides ago.

MR. McKENNA: That's correct. So NEI's interpretation of that, and I won't go back, is that that criteria says against the FSAR.

MEMBER CORRADINI: Well --

MR. McKENNA: NEI evaluate -- their interpretation is against the accident analysis portion of the FSAR. Our interpretation is the entire FSAR.

CHAIRMAN RICCARDELLA: But if you go back to that slide nine that had that highlighted, I think that it might -- the key discussion is the word on the very last line, the word result. It's not a difference in the FSAR. It was a difference in the result, and NEI argues that result means a significant effect on the probability of an accident.

MR. McKENNA: That's correct.

MEMBER BLEY: And the staff argues that if there's any change in the SSC being evaluated --

MR. McKENNA: You have to evaluate it against the entire FSAR, not just the accident analysis.

MEMBER BLEY: Well, when you say against the whole FSAR, the way you've said it before at the subcommittee, you said that, but you also said the malfunction of an SSC with a different result means at

the SSC level, something is different in the failure mode or how it responds --

MR. McKENNA: That's correct.

MEMBER BLEY: -- regardless of what that impact is on the overall safety or risk.

MEMBER BROWN: An LAR is required under those circumstances. A license amendment is required.

MEMBER CORRADINI: I don't want to complicate matters, but I think Dennis said it in a way I think I understand it, which is your interpretation is if there's a change in the failure modes, even if the failure modes aren't significant in terms of how it affects accident analysis, it's a problem.

MEMBER BROWN: It requires a license amendment.

MEMBER CORRADINI: It requires a license amendment. I'm sorry. It doesn't pass --

MR. McKENNA: Unless there's a low likelihood of failure, right, in the qualitative assessment portion. So you could do the qualitative assessment and not have to answer this question.

MEMBER BLEY: But it's decoupled from the impact of --

MEMBER CORRADINI: That's what I was

trying to get at.

MEMBER RAY: Yeah, it's decoupled though because you can't know what was credited to the thing that's being changed in terms of its consequences. It can have consequences on other things that are described in the FSAR, not just on the event consequence of interest. That's why this difference exists.

It's very significant. It's not just some legalistic semantic difference. It's a fundamental difference in understanding what the FSAR is about.

MEMBER BROWN: The staff fundamentally says the whole FSAR needs to be the result of that.

MEMBER RAY: Well, you don't have to work on the whole FSAR, but you've got to consider --

MEMBER BROWN: Well, that's what they say in the Reg Guide, the whole FSAR.

MR. MORTON: Based upon the actual full quoted rule language. The rest of that actually says, "Create the possibility of a malfunction of an SSC with a different result than previously analyzed in the FSAR as updated." So our position is the rule language holds. It's the FSAR is updated, not --

MEMBER RAY: Yeah, but it holds for a reason. I've read all of this stuff so far, and

nobody has ever explained the reason as I see it, which is the FSAR is read and a reasonableness finding is reached, a reasonable assurance of adequate protection is reached on the totality of the FSAR.

You changed something that may affect other things due to the change. You can't simply look at the consequences of that change for a particular action if it's analyzed because it may induce an accident sequence on other stuff that's described in the FSAR.

CHAIRMAN RICCARDELLA: But there's a different question that asked that, isn't there? Isn't it question five --

PARTICIPANT: Yes.

CHAIRMAN RICCARDELLA: -- that asked that? Do you have those answers?

MEMBER CORRADINI: That's back a few slides.

PARTICIPANT: But I don't think --

MEMBER RAY: Yeah, but that doesn't change what I'm saying, Pete.

CHAIRMAN RICCARDELLA: The one that has all six questions.

MEMBER CORRADINI: Slide five. My interpretation of what Harold is worried about is

encompassed in the one above the other one.

MEMBER RAY: Well, yes, I've read that, but, the create a possibility of an accident of a different type. I guess I'm looking at it from the standpoint of the agency having reviewed the FSAR. How do you -- I don't know how to identify that there's an accident of a different type unless you do an amendment.

In other words, you come back to the agency having reviewed the FSAR and say, "This is not going to affect anything else or the effect it's going to have will be minimal." You have to postulate.

You would have to -- and listen, I've done many, many 50.59, you're not going to have somebody doing that who is capable, in my judgment, of assessing what the implications are for the entire FSAR. That's why you process an amendment.

MEMBER BLEY: Well, you do --

MEMBER RAY: I've done zillions of them.

MEMBER BLEY: Yeah, but why do you do the amendment? One, because you have to, and two, they're going to look at it, but if you put the right people on it in the plant to examine the impacts of it --

MEMBER RAY: Well, you're sure to --

MEMBER BLEY: -- which seems to be your

responsibility.

MEMBER RAY: Absolutely, if you do the amendment, I think you will have done what the agency would do, and they say, "We confirm that you've done an adequate job," but you have to do the amendment. The problem that that represents is it's a heck of a lot more work than processing a 50.59 change, which --

MEMBER CORRADINI: But I guess what I thought Dennis was asking Harold is if you're going to do the due diligence anyway, whether you do it before or after NRC approval, it's got to be the same due diligence. That's what I --

MEMBER RAY: If you can pass the test, I'm telling you, Mike, that you apply in making 50.59 changes, if you pass it and you don't need the amendment, you are not going to do the due diligence that you will do if you have to do an amendment. That is for sure. Dick will confirm it and I'm sure Matt will as well.

MEMBER BROWN: So fundamentally, I'm trying to -- I understand, I think I understand what you're saying. Let me phrase it slightly different.

The process of getting to the point of low likelihood such that you decide you don't have to do one doesn't involve the same level of due diligence as

if you had to submit an LAR, an amendment. Did I say that right?

MEMBER RAY: You said it right, but I'd also say the determination of whether there's a possibility of an accident of a different type is not something that will typically be addressed in a 50.59 evaluation that you pass and implement.

PARTICIPANT: It's one of the questions that you have to ask.

MR. BEAULIEU: Can I clarify that?

MEMBER RAY: Yeah.

MR. BEAULIEU: I'm the agency's 50.59 guy. I've been involved with this. I'm Dave Beaulieu. The accident of a different type is a different explicit definition and is being clarified by Rev 1 of this Reg Guide, so that's really a different issue.

What this does is -- let's say that the issue here is a software common cause failure, and this is why the issue arises with digital, just because software can introduce a common cause failure.

So now that we have a plant that was designed for a single failure, which is typically the loss of a single train, now you have a common cause. You can lose all of the trains simultaneously.

So what is a different result is in the

chapter for every safety system, like in the description of the chapter for like high pressure safety injection, aux feed, or whatever it is, there is typically an evaluation of common, of failure modes and effects.

So a different failure mode is not a different result alone. It's only if the effect is different. The result is different. So now if you have a single failure, the FSAR will say we have redundant trains.

They're 100 percent capacity and we're good to go, but if you have a common cause failure, you lose both trains, and so you're not bounded by the single failure because you've lost an entire safety system. The safety system in nonfunctional. It goes away, and it might not be explicitly described in the accident analysis. It won't cover that level of detail. That's in the chapter.

If the commission meant safety analysis, accident analysis, they would have used that word. They use the words in the safety -- in criterion eight, they use the words in the safety analysis. In other places, they specifically mention accidents previously evaluated.

If the commission meant accident analysis

or safety analysis for criterion six, they would have said so. They didn't. They said previously -- it says any previously evaluated in the FSAR. That's what it says and --

MEMBER RAY: My comments were just not limited to digital I&C. I was talking about --

MR. BEAULIEU: Yes, right.

MEMBER RAY: -- how it applies more generally.

CHAIRMAN RICCARDELLA: But wouldn't this common cause failure that results in the result of an entire system and not just one train, wouldn't that trip the question before the one? Wouldn't that say that's an accident of a different type? It wouldn't say it was just losing one train. I'm losing an entire safety system.

MR. BEAULIEU: That's a different type and the definition of that is not a simple answer. It's being clarified in Rev 1. Does it create confusion? It means an entirely different -- a different type means it's an entirely different scenario that was a different sequence such that if the plant was being designed today, that scenario would have been included in the FSAR.

So a common cause failure may or may not

fall into that category, but it's really, criterion five is not the primary challenge for common cause failures of software or anything. It's criterion six that's really the challenge, the different result, not necessarily a different type.

MR. MORTON: But I want to clarify also another piece to this because I'm hearing the discussion.

One of the primary drivers for why we wrote the RIS Supplement 1 in the first place is because staff understood, especially working with industry and hearing their feedback, that there were four of those eight criteria that were very hard to resolve when it comes to software common cause failure.

So without the RIS and providing the qualitative assessment, which is really taking an engineering judgment on the design work that was already done as part of the engineering change package for the proposed mod, you're collecting that information together and making an engineering judgment on the likelihood of failure of the proposed modification.

And if you determine it's low per the definition within the RIS and NEI 101, then you can

answer those evaluation questions as no, it's not going to create an accident of a new type.

The likelihood of failure is low based upon the collection of information on the engineering judgment of the design features, quality design, and operating experience you may have on that, and that's what we've done for --

And that applies to most digital modifications you can have except for those wholesale RPS replacements so that you can answer the question about whether it's an accident of a new type.

Well, if the likelihood of failure is sufficiently low, it's not going to, similar to criterion six. Is it going to be a different result than previously analyzed?

If the likelihood of failure is sufficiently low for the qualitative assessment, you can answer that question no. That's what the RIS was intended to do for many of those types of general modifications that we're talking about.

MEMBER SUNSERI: So I just want to -- I know -- I'm sorry, but I've got to -- I think we're all still talking past each other because we're getting so involved in the details of how to address the questions.

My understanding, which I think is similar to Harold's, is that the fundamental difference is the scope of how you apply these questions, right?

So industry is saying the scope of how we apply these questions is Chapter 15, maybe 3 and 6 that they consider part of the safety analysis. The regulation specifically says the final safety analysis update, which encompasses all of that.

Harold's point is what does the regulator use for the overall conclusion of adequate protection? It's the whole final safety analysis report, just not Chapters 3, 6, and 15. That's what we're fundamentally talking about.

MR. McKENNA: That's correct. So I'm going to move on. We've talked about a lot of these slides that are at the end of the package. I will probably go fairly quickly. Stop me if you need me to.

I'm going to start talking about Appendix D. The first part is the screening section. We have no -- this is all fully endorsed in the Reg Guide. This is how you do a screening for digital modification.

Still in the screening section, this slide just talks, highlights some of the portions of

Appendix D that's new for digital.

MEMBER BLEY: Can I ask you a question?

MR. McKENNA: Yes.

MEMBER BLEY: Because early on, somebody said, you know, why didn't you just spin the RIS into the Reg Guide? And the answer was because the Reg Guide covers all of 50.59.

But when you read the revised Reg Guide, the revision was done for performing digital modifications, and it has sections on digital modifications background and it talks a lot about Appendix D, so I don't quite get why you didn't weave them all together.

I don't think the answer that the Reg Guide applies to all of 50.59 answers that question, going back to a question that somebody asked right at the beginning.

MR. McKENNA: I'll answer it.

MEMBER BLEY: Okay.

MR. McKENNA: So in the development of the Reg Guide, it was just to endorse Appendix D, right? Appendix D, realistically if it were to expand it more upon the Reg Guide, we could have weaved it all together, but it didn't, so we had to include the words of the RIS in total so we have the technical

guidance available, and we considered that too difficult to weave into the Reg Guide.

MEMBER BLEY: Okay, and a real easy question if you got the answer, I've been spitting through the Reg Guide here trying to find the call out to the RIS, and I see that the RIS is one of the documents in the reference list, but I haven't seen the arrow pointing the person using the Reg Guide to the RIS.

MR. McKENNA: So it would be in Appendix D, right? So Appendix D --

MEMBER BLEY: Appendix D?

MR. McKENNA: No, Appendix D of 96-07, right?

MEMBER BLEY: So the Reg Guide doesn't point to the RIS?

MR. McKENNA: No, because we're using -- we're endorsing Appendix D, so we're endorsing the 50.59 process that the industry --

MEMBER BLEY: With exceptions.

MR. McKENNA: With one exception, right.

MEMBER BLEY: And the exceptions are in the RIS.

MR. McKENNA: The exceptions are in the Reg Guide.

MEMBER BLEY: In the Reg Guide, okay. Oh, that's that section in the Reg Guide that I had trouble reading. Okay, go ahead.

MEMBER BROWN: So if this is at the point where if it screens adverse, you go to the next page, the evaluation section?

MR. McKENNA: Right, or you would do a qualitative assessment before. Before trying to answer the evaluation questions, you would do a qualitative assessment.

MEMBER BROWN: And the way you do the screening is per the guidance in Appendix D?

MR. McKENNA: Appendix D, that's correct.

MEMBER BROWN: That whole section on 4.2. That's the screening section.

MR. McKENNA: That's correct.

MEMBER BROWN: Okay, so this is the logical point where you would say all right, if we want to make a change, we go do an initial assessment, then we go do, oh, it's we got to go -- if it's adverse.

MR. McKENNA: It screens as adverse.

MEMBER BROWN: Okay, and then you go to the next page and you go into the full-blown evaluation.

MR. McKENNA: The evaluation section.

(Simultaneous speaking.)

MEMBER BROWN: -- about five or six --

MR. McKENNA: Right, and then in order to answer those evaluation questions, you would do the qualitative assessment first.

MEMBER BROWN: Per 2002-22.

MR. McKENNA: Per the RIS, that's correct.

MEMBER BROWN: Supplement 1.

MR. McKENNA: Right. Okay, this just talks about how the Appendix D is aligned with 96-07. It again highlights our major exception that we're discussing in the Reg Guide.

In Section 4.3.6 of Appendix D, there is a discussion on design basis functions. It connects the design basis functions and the safety analysis results, and I put in quotes there, "Unless the equipment would fail in a way not already evaluated in the safety analysis, there could be no malfunction of an SSC important to safety with a different result." And again, the industry, NEI has interpreted safety analysis as the accident analysis.

These are the six steps in Section 4.3.6, and steps five and six is what our exception covers where they discuss identifying all of the safety

analysis involved, and then for each safety analysis involved, compare the results with the previously evaluated results for the modification.

Again, from step five, I just put some quotes out of Appendix D. If there is no safety analysis involved again, then you can't have a different result with the malfunction.

MEMBER MARCH-LEUBA: So could you give us a concrete example where this would work --

PARTICIPANT: Fail or succeed.

MEMBER MARCH-LEUBA: -- where this would work, but the RIS would fail or -- you know what I mean.

MR. McKENNA: All right, I will, but it's at the end of the presentation and at the backup slides. These are all backup slides. Oh, back one, sorry, back two. There we go.

So here is our first example of how we say this will fail. The component is a power operated relief valve used to control RCS pressure during low temperature operations.

The component malfunction would be a failure to control pressure. So that is evaluated in the FSAR in Chapter 5 and in Chapter 15, but not -- sorry, not described in the Chapter 15 accident

analysis.

So they implement the mod and there is a malfunction which causes the valve a failure to open. So this results in a new failure mode where they have a pressure excursion where they violate a brittle fracture limit of the pressure vessel. So -- yeah, isn't that question five? Doesn't that trip question five? Doesn't that trigger a response to question five?

MEMBER CORRADINI: I think where I'm listening to Pete's question and your answer is it's a matter of how much is done, how much analysis is done within the context of 50.59 versus how much is done in the context of a license amendment.

What I'm hearing is the level of due diligence is different. Therefore, because it's different, it's almost as if you don't believe that criterion five is actually evaluated appropriately in a 50.59. That's my interpretation of this whole discussion.

MR. McKENNA: I won't argue with that and if -- go ahead, Dave.

MR. BEAULIEU: This is Dave Beaulieu. There is overlap in the questions, and so it's not necessarily one covers it, so you get, you know,

credit. There is overlap in the question.

And in terms of due diligence, the purpose of 50.59 is not directly tied to safety. It's tied to what was the basis for us issuing them their license? And if it caused them to question the basis for issuing it, then we have these criteria, and those things would require prior NRC approval.

Most of the things that are submitted are safe. Well, virtually everything submitted to us is safe. That's not the question. 50.59 has a different purpose. It's a threshold for what needs NRC approval. Is it outside of the envelope of what we licensed the plant to do?

MEMBER RAY: Well, to answer Pete as directly as I think I can, yeah, all right, but then you need an amendment in order to make sure that question is asked and answered.

You can't rely on the 50.59 process to recognize, "Oh, there's another accident that has been created by this thing." That's just the reality of how 50.59s get processed. Any of us are going to tell you that, Pete.

Sure, legally you should have recognized, "I have now created the potential for another accident," and that should trigger an amendment as

needed, but you don't necessarily -- are going to realize that.

So 50.59 processing doesn't encompass the entire FSAR typically in reality. That's what an amendment is for. I mean, you could make everything an amendment if you wanted to from the standpoint of being legalistic.

MEMBER BLEY: It almost sounds like that's what you're arguing. That's why I'm a little --

MEMBER RAY: No, it's not. It's only --

MEMBER BLEY: -- tied up here.

MEMBER RAY: It's only in the circumstances in which we're talking about a different type of consequence occurring.

MEMBER CORRADINI: So let me ask that question.

MEMBER RAY: And then you've got to have some amendment process, I would say, to evaluate, well, what's the potential effects of that?

MEMBER CORRADINI: But, I mean, let me ask the question and then I'll stop because we're running out of time. If I had a common cause -- the whole point of this is the attribute of common cause failure for the digital I&C system. At least that's what staff is saying.

If that's the case, then in a PRA standpoint, I could essentially propose a common cause failure of a particular controller that would take out both trains. That's within the safety analysis, which is part of the tangent on that, which is part of the accident analysis.

So I would then consider creating a different quality of accident because of a common cause failure of a digital I&C part. I mean, isn't that doing criteria five? I mean --

MEMBER RAY: Well, you know, I don't know how to answer, Mike. I'm only saying that from my standpoint anyway, when this possibility exists as the staff reads the requirements of 50.59, it's appropriate to process an amendment so you make darn sure you've evaluated all of the consequences.

MEMBER CORRADINI: I get your point.

MEMBER RAY: All right.

MEMBER SKILLMAN: I did an awful lot of these, and if I were doing a 50.59, everybody understands 50.59 is a screening tool. It's a screening tool.

Now, if I take the example that you've identified that I'm changing the PORV, I would have checked yes and yes on five and six. I would have

checked them both and I would have --

Now, here is the deal and Harold pointed it out very clearly. If you check no and no and you're solid on your nos, you could be -- you stop and you go ahead. When you check just one yes or more than one yes, you are now into an analytical exercise that could take six or 12 person months.

It is a huge investment, and so what you're really doing is saying in the totality of my FSAR and for common cause for digital I&C, I have a new failure mode. I probably created a new accident and that requires a huge amount of effort.

MEMBER BLEY: You know, at the place -- that all makes sense, and what Harold said makes sense, but where I'm hanging up is the discussion we had at the subcommittee meeting where it was argued that this distinction in criteria six of what's the different result is only relevant for digital I&C systems and it shouldn't be reflected back to all of the others, and you just shook your head.

If that's right, that makes a big difference, but I thought it was argued we don't want to be applying this to PORVs and other things. We want to be applying it to just digital I&C systems.

MR. McKENNA: Right, so once that

interpretation of the rule goes into effect, it would be able to be applied to everything.

MEMBER BLEY: Well, that would make sense to me, but I heard just the opposite at the subcommittee meeting. That's why I'm confused here because I heard it argued that it would not get reflected back to --

MR. McKENNA: I think what we said in the subcommittee meeting is that Appendix D is only for digital, but once you apply the logic of what the industry is trying to do, they could use it for everything.

MEMBER SKILLMAN: That's what I remember.

MEMBER BROWN: That was an example that they gave.

MEMBER BLEY: Could use, but doesn't have to use, and that's the -- if this is the way it ought to be, why shouldn't you have to do it for hardware or whatever else comes along?

MEMBER BROWN: Didn't they use that as an example that NEI did, the discussion where they talked about that would start precluding certain failures, replacements of a valve --

CHAIRMAN RICCARDELLA: A valve that opens or is closed versus open.

MEMBER BROWN: Ones that normally failed, I can't remember which way, failed open, but now the new replacement valve fails closed in some circumstances.

CHAIRMAN RICCARDELLA: It has no effect.

MEMBER BROWN: It has no effect on the analysis, and therefore, but we'd be precluded. We'd have to come in and do an LAR for that, okay, which that would, based on the process that we've just been discussing here, and that seems to make some sense if it didn't have any effect.

MEMBER MARCH-LEUBA: Well, if it didn't have an effect, you never got to the question.

MEMBER BROWN: Well, it was evaluated in the sense, in their terminology against the safety analysis, not the whole FSAR, I mean update for the FSAR as updated.

I'm remembering vaguely that discussion and the argument would be that now this -- the logic followed based on what you all are using as the exception, if that was translated back into the other realm, that would preclude a whole, you know, a whole ramp of changes that had been made or we possibly would --

MR. McKENNA: It's a new interpretation to

the rule.

MEMBER BROWN: Yes, which creates a conundrum.

MEMBER BLEY: And their argument was it would preclude new changes --

MEMBER BROWN: Yeah, exactly.

MEMBER BLEY: -- because they just wouldn't pay for the LARs. They'd leave it like it is.

MEMBER BROWN: I understand the thought process --

MR. McKENNA: Right, so --

MEMBER BROWN: -- but the concern is real.

MR. McKENNA: So this slide, I kind of wanted to summarize what our exception really means, so I put it in kind of basic guidance.

So a licensee is going to plan a digital modification. They have selected a digital widget from a first of a kind vendor that has not produced nuclear components in the past.

So it doesn't pass the qualitative assessment of a low likelihood of failure and it creates a malfunction with a different result, so what can the licensee do?

They can select a new vendor or they can put the rigor in and submit the license amendment.

That's the whole bottom line.

MEMBER RAY: Or they can qualify the component.

MEMBER MARCH-LEUBA: Or the easy thing is to use some diversity.

MR. BEAULIEU: Can I clarify? This is Dave Beaulieu. The point was made about what the industry said. The industry was talking about a new failure mode would be a different result, meaning they're saying that if the component was a failure to open, the failure mode was failure to open, and now after the mod, it could fail open or it could fail closed.

They're saying, well, that's a different result. That is incorrect. The guidance does not say that. The regulation does not say that. It's the effect. It has to do with the effect of the change.

So if now you have a common cause failure, the failure mode is now two valves fail closed and were done in trains, it's the effect of that. Those two valves failing closed is what this criterion deals with.

So for like a non-safety like main feedwater, for example, 96-07 already gives that as an example. Main feedwater is not credited anywhere. So

the chapter on main feedwater, it assumes a loss of all main feed, so it's not a different result for main feed or a lot of non-safety systems, but for safety systems, the safety system is always credited in one way or another in the safety analysis. It's credited.

And it might not be explicitly described in the accident analysis, but it's always credited in one way or another, and a loss of both trains of safety system, that's what the concern is. That is a different result.

MEMBER BLEY: Yeah, and the way you just phrased it in terms of the effect seems to me it would have, well, certainly at the subcommittee meeting it would have eliminated a lot of the misunderstanding or discussion.

If that's what's really intended, I don't think it uses that, you use those words in the RIS. Maybe you do. I got to go back and look. But I think that would have helped a lot. And I suspect, although we'll hear from the industry, from NEI in a bit, that would kind of resolve the big concern in this issue.

It's clear to you right now. Is it clear in the documentation that that's what you intended, because I didn't think it was?

MEMBER MARCH-LEUBA: The more I listen to

your examples the more I'm with Pete in that when you fail two systems because of CCF, you're creating a failure of question five more than a, yeah, we don't really need to modify six. But we need to emphasize that when we mean a new accident we mean you're failing everything. Whereas, in your old FSAR in chapter 15, you only assume one failure.

I mean, you have two check valves, an analytical check valve and mechanical check valves, and you only assume one failed. And now you replace it by a digital check valve. Both of them can fail. And you never analyze that.

So I think the complaints you're hearing is that our brain thinks more of question five. We understand your problem. We agree with the problem. And I am starting with a solution. But I think better more five than six.

MEMBER RAY: Jose, the problem, that may be. But the issue is how are you sure that you will adequately answer question 5 when you do a 50.59 evaluation. I mean, an amendment isn't the end of the world, my god. I've processed lots of amendments. Yes, it takes more time and effort. But that's the whole point of it.

CHAIRMAN RICCARDELLA: Yeah, but the

frame, the bigger question I think, it's how much due diligence do you do. You've clearly, you guys that have operated plants clearly say you do a lot more due diligence if you need to prepare an LAR than if you don't, right? That's agreed.

But, you know, when you prepare an LAR, there's a lot of additional cost and time. And all of that cost and time isn't strictly related to the due diligence. It's a whole bunch of other things. You open it up to public challenge. You have --

MEMBER RAY: But there's one other --

CHAIRMAN RICCARDELLA: -- all kinds of things. But, you know, so I think the question is how do we limit the LARs to, the need for LARs to mods that are truly safety significant and not have to be doing LARs for everything --

MR. McKENNA: By using the qualitative assessment.

MEMBER RAY: Wait a minute. I want to say one thing before we go too far, what Pete said. There's one other things you do in addition to more due diligence. You also engage the staff.

CHAIRMAN RICCARDELLA: Yeah.

MEMBER RAY: And I don't think that is as bad a thing to happen, or I guess I'll say it the

other way. I think it's a necessary thing to happen because not everything is described in the FSAR that the Agency took credit for or considered or would consider relative to reasonable assurance. It's not. You can't say I know everything. I don't need anybody else to look at what I've done. Okay. I'm sorry.

CHAIRMAN RICCARDELLA: Yeah, and when I say due diligence, I'm saying the more due diligence also includes the diligence provided by the staff.

MEMBER RAY: Doggone right.

CHAIRMAN RICCARDELLA: No question about that. But I think the question is how do we limit that to mods, things that are truly safety significant. That's my perspective on it, so that we're not doing, you know, unlimited LARs.

(Simultaneous speaking.)

MR. WATERS: That's the purpose of the rule. I'm sorry. Do you want to --

PARTICIPANT: No, no.

MR. WATERS: That's the purpose of the rule, that licensees must be safe. And all changes you make, whether it's a law or 50.59, safe and compliant, the purpose of the rule says does it pose a safety question that NRC should independently audit and confirm.

They may well analyze two trains failing. And they can mitigate it or already bound it. But the purpose of the rule is is that type of analysis something that NRC should independently audit and confirm as part of the LAR process, which is our ability to do so.

And these eight criteria are the thresholds independently of when it crosses that threshold and we need to review it. I just want to emphasize time and criteria and six is about when you cannot demonstrate common cause failures are sufficiently low, what does it mean to have a different result, a malfunction different result and how are we interpreting that.

Staff believes that the base document, NEI 96-07, there's guidance for that right now for all types of mods is adequate. And if you read it, it's a pretty common understanding. We have a concern that there's a different interpretation and different criteria being introduced in Appendix D which it deviates from. And that's the issue today.

MEMBER MARCH-LEUBA: Yeah, and is there any digital modification that you can make that would pass question 6? I mean, all of them have common cause failure, and all of them are a new result.

MR. McKENNA: So I have the list of proposed mods that are happening right now out in the industry.

MEMBER MARCH-LEUBA: Okay --

MR. McKENNA: So all these are being done using the 50.59 process using a qualitative assessment. So it's expected that none of these will come into the NRC with a license amendment request. So these are the types of mods that are happening using the guidance and the RIS.

MEMBER MARCH-LEUBA: So how did they pass the RIS generators?

MR. McKENNA: Because there is a low likelihood of failure outcome in their qualitative assessment. So the equipment's not going to fail. So you won't have the common cause failure.

MEMBER MARCH-LEUBA: The digital controls are really good.

MR. McKENNA: Yep.

MEMBER BROWN: And per the RIS.

MR. McKENNA: And per the RIS.

CHAIRMAN RICCARDELLA: You're saying it's done before you get to the six, to the eight questions --

MR. McKENNA: That's correct. So you

don't have to --

CHAIRMAN RICCARDELLA: -- screen, it's screened.

MR. McKENNA: It is screened in. So it's screened as adverse. You do the qualitative assessment, the low likelihood of failure, so you can answer no to the evaluation question.

MR. MORTON: So, if you look at the fourth bullet in the second half, the digital inverter, so PSEG and Hope Creek came in to visit the staff to talk about their qualitative assessment for their digital inverter replacement where they actually went through the process, described some of the things they did, some of the challenges they had.

And we thought that they generally did a pretty good job of implementing it per what we wrote and the expectations and the intentions that we had with that.

And we've had other licensees come in and do the same thing with the RIS using the qualitative assessment for safety significant mods up into and not including the RPS logic, trip logic, for example.

So what you're seeing here is an example of a lot of mods that can be done and should be done without license amendments. And that was the staff's

intent with the RIS is to allow you to do a significant number of safety-related modifications without needing a license amendment request, because we thought that they should be able to up into and including wholesale replacement of RPS and SFAS.

MEMBER REMPE: So --

MEMBER BROWN: Hold it. You just said wholesale replacement of the RPS and SFAS. They came into you? You just lost with me with that. Is that --

MR. McKENNA: He said up into, not including.

(Simultaneous speaking.)

MEMBER BROWN: Oh, up, okay, that's what you meant not including --

MR. MORTON: Yes, yes.

MEMBER BROWN: -- for changes not including. I mean, I can envision like the digital inverters, they will have microprocessors in them. You can't find one to take with that.

MR. McKENNA: And they did --

MEMBER BROWN: And if you've got two trains and you've got an inverter that's feeding the motors that you need to drive, they're going to have common processors that's not going to be different.

More than likely it's a standard motor controller. And now, you're in a condition where they could both fail.

It's not like the RPS systems where we have watchdog timers, et cetera, et cetera. So tripping it or non-tripping doesn't make any difference.

There four trains, you lock up, issue a trip, you're still clean. That's why you have the watchdog timers. Can't do that for the motor controllers.

MEMBER REMPE: So --

MEMBER BROWN: They either start or they stop.

MEMBER REMPE: So I was listening to your recent meeting with the Commissioners. And industry elaborated on I guess some example where they were concerned on how they would demonstrate the probability of a failure if you had digital I&C components was sufficiently low without a lot of testing.

And I think that that is their concern, that, yeah, there's some examples you could get through, but there will be some, unless you went to an analog backup, it would be difficult to preclude a

common cause failure.

And one of, the Chairman actually suggested maybe some pilots are needed to try and work through some of these examples. What is your plan on responding to such a comment like that?

MR. WATERS: Yes, the context, or I think the context of that conversation was primarily where license amendment comes in or would not be 50.59. And I just want to clarify that. So we're talking about a license amendment.

MEMBER REMPE: And so this would not be something they would try to -- you're right. It was a bit off topic. But if they tried to do something like this and they would have trouble doing a 50.59 without a lot of testing, would a pilot help?

MR. WATERS: Well, I don't think we do a pilot 50.59, because the NRC doesn't review, does not approve or deny.

MEMBER REMPE: Right.

MR. WATERS: That's a separate inspection. That conversation was primarily based on a major license amendment, which would be a SFAS and RPS.

MEMBER REMPE: Right.

MR. WATERS: And the question is how do you address common cause failure and do a defense in

depth analysis. And we're working that separate BPT-719. We're actually going to reface her later this year on that.

We are open to using the guidance we have for major applications coming in to test it out. We call it e-plant pilot. We call it a pilot e-plant. So we're eager to have those applications and work through that to see if the lower alternatives, what design majors and features analysis can be done to demonstrate defense in depth against a common cause failure.

But again, that, you know, the industry has said that they don't plan to make these major modifications under 50.59. They've said that. So we're talking about a license amendment process --

MEMBER REMPE: Right.

MR. WATERS: -- where we look at the design architecture and then defense in depth if it's a common cause failure. And we're talking about a purchase for that type of licensing analysis. And we're willing to reorder license applications and test that out. And we're going actually go back to designs.

MEMBER REMPE: Okay. So, basically, I mean, there's been real back and forth with this and

disagreement with industry. And I assume that some of it is because of trying to demonstrate a common cause failure is fairly low as the issue here, at what they're going, on how they're going to demonstrate that.

MR. WATERS: Yes, for license amendments I think the industry -- I don't want to speak for industry. But I think they've asked for additional ways to not do the defense in depth analysis that we typically ask them to do to demonstrate there's no significant vulnerability. It's a common cause failure. But this is licensing since, and the licensing since.

Here we're talking about, again, non-RPS, non-SFAS systems where we're comfortable with them saying common cause failure is sufficiently low enough to answer these questions.

MEMBER REMPE: And they can demonstrate that with --

MR. WATERS: Demonstrate that.

MEMBER REMPE: -- available without having to have some examples to resolve --

MR. WATERS: And the conundrum of part train 6 is whether they're able to demonstrate lags and how do you analyze failure of multiple trains and

what is, is it a different malfunction with a different result. And that's the conundrum right now for those type of systems.

MEMBER REMPE: Thank you.

MR. McKENNA: I've skipped ahead to the last slide just to summarize after the list of mods I put up there that the industry is currently doing those modifications without the endorsement of Appendix D right now. It would have had no effect on those modifications.

And to have an effect, again, the qualitative assessment would have to be more than a minimal increase in likelihood of failure, and it would have to meet the criterion 6. And I'll end right there for any final questions.

MEMBER BLEY: Yeah, I've got two. One is for David behind me. I'm going to see if I got your clarification right. On number 6, where we talk about a different result, my understanding of what you said is that means some new effect on the description or analysis somewhere in the FSAR on which the general conclusions on safety are based. Is that a fair paraphrase of what you said?

MR. BEAULIEU: It has to be any place in the FSAR that describes the malfunction of that

affected system and the results of that malfunction. And it's typically, it says a single failure. That's the typical description.

And so, in the results of that, they always say the result of that malfunction is we're good. We have 100 percent predominant train, and the plant is safe.

So, if you picked out both trains of a safety system, in general the plant is not, there is no, that's beyond what's evaluated.

MEMBER BLEY: I understand. But the first part of that is that the way you just described it is essentially what I said. But you've narrowed it to, that describes the specific malfunction and its results.

MR. BEAULIEU: Yes.

MEMBER BLEY: Those results as described in the FSAR have changed. That's the key.

MR. BEAULIEU: Yes, that's --

MEMBER BLEY: -- the way you've interpreted it.

MR. BEAULIEU: It has to be explicitly prescribed, yes.

MEMBER BLEY: I don't think, I think if the RIS had those words and if that's what everybody

else intends, it would be a lot more clear and some of the confusion that we saw at the subcommittee meeting wouldn't have occurred. And that still seems to be up there. So I'll ask NEI about that when they come.

But I think that's a clarification that, at least it helps me. And it kind of, it does make sense for me here.

Now, the other question is I go ahead and I do a 50.59 and I evaluate these and I say there's no effect. And I do it. And you do an audit. The inspectors do an audit. And they say we don't agree with this. Then they send it back and have you guys look at it. And you say, oh, man, that's a tremendously big, new effect.

What happens to me as the guy who's sending this thing that oversimplified the result --

MR. McKENNA: Right. So the licensee would put that in their corrective action program. And we would issue a violation. They would have to correct that violation, which may mean that it would now get submitted for a license amendment request. I mean, that's simplified.

CHAIRMAN RICCARDELLA: But in the interim, the change has already been done --

MR. McKENNA: Right.

CHAIRMAN RICCARDELLA: -- and the plant is operating in that --

MR. McKENNA: That's correct. So we would have to evaluate for operability. I mean, they would have to go through all the standard processes in place to say they're operable. But, yes, they would have to correct that deficiency.

MEMBER SKILLMAN: Well, and there's more to that. You know, in our previous session from 8:30 to 10:00, this issue would go into the significant determination process. There would be determination of extent of condition. And I don't --

MR. McKENNA: Right, we would evaluate it --

MEMBER SKILLMAN: -- be an alarmist, but under the right conditions this could be a very serious violation.

MR. McKENNA: Yeah.

MEMBER SKILLMAN: It could be. On the other hand, it might be just minor.

MR. McKENNA: It could be. And --

MEMBER SKILLMAN: But the SDP would --

MR. McKENNA: 50.59 violations are processed under traditional enforcement typically. But, yes, it could go under the ROP also.

MEMBER BLEY: Are they fairly common?

MR. McKENNA: No, there's probably I would say maybe five violations per year on average --

MEMBER BLEY: Across the whole --

MR. McKENNA: -- of 50.59, across the --

MEMBER BLEY: Thank you.

CHAIRMAN RICCARDELLA: So I want to be clear, because I got the impression at the subcommittee from NEI that if we, if this difference isn't resolved, that a whole bunch of digital mods aren't going to be done because the operators will decide we need it. What I hear you saying is that most of these mods are going through with a 50.59 anyway.

MR. McKENNA: There's mods being plans and accomplished today using the RIS.

CHAIRMAN RICCARDELLA: And the majority of them won't require an LAR?

MR. McKENNA: Right, if they use the RIS through the qualitative assessments and the qualitative assessment says it a low likelihood of failure, they won't, they'll do it through the 50.59 process.

MEMBER BALLINGER: Has there been an example of one where it didn't or has failed the

criteria? In other words, you've listed --

MR. WATERS: So we wouldn't know --

MEMBER BALLINGER: -- that went through. But has there been an example of one that didn't?

MR. WATERS: Right, we wouldn't know unless they came in with a license amendment request.

(Simultaneous speaking.)

MR. McKENNA: And nobody has.

CHAIRMAN RICCARDELLA: Have you had many license amendment requests for digital I&C changes?

MR. WATERS: No, typically we get amendment requests for reactor protection systems or SFAS systems or components of it.

CHAIRMAN RICCARDELLA: Okay. The big things.

MR. WATERS: We don't get those for the auxiliary and support systems.

I want to answer one of the questions. We are meeting with industry end of this month. And one thing we want to talk about are what are specific digital examples where they cannot address the common cause failure sufficiently low question where criterion 6 is important and interpretation of it becomes important, because we want to hear about those specific examples so we understand what the practical

implications are.

And we'll have a few examples of where we think it's unclear. We want absolutely clear guidance. We don't want to have any adverse inspection findings. We don't want to, on both sides. So this is why it's important to get this guidance correct.

MEMBER BLEY: I think those kind of examples would be really helpful, because I have a little trouble dealing with David said here. You know, you go to the part of the FSAR that describes this specific malfunction. Things are a little different. So it's not exactly the same malfunction that was in there. Is that a result or is that a, or don't you have to look at it because it's a different malfunction?

MR. WATERS: And all FSARs are different and they have different little detail and they have different scenarios to look at. So it's hard to have a generic, it's hard without having actual examples. That's what we're looking forward towards.

MEMBER BLEY: Okay. I think that would help. And the one you had isn't really a digital one. So I haven't seen a really good one yet. Go ahead.

MEMBER REMPE: So, with these examples,

will that not affect perhaps what you have in the Reg Guide, or, I mean, will you have to update it? I mean, that's why --

MR. McKENNA: So the Reg Guide is out for public comment right now. So we'll update the Reg Guide based on public comments.

MEMBER REMPE: And you'll have those examples to consider to see if some changes are needed and you'll incorporate it at that time.

MR. WATERS: And that is our hope. But I want to sort of go back to your pilot question.

MEMBER REMPE: Yeah, that's what I was trying to get to. As we were talking about, you know, what would make you guys come to consensus, and when I heard that statement, I was like, well, I thought examples or pilots would help --

MR. WATERS: People like to have practical examples, really step through the practical examples. When we did the RIS on the CCF, we had workshops where we talked about actual upgrades and how to address this. So, having actual examples and tabletop, that's what, tabletop --

MEMBER REMPE: Right.

MR. WATERS: -- how would you apply the guidance and whatever issues. We look forward to

that. And hopefully we'll have that part of that conversation at the end of the month.

MEMBER REMPE: Because it seemed like you guys just couldn't work through the differences when we had the subcommittee meeting.

MEMBER BLEY: Well, that seemed true. But also I think I'm the last comment. In Section C2 in the Reg Guide, that's the section that goes through the exceptions and additions.

MR. McKENNA: Yes.

MEMBER BLEY: When I read through that, and it isn't crystal clear, it seems like everybody has thrown in a little piece that they were concerned about. And it seems just a hodgepodge. So I think you could really make that a lot more clear. And that might help everybody.

MR. McKENNA: Thank you for your comment.

CHAIRMAN RICCARDELLA: Yeah, I think we better get on with hearing from NEI if we could. Thank you. Very interesting topic.

(Pause.)

CHAIRMAN RICCARDELLA: Ready? Okay. Good afternoon, now. We're past morning. So, you know, we postponed our next meeting. So we have until about 12:30 here --

MR. GEIER: Okay.

CHAIRMAN RICCARDELLA: -- to cover this, plus comment.

MR. GEIER: We'll walk through. And if we want to have more discussion, you know, we're open to --

CHAIRMAN RICCARDELLA: Okay.

MR. GEIER: -- supporting the Committee. So my name is Steve Geier. I'm Senior Director of Engineering Risk for NEI. And we're going to be talking primarily focused on this one area of contention. With me, primarily going to be doing the technical discussion, will be Kati Austgen, my colleague at NEI.

Just a couple comments to start out is, you know, the main driver for this, for the whole integrated action plan and these initiatives that we've been working with the staff on is that there's a real need for the plants out there to upgrade obsolete and really antiquated analog systems.

And many of these upgrades are shown and have been demonstrated through OE to improve plant safety and to certainly improve, significantly improve station reliability.

The RIS, the supplement, as well as ISG-6,

which is for LARs, it really improved and streamlined some of these. And as the staff talked about, we've got about 60 mods that we've polled our members that are moving forward primarily because of the RIS. And these are all, these 60 are all under 50.59.

As of yet, we don't have anybody signed up yet or kind of saying that they're going to move forward with a SFAS or RPS. But there are some considering it.

And I think one of the committee members mentioned about a possibility of a pilot. We're working with members on what that might mean and if there's incentive there to kind of test this. And it's primarily for the ISG-6, Rev. 1 process that was just approved at the end of last year.

MEMBER BROWN: You said SFAS and RPS. I mean, supplement 1 said don't use this for, you wouldn't do a 50.29 --

MR. GEIER: Right, that would be done under the ISG-6, the LAR process.

MEMBER BROWN: Yeah, okay. That's -- I just wanted to make sure we were in the LAR process --

MR. GEIER: Because of the cost and timeframe, that's where this pilot, where there might be some additional funding or fee waivers.

MEMBER BROWN: Well, there have been RPSs done. Diablo Canyon did an RPS, which was approved by the NRC. And Oconee I think did one which was approved by the NRC.

MR. GEIER: That's correct.

MEMBER BROWN: So --

MR. GEIER: Those are two projects why plants are very uncertain about moving forward and the future just because of the cost --

MEMBER BROWN: Well, they sped through fairly niftily. I didn't do the Oconee one, but I did do the Diablo Canyon one, which was pretty straightforward and not overwhelmingly complicated. So those are the only two I'm aware of. Maybe --

MR. GEIER: -- for our members is that those are reasons why they're very cautious about moving forward because of the extreme cost, as well as the additional schedule required because of the LAR process.

MEMBER BROWN: Well, they were also working out how you handle the common cause failure issue relative to the use of watchdog timers and control of access so that people can't come in software-wise via the internet and change part of the software. So they had to demonstrate --

MR. GEIER: And our hopes are, as Mike Waters and staff talked about, is the revisions that BPT-719 might improve the, or would approve the way we treat common cause failure for those significant upgrades.

MEMBER BROWN: Okay.

MR. GEIER: And it might help streamline those going forward.

MEMBER BROWN: All right. I just didn't want to muddy the waters with RPS and SFAS stuff from this particular conversation. That's all.

MR. GEIER: Right. And so all I want, just to kind of introduce Kati, is Appendix D has been a significant improvement document that we've been working on. It has been going on for about five years, which has been a very good interaction with the staff. And we've resolved virtually all the questions with the exception of this one.

And I think it's an important issue. Our members feel like that's, for those, again, don't want to kind of add on too much to what was already discussed, but this question comes into play when it cannot pass the RIS supplement 1 kind of screen, the qualitative assessment.

And there are going to be a subset of mods

that are not going to be able to pass that. And so the desire is to have this clean endorsement so that those mods can also go forward under 50.59. That's our overall desire.

So, with that, I'm going to turn it over to Kati to talk about some of our issues.

CHAIRMAN RICCARDELLA: Excuse me just for a second, Kati. I need to make an administrative announcement that we have to get on the record.

We have a P&P meeting scheduled for 12:15. And we've decided to postpone that till 12:30. So that needs to be on the record. And we'll start our P&P next door at 12:30. So we have until then to continue and hopefully wrap up this meeting.

MS. AUSTGEN: I'm Kati Austgen from the Nuclear Energy Institute. I might as well go ahead and get into Appendix D. You heard a lot from the staff about the purpose. I just wanted to reiterate that 96-07 Appendix D is supplemental guidance for digital modifications. It is intended to be used with NEI 96-07, Rev. 1, which is the currently endorsed guidance for all 50.59 activities.

I'll reinforce that Appendix D helps licensees with the identification of UFSAR described design functions relative to digital activities, how

and where to address common cause failure aspect in the 50.59 process, and how to apply the qualitative assessments to justify those conclusions.

And it also helps with detailed guidance and examples on the combination of design functions, which is back-to-back common cause failure piece. That's a unique twist for digital activities that probably would not see with the other activities that plants have ongoing.

And as you know, criterion 6 then is the most difficult one to address. And that's what we're here to address today.

I also want to reiterate that the engineering and technical work is complete to support a 50.59 review conclusion. So that's the going in premise for NEI 96-07, Rev. 1. It is equally the premise for Appendix D.

These are nuclear professionals. These are engineering professionals. They do their engineering and technical work to determine if the activity is a good idea. They ensure that safety design and operational requirements will be met. And so that has to be there for a 50.59 conclusion to be reached.

And it is essentially the same work that

would be relied upon for a license amendment request if it were determined that a license amendment request is required.

And then, finally, on this slide as the staff noted, 50.59 is a licensing or right-of-approval review. So it is simply can the licensee do the change on their own given all of the engineering and technical work they have and applying the 50.59 regulation.

If they can do it on their own, then the NRC would inspect those 50.59 evaluations following the licensee's approval and implementation. If the licensee cannot do it on their own, then the NRC would approve it in advance with a license amendment should the licensee choose to go forward with it.

MEMBER BLEY: If, in fact, the level of technical review and work is the same as would be required for an LAR, then your claim would be I guess that the added cost with an LAR is the time it takes to interact with the staff here and get the approval, because you wouldn't need to do any further technical work to support it.

MS. AUSTGEN: That's right. The added cost and schedule uncertainty of a license amendment request, interacting with the staff.

MEMBER BLEY: But has it -- have you been to the plant --

MS. AUSTGEN: I have.

MEMBER BLEY: -- of these?

MS. AUSTGEN: I have.

MEMBER BLEY: So you would claim that the ones you gave to approve as 50.59 you had as much detail as you would have had if you had the single LAR.

MS. AUSTGEN: Yes, sir.

MR. GEIER: Yeah, if I can add, too, I've been design manager at two different stations. And, you know, I can also say that there is a separation of processes. There's the engineering process. And there's the licensing process.

The engineering process, that's all completed regardless of the outcome, you know, of the 50.59 evaluation. You have your procedures and your calculations and your analyses that are required.

What goes, the difference is once you've decided that something goes into an LAR is you need to write the LAR, submit the LAR, and then answer any RAIs, interact.

And that typically, you know, for an average one could add up to a year. And when you're

looking at scheduling mods, typically these mods would go in during an outage. That could mean you could postpone it, you know, a year and a half to two years because you would have to skip that cycle.

So that's where the timeframe comes in, and then all the added cost of that delay. The engineering work, that cost is the cost. It's not going to change whether you're doing it under 50.59 or you do it under LAR. It's that LAR, the licensing cost.

CHAIRMAN RICCARDELLA: But some of my colleagues who've been in operating plants implied that a licensee does a lot more due diligence if an LAR is required than if not.

MR. GEIER: My experience, I would contest that. Now, there may be more work that has to be done in answering RAIs. But the engineering work that comes into and then writing the initial LAR, that's the same. There's no difference.

CHAIRMAN RICCARDELLA: Just educate me. Is there also a concern about once you have a license amendment request, you're opening up to a public challenge and could be delayed --

MR. GEIER: No, no. I would say public challenge, that has no bearing on it. It's really the

uncertainty and the, from a schedule and what changes that might be imposed on by the staff to start getting into the RAI and the challenge process.

CHAIRMAN RICCARDELLA: Okay. Thank you.

MR. GEIER: You're welcome.

MS. AUSTGEN: Okay. So then, we will recap for you the major points of how we look at addressing criterion 6.

And I do want to make clear that we view this as being the same as NEI 96-07, Rev. 1. This process may not be spelled out as explicitly. But the process that we propose to follow is the same that is followed in 96-07, Rev. 1. So, if the staff believes that it is inconsistent with Rev. 1, then that is a kick-out to something beyond digital.

But the way we've been implementing 96-07, Rev. 1 for the past 20 years, the way we propose to address criterion 6 in Appendix D, it is pulling out those digital nuances so that you can still apply the same approach as in 96-07, Rev. 1.

MEMBER MARCH-LEUBA: So what would you have to do different if the Reg Guide is published?

MS. AUSTGEN: So, if the Reg Guide is published and takes exception to this, you'll be looking at a different level for where you find result

that would be different in criterion 6.

MEMBER MARCH-LEUBA: Can you provide us with an example?

MS. AUSTGEN: I would rather defer based on time and do the example in our public meeting later this month. Happy to share those with the Committee.

MEMBER MARCH-LEUBA: I know we're -- I'm looking at my watch. You're saying that Appendix D is consistent with the regulation. The same law, the regulation says Reg Guide, which is different. So we do have a discrepancy. And an example would really help a lot.

MS. AUSTGEN: Yes, yes.

MEMBER REMPE: Several examples that can't pass would help a lot to work through this I think. It sounds like the staff is interested in that. It sounds like you are willing to provide some examples, right?

MS. AUSTGEN: Yes.

CHAIRMAN RICCARDELLA: Is this public meeting you referred to?

MS. AUSTGEN: So we're going to have a public meeting with the staff. I believe it's going to be June 25th.

And the purpose will be to discuss

examples and illustrate the difference, how those examples would go through Appendix D as written as the industry says it ought to versus how it would go through criterion 6 as the staff says it should based upon their exception.

(Simultaneous speaking.)

MEMBER CORRADINI: Digital I&C examples.

MS. AUSTGEN: We intend to do both.

MEMBER CORRADINI: Okay. Thanks.

MR. GEIER: I should mention that there is several examples already in Appendix D. But those are examples using the industry's approach.

I think what we want to bring in is what the impact would be, come up with some examples if we use the staff's approach, how that would impact several mods that otherwise would pass that particular question.

MEMBER BROWN: So you're going to provide examples in this public meeting of, to be explicit of things that won't pass the exceptions. Now, with the exception in there, you would not pass. And that's, I think that's what Joy and Jose are emphasizing.

MEMBER REMPE: And it would be helpful if the staff and industry could find a way through to modify the Reg Guide in a way without just saying we

fully endorse. Maybe it's also the NEI document needs to have some changes. But there should be a way to come to some sort of compromise I hope.

MEMBER BLEY: I'm thinking back to the subcommittee meeting. You brought some examples at that time. And the way this was stated toward the end of our session with the staff, that a new result means that somewhere in the FSAR it describes a specific malfunction.

And the results of that malfunction and the new result would mean that the results are actually, you know, that has a new effect on the results in that part of the FSAR, rather than simply a different failure mode or something like that, which is where a lot of the examples we talked about before focused on.

Now, you may not agree with what was said here. And that isn't, those words aren't in the documents that I can find. If you have any comment on that, I'd appreciate it.

MS. AUSTGEN: I think in going through our four points, I think we can address that and help with that. Okay.

So let's go ahead and go to our next slide. So our first point was that a malfunction is

defined. And it's not just a malfunction, but the phrase in the regulation is a malfunction of an SSC important to safety.

And that is defined in NEI 96-07, Rev. 1. Of course, it is defined as a failure to perform a design function. So it's not just any failure. It's a failure to perform a design function.

Then, design function is also defined in NEI 96-07, Rev. 1. And you can see on this slide there's three different flavors of a design function.

We start in applying the 50.59 process by looking as broadly as you can. Look at all the failures that might be related to this activity. Now figure out if it's a malfunction. Is it a failure to perform a design function? If it is a failure to perform a design function, figure out which kind of design function it is.

Recall in criterion 6 that you're looking at malfunction of an SSC important to safety with a different result. So this slide is all about answering that first question, what's a malfunction of an SSC important to safety.

In order to get to that different result piece, that's where we go further and we say, okay, we know from definition of design function and definition

of design basis function that those are credited in the safety analysis.

And we know from endorsed Reg Guides and industry guidance that design basis functions are described in safety analyses, not just accident analysis, but safety analyses. But that also doesn't mean the entire updated FSAR. And, again, there's a definition for safety analysis. It's definition 3.12 in NEI 96-07, Rev. 1.

So, given that, I hope to clarify a little bit of how the staff has characterized our position. We do not say that safety analyses is strictly accident analysis. It is bigger than that. But it is not the entire updated FSAR, descriptive information, text, tables, diagram.

You have to link it back to safety analysis, what was actually performed to show that you maintain the reactor pressure boundary, the integrity of the systems, et cetera.

MEMBER BLEY: The way the staff phrased it toward the end of that session isn't this way. It's if somewhere in the FSAR a malfunction is described along with the results of that malfunction, and that's where they're saying they'd use the whole FSAR. Why do you disagree with them?

MS. AUSTGEN: So, again, getting back to the failure modes piece of it, you might have a failure modes and effects analysis. That might be descriptive material in the FSAR.

In fact, Appendix B, bravo, to NEI 97-04 endorsed by Reg Guide 1.186, specifically says that failure modes and effects analyses are descriptive material. They are not the safety analyses, which is what's being referenced as where you would find credit for design basis functions and by extension design functions because --

MEMBER BLEY: You kind of answered me by pointing with your own definitions. But that's all right.

MS. AUSTGEN: Yes. So let's keep moving.

MEMBER RAY: Of course, the S in FSAR stands for safety.

MS. AUSTGEN: Yes, it does. Yes, it does. So, and so we see Final Safety Analysis Report is a big thing. It's defined by regulations. It has all these constituent pieces and parts.

One sliver of that is safety analyses, those things that demonstrate that the plant will be able to cope with accidents and the things that are presented to it.

MEMBER MARCH-LEUBA: So, if the plant, the FSAR assume a single failure of that one train on chapter 15, now you have failure of two trains. Is that a new accident?

MS. AUSTGEN: So --

MEMBER MARCH-LEUBA: What will happen? I mean, I've been mixing.

MS. AUSTGEN: Yeah, yeah, so, again, we're falling into the earlier discussion where we're mixing and matching the different criteria. So I'll say it's not a new accident, because if you already describe one train failing and you could run that analysis and say, well, now both trains failed --

MEMBER MARCH-LEUBA: My reactor brain says you're in an analyzed condition. And therefore, you should never satisfy the condition.

MS. AUSTGEN: So you will certainly analyze it. Now the question is, from our perspective if the safety analysis that demonstrated that you would be able to make it through the loss of one train, did it say you have to have the entire other train, or did it say, you know what, I could have neither train and I would still survive.

MEMBER MARCH-LEUBA: It's still an analyzed condition. You have to analyze with failure

of two. You either did or you didn't. And if you didn't, then you have to do it again.

MS. AUSTGEN: But that's not --

MEMBER MARCH-LEUBA: And we have one and a half minutes --

MS. AUSTGEN: That's what the criterion is asking.

MEMBER MARCH-LEUBA: -- one and a half minutes to go.

MS. AUSTGEN: Yeah.

MEMBER MARCH-LEUBA: So let's be done.

MS. AUSTGEN: Okay.

CHAIRMAN RICCARDELLA: Excuse me just for a second. We've reached the witching hour of 12:30. And so what's going to happen is we're going to keep going with this meeting. But my two colleagues have left to conduct the other meeting. And I'll keep going. Thank you.

MS. AUSTGEN: Thank you. So, again, we point back to a notice of proposed rulemaking. When the current 50.59 rule was being promulgated, this notice of proposed rulemaking explained the transition from saying malfunction of a different type to malfunction of a different result. And they explained what result means.

They say unless the equipment would fail in a way not already evaluated in the safety analysis. They do not say already described in the FSAR. They say evaluated in the safety analysis.

MEMBER BROWN: Is this the version of 50.59 that was issued back in 1999 and early 2000?

MS. AUSTGEN: Yes, that's right.

MEMBER BROWN: I couldn't find this change from type to result.

(Off-microphone comments.)

MS. AUSTGEN: Yeah.

MEMBER BROWN: I couldn't see, I couldn't find a precursor. All I'm saying is I couldn't find something before. All I saw was the end result. I could not see what came before.

CHAIRMAN RICCARDELLA: You're saying it was in the NPRM --

MEMBER BROWN: Yeah, I couldn't --

CHAIRMAN RICCARDELLA: -- notice of proposed rulemaking.

MEMBER BROWN: Yeah, I couldn't find that. So I was struggling.

MS. AUSTGEN: Right. Yes, it was in the notice of proposed rulemaking. And I will go ahead and give you the citation for the page of the Federal

Register Notice.

MEMBER BROWN: Is there an ML number for that?

(Off-microphone comments.)

MS. AUSTGEN: Okay. We'll give it to Kathy.

MR. GEIER: Yes, we have a copy of the page from that.

MEMBER BROWN: No, that's fine --

MR. GEIER: And we can provide a copy that we've got. It's got the number on the top.

MEMBER BROWN: The history was tough to find. That's all.

MS. AUSTGEN: Yep. Okay. Short answer, it would not have an ML number, but it is in the Federal Register. So --

MEMBER BROWN: That's fine.

MS. AUSTGEN: Okay. Let's go to the next slide.

MEMBER KIRCHNER: Since we have more time, maybe we can go back to what you were saying.

MS. AUSTGEN: Yeah.

CHAIRMAN RICCARDELLA: I'll point out to my colleagues that the next meeting starts at 1:15. But that may not be a problem since the cafeteria is

closed anyway.

MEMBER KIRCHNER: When you say you're focusing on result, let's just take a broad category of accidents like LOCAs. Now, if you have a digital control system for the ECCS systems and you have a common cause failure, typically when you do your LOCA analysis, you assume a single failure somewhere in the system, but you don't take out two divisions or four divisions on an advanced plant.

But the potential could be there with a digital control system for those different divisions having a common cause failure. And then you would take them all out. Are you saying that's not a -- that would result in quite a difference in the outcome. So --

MEMBER CORRADINI: Can I ask your question differently, because I think you're getting to the crux of it? If I have a common cause failure, it could be an electrical or mechanical component.

MEMBER KIRCHNER: Anywhere, yes.

MEMBER CORRADINI: And it doesn't have to be a digital component.

MEMBER KIRCHNER: Yeah, it could be things like --

MEMBER CORRADINI: But the assumption --

MEMBER KIRCHNER: -- a safety --

MEMBER CORRADINI: -- in a single failure criterion is that that probability is low.

PARTICIPANT: That's right.

MEMBER CORRADINI: And given that it's low, still I will assume a single failure. So the same logic would have to go with the digital component, which is they'd have to show that the digital common cause failure is low, but nonetheless I'd have a single failure.

MEMBER KIRCHNER: Yeah.

MEMBER CORRADINI: That's what I think has got to be -- I'm looking for -- Dennis said it early in this discussion and I haven't left it, which is what's good for the goose is good for the gander.

MEMBER KIRCHNER: Yeah, that's where I'm going.

MEMBER CORRADINI: If we're talking digital I&C, we're talking mechanical, electrical, it's got to all be consistent.

MEMBER MARCH-LEUBA: Well, the staff told us it's, all the examples that are going through the system now are because they're not even doing 50.59. They screen out at the beginning. The probability of failure is so low that they don't have to evaluate.

CHAIRMAN RICCARDELLA: They're not doing the assessment. They're doing the screening.

MEMBER MARCH-LEUBA: Right. The screening gets you out of the --

MR. GEIER: So, just to clarify if I can, is the RIS, the qualitative analysis being done by the RIS, that becomes an input. It's done under, it's not necessarily part. It's not a question of 50.59. It's not a part of that. It becomes input into the 50.59.

So, if you perform that and the results of your qualitative assessment is that it's a low likelihood of CCF, what that means for that question is you don't need to consider that a malfunction will occur as a result of a software CCF. That is what is resulting in that question as being no.

Now, you still may not pass your screen. You may still be doing an evaluation. And you still have to look at those other questions. But the whole idea of the qualitative analysis is to be able to conclude that you don't need to consider software common cause failure as a malfunction from the component --

MEMBER BROWN: -- sufficiently low.

MR. GEIER: You've concluded sufficiently low.

MEMBER BROWN: That's what Mike said. It's sufficiently low.

MR. GEIER: Therefore, you don't need to consider that it's going to happen that that malfunction is going to occur.

MEMBER MARCH-LEUBA: Now, the problem with that approach, which I like, is that there are PhDs being done about how to evaluate that probability to failure. And you get three different digital I&C experts, and you'll get five different answers.

MR. GEIER: And because you do the qualitative assessment, that doesn't necessarily mean that you're not going to do a 50.59 evaluation. You still may be doing that evaluation. You just use the results of that evaluation to help you answer your questions. Hopefully, that helps on that.

CHAIRMAN RICCARDELLA: Is that what you were referring to as the qualitative?

PARTICIPANT: That's the fourth.

CHAIRMAN RICCARDELLA: Yeah.

PARTICIPANT: That's on top of that --

CHAIRMAN RICCARDELLA: But that's what you're referring to as the qualitative assessment?

MR. GEIER: As was described, the qualitative assessment is a parallel assessment

specific to CCF. There's other aspects of the modification that you're also evaluating.

Because don't forget, I mean, you're looking at the whole modification. You're looking at everything from environmental qualification, from structural, from, you know, because there's more things that occur.

It's just that RIS gave us a way to evaluate a digital mod for the potential of a software CCF causing that to malfunction.

MEMBER BROWN: These are in kind of the same ballpark. The initial screening -- oh, I'm sorry. Thank you very much. I wish you all would help me, okay, instead of having to have the briefers do it. The screening is at the very -- it's adverse or non-adverse.

CHAIRMAN RICCARDELLA: Yeah.

MEMBER BROWN: You haven't even gotten down into the qualitative assessment. That's a higher level worth of back of the envelope, whatever it is. You'll look at it. I've got some new stuff in there. And it performs differently than the old stuff. Could there be a problem?

And if the answer to that comes out yes, that's adverse. And you need to move into the

evaluation period. And then you do the, you go through the qualitative assessment with the RIS approaches.

And if that's now low likelihood, in other words, it's sufficiently low of a CCF, then you just go ahead and do the change on your own. If it's not, then you're in the LAR realm.

Did I phrase that properly? I'm trying to get this down to -- I am too old to be convoluted around. I just --

(Simultaneous speaking.)

CHAIRMAN RICCARDELLA: But some of it is that second thing you said involves these eight questions.

MEMBER BROWN: Yeah, the evaluation involves the eight questions. The one on 6 is, is the CCF consideration sufficiently low, and therefore I meet that one and I don't have to anything more. You may have to deal with one of the other ones I guess in some circumstance. That's a different issue.

MR. GEIER: And if you look at the engineering process, that qualitative assessment is likely to be done as part of the -- it's new. So I'm not sure how utilities are doing this. But it's likely to be done as part of the engineering design

package.

And so once that's complete and you have this, so if you got a digital component, a digital upgrade and there's a potential for software CCF, you're likely going to do this analysis. And then you take that whole package and then you apply 50.59 to that, to the change in parallel, you know. Actually, it comes after you complete --

MEMBER BROWN: -- you determine there's something, a different common cause failure is a possibility. And, therefore, you have to then move into the evaluation --

MR. GEIER: And actually, I mean, everything you do in the engineering world becomes fodder for input for, in a 50.59 evaluation because you look at, because it's all part of that change.

And I think in terms of flowcharts, you know, how things -- and again, I come out of the engineering world. And this is all being, it's an engineering process. And then you take the results of that and you apply the licensing piece, which is where Kati comes from, and applies 50.59 rule to it.

MS. AUSTGEN: Okay. So we will provide additional references for the staff to get to you on changing from type to result and what that means.

I'd like to move on to our third point because that will I think help also. So one of the issues going on at the time of the promulgation of that 1999, 2000 rulemaking on 50.59 was that FSARs varied in their depth.

And so how could we make sure that every licensee, no matter how thick or thin their FSAR, was being treated on a level playing field when it came to whether or not they could make changes on their own under 50.59?

And so the solution to that was to focus on design function, because no matter how thick or thin your FSAR was, it described if something had a design function. That is, if it had to do something in order to meet your safety analyses, that was included in UFSAR.

So this is where looking at, hey, just because I have a new widget and it wasn't described in the FSAR, that doesn't give you a free pass. If your new widget has some bearing on a design function, you will find that design function in your FSAR. You'll pull it into 50.59.

That's where you'll make your is it adverse to the design function or not adverse to the design function determination based on your technical

work. And if it is adverse to the design function, you will go on to the 50.59 evaluation and answer the eight criteria.

MEMBER BLEY: Okay. So I like that. And it's a little different than I think we heard back at the subcommittee meeting. But if you got something new and it's not in your FSAR, that doesn't get you out of looking at it. You have to look for its design function and that should be there.

I think that's a crucial point. This is the first time I've heard it mentioned.

MEMBER BROWN: Yeah, and I'm hoping I can get the transcript, because I couldn't write fast enough.

MEMBER BLEY: Tonight.

MEMBER BROWN: It was very clear, very crisp, and very linear. So --

MS. AUSTGEN: All right. We'll aim to keep that up.

MEMBER BROWN: Give you credit for that.

MS. AUSTGEN: Okay. So then, if we take that approach then, what we're saying is you look for design function. That's not any and all descriptive material in the FSAR.

So, again, go back to what we believe

we're hearing from the staff when they say they want to take exception to how we provide guidance on criterion 6. They would say look at all the descriptive material in the FSAR. Well, now you're back to do I have a thick FSAR or a thin FSAR. And it might make a difference.

And they're saying we're still sticking with the design function. Identify the design function, and then you can work through the steps of the process. And thank you to the staff for putting up the steps of the process in their slides.

MEMBER KIRCHNER: Isn't there some place for common ground here with the staff and, because it would seem to me, I'm kind of in Harold's camp, I would go into the FSAR and look at the impact of the change accordingly. For example, if we're changing something like a valve on the primary coolant system, I'm not going to be looking at the siting part of the FSAR.

So, I mean, some sense and sensibility has to apply here as well. I'm going to go and look at chapter 3. I'm going to look at chapter 5. I'm going to look at chapter 15. I'm not going to be off in chapter 1 or 2 or however many volumes are on the bookshelf.

So it seems to me there's a way to find some common ground with the staff in this particular application of criterion 6.

MEMBER BLEY: I agree. And the way this was presented, my memory of the Subcommittee was, gee, if my FSAR was real thick and I've got one of these widgets then I have to evaluate it, but if it's real thin and I don't have one of these widgets, I don't have to evaluate it. And that just didn't smell right.

But if you can tie it to the design function and evaluate against the design function, that gives you a way not to let them fall through the cracks.

MEMBER RAY: Dennis.

MEMBER BLEY: Yes, sir.

MEMBER RAY: If there's a failure, a malfunction, that doesn't affect the design function but it effects something else, I'm trying to think of something really, because of the time, the malfunction of the new device impacts other things in a way that the, say it's, uses compressed gas to activate instead of an electrical motor. Out of the air.

But the malfunction doesn't affect a design function as described for the device but its

malfunctioning could affect something else because it's no longer using the same activation method. It's using a compressed gas instead of an electric motor, let's say. Or vice-a-versa.

I find it hard to narrow the circumstances in which I'm only looking at whether there's a different outcome for the design function as opposed to a different impact because I've replaced one component with another one that's perhaps very different.

MEMBER CORRADINI: But wouldn't --

MEMBER RAY: And that's what causes me to say, I don't care whether it's three volumes or 17, the license is based upon the description of the plant, and if the change affects that description, it seems to me like a license amendment is required. I'm done.

MEMBER CORRADINI: But I thought where we were going, when you were saying looking for common ground is, if you have identified the design function and the modification effects that design function, then you have to consider the results of a malfunction.

Whether that malfunction, and I'm looking at you guys, whether that malfunction is designated in

Chapter 3, Chapter 6 or Chapter 15.

MEMBER BLEY: Or 9.

MEMBER CORRADINI: Or whatever. That's what I --

MEMBER RAY: But you're limiting just to design function now.

MEMBER CORRADINI: Well, I'm saying --

MEMBER RAY: Not to the kind of hypothetical I was trying to come up with.

MEMBER CORRADINI: Yes, I can't deal in hypotheticals.

MEMBER BLEY: The trouble with a hypothetical is --

MEMBER CORRADINI: I'm dying for a practical example.

MEMBER RAY: Well no, you just look at it as if it were described that way in the original submittal and say, well, that's all right.

MEMBER BLEY: Or it could be, with your example, it could be that introduces, where the original thing met one design function, the new thing might affect some other design functions as well.

MEMBER RAY: It might affect something else. I'm just saying, limiting the change to what impact it has on the design function seems to me to be

too narrow. That's all I'm trying to say.

And I interrupted Mike, I'm sorry.

MEMBER CORRADINI: That's all right.

MEMBER BROWN: Well, the way she said it, the design function just, you still have to, if it's not, you still have to assess it if it effects a design function. Even if it's not stated in FSAR or the old FSAR. The thinner volume.

MEMBER CORRADINI: But the design function has to be stable.

MEMBER BROWN: Yes. Yes.

MEMBER BLEY: But now you got to go back and define --

MEMBER BROWN: I got to go back and read the words from the transcript --

MEMBER BLEY: -- what design function means.

MEMBER BROWN: -- because I've lost it already.

MEMBER BLEY: That's where she started.

MEMBER RAY: Well, what I meant was, it doesn't create a hazard that didn't exist before, for example. But that's what I'm saying.

MR. GEIER: The one thing I'd say is that we describe, is you take something that maybe was

designed a certain way and you change that design. But the whole idea of it, it would still be performing the same design function but the engineering analysis looks at those things.

If you change something from say mod powered by power and you put in a air operator valve and you're running air, you know, you look at all those impacts of those design, not just the function of that. You look at everything that's brought into that --

MEMBER RAY: Yes.

MR. GEIER: -- the entire mod, that's done in the engineering space.

And then you take the results of that engineering analysis, and how that effects the design function and you evaluate under 50.59.

MEMBER RAY: But you have to understand how to define, how to limit the boundaries of the design function. Is the design function not to create a hazard of an electrical explosion, for example.

You know, I think we're trying to squeeze into a few seconds, a discussion that's a longer discussion inevitable, that we'll probably have after this is over.

MS. AUSTGEN: So, to keep --

MEMBER BLEY: Keep rolling.

MS. AUSTGEN: Yes. To leave this point, I will leave you with NEI 96-07 Rev 1, Definition 3.3 of change. In the discussion provides what a design function is. And so that is --

MEMBER BROWN: Where did you say that was, 96?

MS. AUSTGEN: 96-07 --

MEMBER BROWN: Where?

MS. AUSTGEN: -- Rev 1.

MEMBER BROWN: Where?

MS. AUSTGEN: 3.3.

MEMBER BROWN: 3.3, okay, I got that now.

MS. AUSTGEN: The definition of change.

MEMBER BROWN: Okay.

MS. AUSTGEN: And in the discussion for that definition provides what a design function is.

Okay, so let's keep going. Additional, so I've tried to clarify that the way we have described implementing criterion 6, the guidance for Section 4.3.6 in Appendix D, we see that as consistent with NEI 96-07 Rev 1, Section 4.3.6.

We also see that as consistent with some other 50-59 criteria. And this was to get to the Staff's point about going back to the text of the

regulation versus what we have in guidance 96-07 Rev 1.

Well, if you go back to the text of the regulation, on some additional criteria it also says, previously evaluated in the final safety analysis report as updated. I will grant you that says, final safety analysis report as updated.

But, based on existing guidance, we have understood that to mean, for the last 20 years, that evaluated in the final safety analysis report means in safety analyses. Those are specific calculations underlying your conclusion --

MEMBER MARCH-LEUBA: I still don't understand what chapters you will be worried about?

MS. AUSTGEN: We don't --

MEMBER MARCH-LEUBA: Give me example.

MS. AUSTGEN: We don't narrow it down to chapters.

MEMBER MARCH-LEUBA: Yes, well give me one.

MS. AUSTGEN: I'm not going to give you a chapter. I'll give you the definition of safety analysis.

MEMBER MARCH-LEUBA: You always forget about this.

MS. AUSTGEN: I know.

MEMBER MARCH-LEUBA: So there is an example that you can give us and are willing to, and therefore I'm suspecting you're modest.

(Laughter.)

MEMBER MARCH-LEUBA: And you got ten minutes to close this up.

MS. AUSTGEN: I'm an open book but I can't go into examples because, as we said, they're open ended and they go forever so we'd rather hold that for the public meeting.

What I will tell you is, what we believe safety analyses are, are as defined in 3.12 of NEI 96-07 Rev 1.

Safety analyses are analyses performed pursuant to NRC requirements to demonstrate the integrity of the reactor coolant pressure boundary, the capability to shut down the reactor and maintain it in a safe shutdown condition, or the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to the guidelines in 10 CFR 50.34(a)(1) or 10 CFR 100.11.

MEMBER MARCH-LEUBA: So --

MS. AUSTGEN: Sorry, one more, just for

completeness.

Safety analyses are required to be presenting in the UFSAR per 10 CFR 50.34(b) and 10 CFR 50.71(e) and include, but are not limited to, the accident analyses typically presented in Chapter 15 of the UFSAR.

MEMBER CORRADINI: But to use your three or four, I can't remember, criteria attributes, I'd find those in Chapter 3 if I was talking about structural components, or SSCs. I find them in Chapter 5 relative to reactor pressure vessel integrity.

MS. AUSTGEN: Yes.

MEMBER CORRADINI: So, my interpretation is, it's got to be throughout the FSAR as applicable.

MS. AUSTGEN: Yes.

MEMBER CORRADINI: Okay. Not just Chapter 15.

MS. AUSTGEN: Correct.

MEMBER BROWN: Okay. She's almost done now, right?

MS. AUSTGEN: I am.

MEMBER BROWN: Okay.

MS. AUSTGEN: I am. One more slide. Let's get us to our summary slide. There we go.

Okay. So, we follow previously approved definitions, we look at the rulemaking record, and our two decades of experience with implementing 50.59 to understand that when you look for a malfunction, you're looking at failure to perform a design function.

When you look for a different result, you're looking at the safety analysis level. And again, that was definition 3.12, safety analyses.

We've talked a little bit about, unless it would fail in a way not already evaluated, there is no need for the NRC to review the change. That's part of the rulemaking record. And the logic, we believe, is consistent with the application of the other evaluation criteria.

MEMBER BROWN: Can I just make one observation. And this kind of supports a little bit of the Industry's position.

NEI 96-07 goes through and uses, as a basis for their whole approach on the item, Criteria 6, about a page and a half where they go through 3.3, 3.12, 3 point, the NRC endorsed those almost 19 years ago. So NEI 96-07 was endorsed without exception, without clarification in 2000. In the initial Reg Guide 1.187.

So there is a past, a history, that's all I'm saying, of the utilization of these thoughts. These engineering thoughts, design basis thoughts, what are malfunctions, what are design functions, et cetera, as well as the safety analysis for the last 19 years.

So, we have accepted, at least NRC has accepted that at some point, as some of the criteria used for evaluation. So it's all in there, it's just a matter of how you tweak the nuances of how you use it.

Are there any more questions? You're complete, Kati? I'm sorry, I interrupted you.

MS. AUSTGEN: Yes, we're done. Thank you.

MEMBER MARCH-LEUBA: I'm confused.

CHAIRMAN RICCARDELLA: I'm more confused now because I don't think I understand what the disagreement was.

MEMBER BROWN: I'm like, it seems to me I agree with you, Dennis. I think there's some realm that seems to me that the Staff and NEI can come up with a way of phrasing that exception in a manner that would end up being acceptable to both parties. And allow it to be, to move on.

But it's not up to us to try to tell them

how to do that.

MR. GEIER: We're very hopeful that by using some examples in this meeting on June 25th, it will help bring some --

MEMBER BROWN: Examples of how it doesn't work, one way or the other would be

MEMBER BLEY: Both ways.

MEMBER BROWN: -- both ways, would be very, very helpful. In other words, examples that won't work relative to their thought process and therefore they're concerned and thought process for yours relative to your concern.

CHAIRMAN RICCARDELLA: Or an example that would pass on the Industry's interpretation but not pass on their --

MEMBER BROWN: And be a problem under theirs.

CHAIRMAN RICCARDELLA: Yes. Yes.

MEMBER BROWN: Okay. That's the crux of the thing.

MEMBER MARCH-LEUBA: And that would be a public meeting so the slides will be available?

MR. GEIER: That's correct.

MEMBER RAY: By not pass, Pete, you mean would not require an amendment?

MEMBER BROWN: Yes.

CHAIRMAN RICCARDELLA: That in accordance with the Industry interpretation wouldn't require an amendment, but in accordance with the Staff's interpretation would.

MEMBER RAY: Right. I should have said --

CHAIRMAN RICCARDELLA: I'd like to see an example of it.

MEMBER RAY: -- to pass means not requiring an amendment.

CHAIRMAN RICCARDELLA: Yes.

MEMBER BROWN: I'm done. Should we go on to go to public comments?

CHAIRMAN RICCARDELLA: Yes.

MEMBER BROWN: Is the line open, Kathy?

(Off microphone comment.)

MEMBER BROWN: Okay. I guess I can do that simultaneously. Is there anybody in the audience that would like to make a comment? Based on --

MR. LEWIS: My name is Marvin Lewis.

MEMBER BROWN: Hold on just a minute. I don't see anybody from the room that wants to make a comment.

Public line is open. Can you, I think I heard somebody, could you say something again to make

sure it's open?

MR. LEWIS: My name is Marvin Lewis. Can you hear me?

MEMBER BROWN: Yes, thank you very much. Okay, if there is anybody on it we can go ahead and start and make some comments from the public. Marvin, since you answered you're first.

MR. LEWIS: Yes, I've been listening as best as I can, and I was listening when you were talking about backups and separation of trains and stuff like that. And it seems to me that you're ignoring the problem and asking for a verbal solution. Just solving the problem by words.

That might be a real, real problem. And that's, you know, software, hardware, computer digitalization is one thing, but having two trains of tables going across the floor separated by a certain amount or a two sets of valves and two sets bypasses, or whatever, it's real.

And I don't hear anybody saying, let's go out and take a look at the SSC. The actual item we're talking about. Thank you.

MEMBER BROWN: Okay, thank you very much, Marvin. Thank you, Marvin. Is there anybody else on the public line that would like to make a comment?

Hearing none I will pass this back to you, Pete.

CHAIRMAN RICCARDELLA: Okay, thank you. We'll recess the meeting until 1:15. Not much time for lunch, but the cafeteria is closed so it doesn't matter.

MEMBER REMPE: Again.

(Laughter.)

MEMBER BROWN: Exactly. Kati, thank you.

Oh, I didn't thank you all. You all did a nice job of providing your side of the story and I wanted to thank the Staff for their observations and stuff today. I think a lot of information came out, so very good.

(Whereupon, the above-entitled matter went off the record at 12:59 p.m. and resumed at 1:16 p.m.)

CHAIRMAN RICCARDELLA: The meeting will now come to order. We're going to review several chapters of the NuScale DCA, and I'll turn the meeting over to Subcommittee Chairman Mike Corradini.

MEMBER CORRADINI: Okay, thank you very much for turning it over. We're going to start our afternoon session, which will go for four plus hours, if we can hold it to that. Which is my plan.

We've arranged this in a manner where NuScale will start us off with a few items. But then

move of their presentation will be in closed session at the end, since we had asked them for certain things from the Subcommittee.

I think most of the Committee was at the Subcommittee meetings in mid-May. I think two or three members weren't, so they'll kind of go along for the ride.

So, Rebecca, are you going to lead us off?

MEMBER REMPE: Before you do that, Dr. Corradini, I think you and I need to acknowledge that because of some prior work we did that we have to limit our participation regarding Section 19.2 in the deliberations for this meeting, right?

MEMBER CORRADINI: Right. Rebecca, are you going to start us off?

MS. NORRIS: Yes. I will be doing this entire presentation.

MEMBER CORRADINI: Okay. Oh, I'm sorry. And I was supposed to check to make sure your colleagues at NuScale are on the line and the phone line. So, is NuScale subject matter experts back in Corvallis on the line?

PARTICIPANT: Yes, we are.

MEMBER CORRADINI: Okay, thank you very much. I should have checked on that at the very

beginning. Rebecca.

MS. NORRIS: Thank you. Good afternoon, everyone, I am Rebecca Norris. I am a licensing supervisor for this chapter, Chapter 19, Probabilistic Risk Assessment and Severe Accident Evaluation.

So, the objective for this open presentation, specifically, is not to be a technical presentation. Hence why I do not have any of my subject matter experts up here with me.

This is just a schedule of the technical responses we have planned for all of the questions we have collected from ACRS so far. That have been submitted through the Staff or directly in the meetings.

So, the three venues that we have to answer questions are this afternoon in the closed session, the June 18th through 20th Subcommittee, which is Chapters 6 and 15 specifically, to answer some of the questions that have come up.

MEMBER CORRADINI: 3, 6 and 15.

MS. NORRIS: 3, 6 and 15, yes. And then the July 23rd through 25th visit to Corvallis for some, I believe most of the ACRS members will be going.

So, the topics we plan on covering, with

regard to Chapter 19 and these venues are in the afternoon. We're going to be covering the passive safety system reliability evaluation.

And then June 18th through 20th we'll have ECCS, valve operation internals. We have a specific slide animation that was requested that we apparently showed at a much earlier ACRS meeting. And we have all that lined up.

Also, the Target Rock inspection of the ECCS valves is going on this week. So hopefully that week we'll have some insights from there. Just early insights.

MEMBER CORRADINI: Remind me, Target Rock is the location where the ECCS valves are being manufactured?

MS. NORRIS: Yes. Yes, that's correct.

MEMBER CORRADINI: Or tested. Tested.

MS. NORRIS: Tested.

MEMBER CORRADINI: Okay, thank you.

MS. NORRIS: So, for the Corvallis visit is actually when we have most of our PRA items lined up to be spoken about.

So, first on the list we have the ECCS valve design. Specifically, basically all the proprietary material that we can easily show you in

Corvallis. Detailed drawings, electrical drawings, things like that.

We also, for PRA analysis, we have the list of questions that are on the slide. We have a more detailed list that was sent out through emails with the ACRS staff members, Mike Snodderly and Steve Pope on our end.

And so, if anybody has any more questions or additions or clarifications to that, please let us know either during the meeting today or you can email through the normal channels with Mike Snodderly.

In addition to this, we got a couple of days ago Member Rempe's questions. I think we had two specifically.

They were with regard to multi-module response with shared systems, faults basically. We did send a response email with very, a very short answer to that. I'm sure we'll be in some more communications regarding that question.

If we don't, if we need to further answer the question, we plan on doing it during the 23rd through 25th site visit.

The other question was on the sensor diversity, specifically with the level sensor and the reactor pressure vessel. And we also plan on

answering that during the July site visit as well.

Oh, I think I actually got that backwards. We sent an email regarding the sensor diversity question, we haven't sent any information on the multi-module response yet.

And that is actually all I have for this. For this presentation. So, request if there are any clarifications, questions, anything like that on the schedule.

MEMBER CORRADINI: Members, any questions? Hearing none, let's move on.

CHAIRMAN RICCARDELLA: But you'll be here during all of the Staff discussions of the chapters we're reviewing --

MS. NORRIS: Yes.

CHAIRMAN RICCARDELLA: -- at this meeting and if some questions come up you can --

MS. NORRIS: Yes. So both everyone in person and also on the phone. We'll have --

MEMBER CORRADINI: Yes, there's other in the room --

CHAIRMAN RICCARDELLA: Good.

MEMBER CORRADINI: -- backing her up.

CHAIRMAN RICCARDELLA: Okay, very good.

MS. NORRIS: That is true.

MEMBER CORRADINI: Okay, thank you, Rebecca.

So, we'll begin first with Chapter 3.9.2 from the Staff. Members should have those handouts in front of them.

I recognize some of the parties moving to the front of the table.

MS. VERA: Okay, good afternoon everyone. My name is Marieliz Vera and --

MEMBER CORRADINI: Do you have a green light on? Nope.

MS. VERA: Good afternoon, everyone, I'm Marieliz Vera. I'm the project manager for Chapter 3 of the NuScale DC application. Today we're going to present the Section 3.9.2 dynamic testing and analysis of system, structure and components.

The review team is Yuken Wong, Dr. Steve Hambric and Dr. David Ma, that is in the audience, and the project manager, Greg Cranston is the lead project manager.

And I'm going to turn the presentation to Yuken.

MR. WONG: The Staff reviewed Section 3.9.2 in accordance with the standard review plan and Reg Guide 1.20. Which is the comprehensive vibration

assessment program for reactor internals.

We sent the review of two areas. The first one is the dynamic system analysis of reactor internals and the Service Level D conditions. Level D is the fault condition involving the simultaneous safe shut down earthquake and hybrid events.

The second area is the reactor internals comprehensive vibration assessment program, or CVAP.

Next slide please. I will present the four open items related to the NuScale power module dynamic analysis under Service Level D conditions.

The NuScale power module, or NPM, was analyzed for six months initially. However, these ones did not consider the case of 130 percent nominal NPM stiffness.

The Staff raised the concern that in addition to shifting the NPM stiffness down 30 percent, the analysis should also consider shifting the NPM stiffness up 30 percent in order to account for the uncertainty in the NPM input and assumptions.

In response to the NRC concern, NuScale performed 12 seismic runs, including a test with 130 percent nominal NPM stiffness. The results are documented in Revision 2 of the seismic report and it is currently under review.

This figure shows the reflector blocks. They are stacked and restrained horizontally, but not vertically.

The lower core plate vertical in-structure response spectra acceleration at the high frequency end exceeds the gravity acceleration. As a result, the reflector blocks may uplift during a seismic event.

However, this uplift was not considered in the original analysis. In response to NRC concern, NuScale relies the ANSYS model to simulate the uplift of the reflector blocks from the lower core plate.

The Staff reviewed the modeling methods and results and found them acceptable. And this open item is now resolved.

The next slide.

CHAIRMAN RICCARDELLA: When they did that analysis, did it show any uplift? Did any of those ANSYS elements open up?

MR. WONG: Yes. There is small uplift of the reflector blocks. And then there are not enough to close the gap between the reflectors and the upper core plate.

And that uplift and consequent impact will be, that level will be considered for the fuel

assembly analysis.

CHAIRMAN RICCARDELLA: Thank you.

MR. WONG: During refueling, NPM will be placed in the reactor flange tube for disassembly. NuScale updated the ANSYS model to simulate the uplift of the NPM from the reactor flange tube during a seismic event. The results are documented in Revision 2 of the NPM seismic report and it is currently in the review.

Next one please. The last open item. The Applicant provided the level D stress evaluation results of reactor vessel internals and steam generator components in a RAI response, however, there is, the results are based on the original six seismic runs.

NuScale will update our results based on the new in-structure response spectras from the 12 seismic runs. The Staff will review the supplemental response when it is available.

And now I'm going to turn over to Dr. Hambric to discuss the CVAP.

DR. HAMBRIC: Hi, I'm Steve Hambric from Penn State and we reviewed the usual flow induced vibration phenomena that you would for a design application.

The good news is, there's a couple of phenomena that traditionally have been issues for reactors, are not for NuScale. And the first is turbulence buffeting.

The reason that's not a big concern is that flow rates are much, much lower than what you would expect. Or what you would get in a typical reactor due to the natural recirculation, the small size. So there's not of focus been put on that.

Flutter and galloping, they just use good design practices to make sure that any structure and cross flow has plenty of margin against that sort of thing.

There are some mechanisms that we found low margins of safety. And that's what we're going to focus our time on today.

The first is vortex shedding. So there's cross flow again but over a body where vortices form. And the frequency of those vortices could line up with a structural resonance. They lock into each other and bad things happen. A strong vibration, impact, high stresses, things like that.

An even worse phenomena is fluid-elastic instability. In this case it would be associated with the steam generator, a raise of tubes where the lock-

in continues into the different tubes, all combining with each other and causing an even higher vibration and contact. Again, things you don't want to happen in a reactor.

CHAIRMAN RICCARDELLA: I would expect those would be mitigated somewhat by the lower flower as well, would they not?

DR. HAMBRIC: We'll talk about that.

CHAIRMAN RICCARDELLA: Okay.

DR. HAMBRIC: But the margin that they currently have is on the low side.

CHAIRMAN RICCARDELLA: I apologize, I'm the lead in this section but I was not able to be here during Subcommittee meetings, so I might be asking some questions that you have already asked.

DR. HAMBRIC: That's fine.

MEMBER CORRADINI: But he has all your slides and he's studied them --

CHAIRMAN RICCARDELLA: Yes, I did.

MEMBER CORRADINI: -- extensively.

DR. HAMBRIC: So this is a test. That's good. I think we've kept some of them as backups so we should be able to --

CHAIRMAN RICCARDELLA: Yes, understand.

DR. HAMBRIC: They are, NuScale is putting

significant resources in trying to retire this risk that's associated with some testing. And we'll talk about it in a few slides. But we will be going over to witness part of it.

CHAIRMAN RICCARDELLA: The TR-3 testing.

MEMBER KIRCHNER: And, Mike, just a procedural question. Can we get into detail on any of these or is this being saved for the closed session?

MEMBER CORRADINI: They'll tell us when we get into closed territory, but my answer is, most of this I think is open. The slides that were discussed in the main meeting were all open.

DR. HAMBRIC: Yes, I think, correct me if I'm wrong, as long as we don't get into specific numbers or design parameters or things like that, then we should be okay. But I'm sure NuScale will chime in if we're --

MEMBER CORRADINI: Yes, they'll stop us when we stray.

DR. HAMBRIC: Yes.

MEMBER CORRADINI: Okay.

DR. HAMBRIC: NuScale also did a pretty thorough assessment of the possibility of acoustic resonance. This is flow instability over openings and pipes locking into acoustic resonance.

This is what caused all the trouble in the Quad Cities plant and the steam dryer issues. So there are a few locations that they want to keep an eye on that they'll be doing some initial startup testing addressed.

CHAIRMAN RICCARDELLA: And that's driven by secondary flow which isn't that low, right?

DR. HAMBRIC: Right.

CHAIRMAN RICCARDELLA: Those concerns, yes.

DR. HAMBRIC: Mainly the steam. And the final mechanism is the leakage flow and stability. Those are usually in trained objects inside passages. We've had very narrow flow passages and so instability is performed.

And with all of these, you have an instability vibrating at a certain frequency coupling to some sort of resonance, either acoustic or structural. And if the frequencies align and the stars align, then we can lock-in and bad things can happen. So we'll go through each of those.

The open items that are in the SER are associated with some concern that we have with the analysis procedures NuScale has used and the particular non-conservatism. And also, the testing

for the plant. Or non-plant.

So, we got a slide here on analysis concerns and another one on testing.

The analysis concerns we've kind of boiled down into two main ones and then a secondary one. The main one is, where they're coming up with their flow velocity estimates. And they're structural resonance questions.

So, to assess any lock-in problem we need to know both how fast the flow is moving, and that tells you what frequencies the flow instabilities are oscillating at. And then how the structures are vibrating, what frequencies they're resonating. And we'll looking for alignment and some other things.

So, the flow modeling non-conservatisms we found were associated with a rough CFV assessment that they did. It does not include all the details of all the components.

So for example, the steam generator's model is sort of a big heat sink. There's really no localized philosophies computed through the individual tubes. And their assumption of some uniformed velocity could very well be violated in certain locations.

Any literature you see in steam generator

tubing arrays will show you that the velocity is not uniformed. There's some parts for the flow that was faster. Those are the parts we care about. And some are slower. That has not been assessed so far.

Structural modeling, they use finite element analysis, which is fine, but a couple of things that we're waiting for answers on is a mesh resolution study to make sure that the meshes are refined enough to give us accurate resonance frequencies. Of course, meshes tend to give you high frequencies, which was not conservative.

And then we've had a lot of discussion about some of the boundary conditions that they've assumed on some of their structures. And in particular, some components we'll get into in a moment where they assume they had pin supports.

Any time a tube goes through a hole, for example, and there's actually a gap between the tube and the hole. And so we're discussing that in some of our open items.

Now, the final secondary comment was, so far they have only assessed margin against these sorts of lock-in phenomena. How much percent margin do they have between, for example, a resonance frequency and a full ex-citation frequency.

But what you'll see in a minute, the margins are actually kind of small. And when they get small, we need to do more than that. We need to actually do a force response analysis.

If those frequencies are close, you're going to have a higher amplitude vibrant than you will if there's just turbulent buffeting, for example.

MEMBER CORRADINI: So, I'm sorry. No, go ahead.

MEMBER MARCH-LEUBA: No, I'm talking about something else.

MEMBER CORRADINI: Oh. Your point is, is if they start overlapping, you got to do more of a non-linear analysis. If they're far apart you can get away with --

DR. HAMBRIC: It's probably even linear. But still, it's not doing anything right now.

MEMBER CORRADINI: Okay.

CHAIRMAN RICCARDELLA: -- response peak, you're saying if they're not right on, if they're just, if they're a little bit off that peak, you still get some --

MEMBER CORRADINI: Right.

DR. HAMBRIC: Yes. It wouldn't necessarily be a lock-in, but you're going to get a

higher vibration than you would with just turbulent buffeting. That has not been assessed so far.

MEMBER MARCH-LEUBA: And then the non-linear effects will align them.

DR. HAMBRIC: Yes. So I think the idea is, they want to make sure there's margin so there are no non-linear effects --

MEMBER MARCH-LEUBA: Yes.

DR. HAMBRIC: -- but even so, the linear effects must be accounted for. And that's an open item that we have.

CHAIRMAN RICCARDELLA: But the margins are just based on frequency rations?

DR. HAMBRIC: Yes.

CHAIRMAN RICCARDELLA: Okay.

DR. HAMBRIC: Critical velocities, critical frequencies, factors like that.

MEMBER MARCH-LEUBA: Because, NuScale, and you haven't done the slides, NuScale has a specific characteristic that you can only have flow if you have nuclear power.

DR. HAMBRIC: Right.

MEMBER MARCH-LEUBA: So you can only test if you get 100 percent power.

DR. HAMBRIC: Yes, exactly.

MEMBER MARCH-LEUBA: How would they identify that it's one of these things?

Because you cannot put sacrificial instrumentation, like you do on other things because it will stay in the primary --

DR. HAMBRIC: Right.

MEMBER MARCH-LEUBA: -- for a couple of years. So, have they considered anything to detect in case you were wrong?

DR. HAMBRIC: Yes. So we'll have some of that.

MEMBER MARCH-LEUBA: Okay.

DR. HAMBRIC: You're exactly right.

MEMBER MARCH-LEUBA: Good to know.

DR. HAMBRIC: So in fact, the next slide is testing concerns. One of the things that stuck us when we first got the application is there is very little benchmarking in testing.

Now, the reason for the reduced benchmarking is, if you look at past applications, applicants have spent a lot of time and money on trying to sort out the strength of turbulent buffeting flows, because the flows are so fast. The flows do become important.

That's not the case here so the testing

really isn't necessary.

So now we're looking at just essentially testing for these possible lock-in problems, which is much trickier and they're really hard to benchmark.

The other thing, as you just mentioned, Jose, is that it's a natural circulation plant and there's really no way, before they load fuel, to get hot flow going in prototypic flow conditions over these components in a real reactor.

CHAIRMAN RICCARDELLA: You can do stuff with electrical heating, can't you?

DR. HAMBRIC: They could but it would be --

CHAIRMAN RICCARDELLA: Very expensive.

DR. HAMBRIC: -- expensive, difficult, maybe not good enough.

CHAIRMAN RICCARDELLA: Yes.

MEMBER MARCH-LEUBA: 300 megawatt is a lot of power.

MEMBER CORRADINI: I guess I want to make sure I understand. You want to be at full power or you can be at partial power and see some of these things?

DR. HAMBRIC: No, no, you need to be, in fact, probably beyond the full power.

MEMBER CORRADINI: Okay. So you can't do it at part --

CHAIRMAN RICCARDELLA: You can't get the flow without the --

MEMBER CORRADINI: I understand that. I understand that, but I'm asking --

CHAIRMAN RICCARDELLA: I'm sure you knew it.

MEMBER CORRADINI: But I can't approach any of these phenomena with what they're normal heat up system is, which is the aux boiler coming up to like 20 percent or something.

DR. HAMBRIC: Not in a test.

MEMBER CORRADINI: Okay, thank you.

DR. HAMBRIC: So, after a lot of discussions, very helpfully discussions, we came up with, NuScale came up with an approach that we think we're happy with, but we still have some boxes to check to make sure of that.

The initial startup test, let's do these bullets in reverse order, is more focused on, what if they're wrong. So, it's not trying to benchmark any particular mechanism or measure anything in particular, it's to see if something bad is happening in spite of all of their best efforts, in spite of all

our best efforts to ensure that nothing will.

So, we are still waiting to see their instrumentation plan, but the idea is to put enough instrumentation in the initial reactor, the prototype reactor, so that if something happens they can identify it, number one, and number two, localize it. And then number three, presumably mitigate it.

So that is the goal. This is going to require --

MEMBER MARCH-LEUBA: No, that instrumentation is going to end up in the core as a loose part.

DR. HAMBRIC: Well, that's if something horrible happens, yes.

MEMBER MARCH-LEUBA: No, no. With all the tubes failing, the instrumentation fails all the time.

DR. HAMBRIC: Oh sure.

MEMBER MARCH-LEUBA: And becomes a loose part. Oops.

DR. HAMBRIC: Because that actually probably should be something that we ask them in their test plan is, what is your plan for making sure there are no loose parts in your reactor in case something does come loose.

MEMBER MARCH-LEUBA: Well, fortunately the

flow is so low that most of those parts will end up in the bottom of the lower plenum.

DR. HAMBRIC: Okay. Well, that's --

MEMBER MARCH-LEUBA: And they won't be carried.

DR. HAMBRIC: But still, that's a good point. We should ask them.

MEMBER MARCH-LEUBA: Yes, we definitely have to have a plan for when it breaks, what do you do.

DR. HAMBRIC: Okay. Okay.

MEMBER MARCH-LEUBA: Not if it breaks but when it breaks.

DR. HAMBRIC: So, that is still something we have not reviewed yet. They have agreed to do this instrumentation plan, they've agreed to do the initial startup test, and we have not sign the final plan yet. So that is pending review.

Accompanying that initial startup testing are some focused tests, which we'll get into in a moment, to really go after a couple of the key mechanisms. One with the steam generator, and two with the steam generator inlet flow restrictors. And I'll talk about both of those.

Okay, go ahead please. All right, so here

are the components with low margins of safety. These are imagines drawn from NuScale documents.

The top one is obviously the helical coil steam generator. A couple open items on that. And they were concerned about both vortex shedding as well as fluid-elastic instability.

So, the vortex shedding is restricted to the very bottom tubes. And those are the tubes where vortices can actually form. Anything upstream of those tubes the vortices can't form because there's another tube in the line. So you really have to have an open space --

MEMBER MARCH-LEUBA: And this vortex is performed on the primary, outside the tubes?

DR. HAMBRIC: Yes.

MEMBER MARCH-LEUBA: Or inside the tubes?

DR. HAMBRIC: Outside the tubes.

MEMBER MARCH-LEUBA: Okay.

DR. HAMBRIC: Yes. We do have some questions about the insides of the tubes, but they're not as important as these. But they are in the safety evaluation report.

CHAIRMAN RICCARDELLA: So that's what's separated by your red arrow?

That's what's separated by your red versus

blue?

DR. HAMBRIC: No. That's, again, a picture from the NuScale document. I just put the red arrow in there to say that's the direction of flow.

CHAIRMAN RICCARDELLA: Oh.

DR. HAMBRIC: So the blue are actually their supports. So they've got these long --

CHAIRMAN RICCARDELLA: Yes.

DR. HAMBRIC: -- pretty complicated support structures with little clips that all of the tubes kind of pop into.

CHAIRMAN RICCARDELLA: But you said that the vortex shedding was restricted to certain areas, could you kind of point to that on the --

DR. HAMBRIC: Actually, right where that red arrow is. It's the very bottom two.

CHAIRMAN RICCARDELLA: All right.

DR. HAMBRIC: So if there's open water downstream of the flow, then you can have vortex shedding. So we compute --

MEMBER KIRCHNER: These margins are based on your calculations or their calculations?

DR. HAMBRIC: These are NuScale reported margins.

MEMBER KIRCHNER: Okay.

DR. HAMBRIC: Our assessments of possible non-conservatisms of flow velocities and boundary conditions and damping take away those margins. And that's what we're concerned about.

Now, NuScale will argue that they have put lots of extra conservatism in their other parameters, so that these margins, in their eyes, are conservative.

MEMBER KIRCHNER: Thank you.

DR. HAMBRIC: But that's still a point of debate between us. That's why we have open items and we continue --

MEMBER KIRCHNER: And, again, be a little precise here. When you say takes away the margin, your calculations would indicate they have FEI or vortex shedding?

DR. HAMBRIC: If we work with the numbers they're giving us --

MEMBER KIRCHNER: Yes.

DR. HAMBRIC: -- and then go to the open literature and check other people's thoughts about what critical velocities are, what the velocity distribution in the steam generator might be. Yes, margin as well.

CHAIRMAN RICCARDELLA: These are margins

on flow velocity or on frequency or --

DR. HAMBRIC: Margins against lock-in between the flow phenomenon and the structural resonance.

CHAIRMAN RICCARDELLA: Which, yes, which means frequency differences?

DR. HAMBRIC: Yes. Essentially, yes.

MEMBER BALLINGER: If I look at ten percent margin, I ask myself, what's the uncertainty on the analysis.

DR. HAMBRIC: Yes, they in fact have been working on deriving uncertainties in their measurement inspection plan. But they would argue that the uncertainty is being moved artificially close to the margin because they've put so much conservatism in.

MEMBER BALLINGER: Okay.

DR. HAMBRIC: Yes.

MEMBER BALLINGER: So conservatism --

MR. GEIER: So you got bias and conservatism and you've got uncertainty.

MEMBER BALLINGER: Okay. So it's really not margin, you need to put more words in there that it's estimated margin given uncertainty or something like that.

DR. HAMBRIC: Yes, they provide a, two

margins. One, which is based on their best engineering estimate, and one which they say is worst case.

MEMBER CORRADINI: Which is this, maybe that's --

DR. HAMBRIC: This is their worst case.

MEMBER CORRADINI: Okay. That's what I thought.

MEMBER BALLINGER: Is the best estimate more proprietary?

DR. HAMBRIC: I'm not sure and I honestly don't remember what the best estimate results are.

MR. WONG: I recall NuScale mentioning in a subcommittee meeting here, that the latest update, that has not been provided to the NRC shows, around 60 or 80 percent.

MEMBER BALLINGER: I think I remember --

DR. HAMBRIC: But we have no seen those yet.

MEMBER MARCH-LEUBA: Didn't NuScale, I know they have measured the pressure drops across the simulator, and heat temperature coefficient, so they have a vape. I mean, don't you have a actual heat exchanger with pump somewhere?

DR. HAMBRIC: Sorry?

MEMBER MARCH-LEUBA: Yes. Didn't you guys test the heat exchangers on an outside loop to measure pressure drops and heat temperature coefficients?

(Off microphone comments.)

MEMBER MARCH-LEUBA: Yes, but did you look for --

DR. HAMBRIC: Yes.

MEMBER KIRCHNER: -- that loop is still available?

MEMBER CORRADINI: Yes, you got to come to the mic if you're going to answer him, otherwise we'll just wait to hear from --

DR. HAMBRIC: Right. So, they've done initial tests for those sorts of things, but the test that they're going to do will address these concerns. And that's what we've talked about.

MEMBER MARCH-LEUBA: What I don't understand is they have a loop, a dedicated loop with other reactor where they can pump flow through the simulator.

DR. HAMBRIC: Oh, right. That gives them their heat exchange coefficients and loss and --

MEMBER MARCH-LEUBA: But yes, it will also give you all this vibration.

DR. HAMBRIC: Well, if they instrumented

it to do so. And if the supports --

MEMBER MARCH-LEUBA: That's what I was asking, if it's still available.

DR. HAMBRIC: And if the supports are prototypic --

MEMBER CORRADINI: I think you want to hold off where he's going with this because I think there's going --

DR. HAMBRIC: All right.

MEMBER CORRADINI: -- we're going to talk about.

CHAIRMAN RICCARDELLA: At this relatively early stage of design, aren't there things that could be done to change natural frequencies if it turns out to be a problem?

DR. HAMBRIC: Yes. And that's one of the things that we're hopefully that the new test will show us. That maybe those natural frequencies are higher than are currently estimated.

CHAIRMAN RICCARDELLA: Yes. Yes. But I mean, you could put in another support or something to --

DR. HAMBRIC: And we'll talk about the supports.

CHAIRMAN RICCARDELLA: -- increase, all

right, good.

DR. HAMBRIC: Okay. So these margins are older. We know that NuScale is working to improve them but we don't have the final, latest numbers to talk about.

But again, we'll talk about the testing that they're going to do to hopefully retire these risks to our satisfaction.

CHAIRMAN RICCARDELLA: Okay.

DR. HAMBRIC: In a couple slides. The other components that are in cross flow are the control rod drive shafts. There's two pictures that were in the right there at the bottom. The CRDS's are on the right.

And then the in-core instrument guide tubes are on the left. And both of these are tube arrays with pretty wide separation. There's no chance of fluid-elastic instability of these.

But they all get threaded through these holes and there's a support grids that you can see in the pictures.

And the concern here is vortex shedding. And the flow comes upward through the core. And then at the very top it has to move radially outward and then work its way down through the heat exchanger. So

it's up at that top part that the rods are in crossflow.

And current analyses show a less than 25 percent margin, for both components, against vortex shedding. And that is something we have open items for.

MEMBER MARCH-LEUBA: Will this be worse, sorry, go ahead.

MEMBER BLEY: No, go ahead.

MEMBER MARCH-LEUBA: Will this be worse with liquid water or with the steam?

Because under so much conditions should you uncover part of the steam generator or --

DR. HAMBRIC: It would be with the water.

MEMBER MARCH-LEUBA: Water makes it worse?

DR. HAMBRIC: Yes.

MEMBER MARCH-LEUBA: I would assume so but --

DR. HAMBRIC: Yes, definitely water.

MEMBER BLEY: Now you said, if I understood right, the vortex shedding is an issue at the reactor coolant system outlet coming down?

DR. HAMBRIC: Well, it's right where those red arrows are.

MEMBER BLEY: Oh, up at the top.

DR. HAMBRIC: Yes. It's on the way to --

MEMBER BLEY: Where you have the crossflow?

DR. HAMBRIC: Yes.

MEMBER BLEY: Okay. So up there you get some real vibration problems if you have the --

DR. HAMBRIC: Flow comes up, it goes our radially and then it goes back down again.

MEMBER BLEY: Okay. I was looking at the wrong one. That makes sense.

DR. HAMBRIC: Yes, I think there's a black arrow that they're, I pulled these from NuScale drawings. That's probably calling something.

MEMBER MARCH-LEUBA: And while we're bothering you, I mean, the inside of the tube you have the boiling. When I boil water in my kitchen it goes the whole thing, the whole pot moves.

(Laughter.)

DR. HAMBRIC: In the helical coil steam generator tubing yes. Yes. That's actually another open issue we have didn't make the cut for this presentation. But they've done internal flow measurements where we have seen some strong pulsations that are --

MEMBER MARCH-LEUBA: But does that --

CHAIRMAN RICCARDELLA: With boiling inside the tubes.

MEMBER MARCH-LEUBA: -- give you the proper frequencies?

DR. HAMBRIC: I have no idea. They're getting back to us on that. There is a characteristic frequency that shows up in the internal flow pressures, and the question is out to them, what does that mean in a structural response and is it important.

Okay, next slide. All right, the last component of a significant interest are the steam generator flow restrictors. The bottom there's one of them. And up on the top you can see the full array.

And that big structure, very carefully, gets feed into all of the steam generator inlet tubes. And what these restrictors are meant to do is prevent something called a density wave oscillation mechanism from occurring in the entire steam generator.

And this is a pretty unpleasant instability. It happens at extremely low frequencies but it's not something you want in the plant.

But putting these restrictors in eliminates that problem. However, NuScale spent a fair bit of effort making sure to introduce another

problem that's a leakage flow instability.

So if you look at that picture at the bottom, imagine the flow migrating from the small cross-sectional area part to the fatter cross-sectional area part.

MEMBER MARCH-LEUBA: And you can use the mouse to point, it will help a lot.

DR. HAMBRIC: Oh, I'm sorry. Okay, so imagine the flow getting squeezed through that annulus. So there's a tube that goes, the steam generator tube surrounds this.

And as it expands beyond it, you get pulsations in the loading. And we need to make sure that those pulsations, the frequencies of those pulsations, don't correspond to the cantilever beam mode of this entire structure. And lock-in and amplify the pulsations and amplify the vibration and cause problems.

MEMBER BLEY: And these are in every tube?

DR. HAMBRIC: Every tube.

MEMBER KIRCHNER: Every tube.

DR. HAMBRIC: Every single one.

MEMBER BLEY: Is this done elsewhere? I've never seen anything --

MEMBER KIRCHNER: These have been tested

as prototypical conditions.

DR. HAMBRIC: The design that is, was chosen, was selected from several that were tested in somewhat prototypic conditions. So they built a fixture and then stuck a whole bunch of design concept into the fixture, ran extremely high flow through them, much higher than they'd expect to see in real operations, and picked the one that showed almost no vibration whatsoever.

Tweaked the design a little bit, and because of that tweak they're going to go and do a final test of just this design. In the same sort of a fixture but with a lot more instrumentation, a lot more care.

And the test plan and the procedures and instrumentation have all been submitted as part of their measurement inspection program. We've evaluated it. It seems sounds to us. We're doing our final checks now but this looks to us like they're on a pretty good path to success.

MEMBER BLEY: So, when you have one of these in a tube, how is the widest diameter of this restrictor compare with the inside diameter of the tube? How much space was the clearance?

DR. HAMBRIC: Oh, the clearance. I've

forgotten that. It's tight. Can someone from NuScale address that?

MEMBER CORRADINI: Look, before we start banting numbers --

DR. HAMBRIC: Oh, that's true, thank you. Thank you.

MEMBER KIRCHNER: It's very tight.

DR. HAMBRIC: But in their suite of components that they've evaluated, they evaluated a parametric study like that. They vary gap width, they vary number restrictors, light between restrictors. They did a pretty thorough job assessing those issues.

And I'm sure that flow throughput was important to them. They didn't want to over restrict the flow otherwise they wouldn't get the power out of the reactor.

MEMBER BLEY: You said these kind of restrictors are used in other steam generators?

DR. HAMBRIC: Well in other, yes, sure.

MEMBER BLEY: Like conventional steam plants?

DR. HAMBRIC: Yes, flow restrictors are a common device to --

MEMBER BLEY: I think an orifice --

MEMBER MARCH-LEUBA: We know something

about density, the other ones we don't, but density we do. And they typically use orifice in the reactors.

DR. HAMBRIC: Yes, the orifices were, anything at all to add resistance.

Okay, so the next test is the more involved one. And this is what is still under Staff review and will be for a while.

MEMBER CORRADINI: This test, just for clarification, this test program you're going to be speaking about is, from a planning standpoint is, after the DCA will be evaluated and passed, this will be a construction item?

DR. HAMBRIC: Well, part of it.

MEMBER CORRADINI: How does this fit in, in terms of where it is in time lines?

DR. HAMBRIC: So, half of it we will have in time, we hope, for the final SER. The other half we won't. So I'll get to it on the next slide.

MEMBER CORRADINI: Okay, sorry. Thank you.

DR. HAMBRIC: So, earlier tests of steam generator mockups have been mainly thermal hydraulic oriented with minimal instrumentation. And also the supports of the tubes were not prototypical.

This is intended to be a flow induced

vibration specific test. Where they've spent a lot of effort to making sure that the supports, these clips that you can see in their designs are prototypic, that the clearances are prototypic.

They're putting in five rows of tubes, which should be enough to assess fluid-elastic instability. And the instrumentation is significant. With the steam gauges accelerometers, they will be driving these structures in multiple ways.

And Part A of the test is structural dynamic. Where are the resonance frequencies, what are the clip boundary conditions revealing because they're current assessments assume that the clip boundary conditions are quite conservative, pinned almost.

There is some sliding allowed but they're essentially viewing them as a point connection that restricts lateral motion.

In reality, each tube goes to a clip on the bottom and two clips on the top. So it's more like, almost clamped. If it's clamped, all those resonance frequencies go up and all of a sudden, we've got a lot more margin than we thought we did.

So that's a big output from this test.

CHAIRMAN RICCARDELLA: But there's

clearances, right?

DR. HAMBRIC: There is clearances. So one of the big outstanding items we have with them is they're relying on thermal expansion to take away those clearances.

And we're waiting for calculations from them to prove to us that that is true. There is enough thermal expansion to really lock those tubes into those clips and make that boundary condition whole.

Now, they can't do that in this test. So they've come up with sort of a pre-loading gadget, which we haven't seen yet, we're hopeful we will in a couple of weeks, where they will press the tubes against the supports where they force the similar two that they expect to get out of thermal expansion.

It sounds great, but we're waiting for the calculations to prove that that is in fact real. Because that's pending.

That's number one. What are the resonant frequencies and are they higher than expected and can they then take credit for that in their analysis of a real steam generator.

CHAIRMAN RICCARDELLA: What about fretting and wear at those contact points?

DR. HAMBRIC: That's part of the expansion.

CHAIRMAN RICCARDELLA: Yes, I know.

DR. HAMBRIC: Is it tight or not?

CHAIRMAN RICCARDELLA: Well -- you're saying if they get it tight enough that there won't be any fretting?

DR. HAMBRIC: Couldn't be. And if force response is low should we see any vibration. There's a lot of open questions to make us believe that that's going to be the case. If it's tight enough there should not be any motion in the frame.

MEMBER CORRADINI: But this test is crucial to prove out things empirically. That's the way I hear it.

DR. HAMBRIC: Yes. Now, the other key mechanism is damping. So if you look in the backup slides, they're assuming one and a half percent damping for the helical coil steam generator.

In Reg Guide 1.20 we allow one percent. If you go above that, you need proof. And we have not had that yet. They're hoping to prove that here.

If it is indeed one percent or less, than the frequency separation becomes super important. If the frequencies are close and the dampening is low,

then we've got low margin and we need to make sure that works.

CHAIRMAN RICCARDELLA: Will this test address both vortex shedding and fluid-elastic instability?

DR. HAMBRIC: Soon. So, the structure test gets us part way there.

So the next test, which will not be done any time soon, and NuScale has not told us when it's going to happen, will be to turn the flow on and assess whether vortex shedding is happening or fluid-elastic instability is happening.

Now, the great thing about this --

CHAIRMAN RICCARDELLA: What are they going to test without turning the flow on?

DR. HAMBRIC: This is all just structural dynamic tests. Where are the resonance frequencies --

CHAIRMAN RICCARDELLA: Ah.

DR. HAMBRIC: -- what are the boundary conditions.

CHAIRMAN RICCARDELLA: Okay. Okay.

DR. HAMBRIC: Are the boundary conditions stiffer than they are currently assumed.

CHAIRMAN RICCARDELLA: Yes. Yes.

DR. HAMBRIC: If so, that's a good thing.

CHAIRMAN RICCARDELLA: So they're just going to shake it on a shaker table?

DR. HAMBRIC: Or with hammers.

(Laughter.)

DR. HAMBRIC: Well, that's a common dynamic testing method.

CHAIRMAN RICCARDELLA: An instrumented hammer.

MEMBER CORRADINI: Doctor, if they can do it to you, they can do it to the steam generator.

DR. HAMBRIC: They can. That's about, yes, it's pretty analogous. I mean, trying to get a dynamic response out of a hammer.

MEMBER SKILLMAN: Steve, for the situation where they are counting on expansion of the tube, to back the tube into the clip, can the aggregate force of all of the tubes backing into the clip deform the support?

DR. HAMBRIC: I don't know.

MEMBER SKILLMAN: Will they be looking at that?

DR. HAMBRIC: We can ask.

MEMBER SKILLMAN: Well, find out.

DR. HAMBRIC: Okay.

CHAIRMAN RICCARDELLA: It depends, is the

thermal expansion you're talking about just expansion of the dilation of the tube or is it the whole helix expanding?

DR. HAMBRIC: Well the tube will expand, the supports will expand too.

CHAIRMAN RICCARDELLA: Yes.

DR. HAMBRIC: The metal, the clips. And then you got the aggregate. And we haven't seen a calculation so we don't know how much detail to put into it. We've done a localized calculation of the entire array. It's TBD. We're waiting to hear back.

MEMBER MARCH-LEUBA: The one normal operating conditions, there's a density of 63 percent of normal water. For dampening, that would make a big difference, won't it?

DR. HAMBRIC: Very big difference, yes.

MEMBER MARCH-LEUBA: So, do you have any plans, they have any plans for this testing, are they going to use a surrogate fluid or --

DR. HAMBRIC: Oh, the fluid dampening. Yes.

MEMBER MARCH-LEUBA: The dampening will be caused by motion in the water. And if your water weighs 60 percent of normal, it will be different.

DR. HAMBRIC: Yes, there is some extra

dampening you get, but at they are, at the moment, not counting on that. They're assuming that the supports --

MEMBER MARCH-LEUBA: I guess you could scale it.

DR. HAMBRIC: The frictional motion between the supports and the tubing, they are similar to this dampening. But if it's locked in because of thermal expansion, maybe that goes away.

MEMBER MARCH-LEUBA: Yes.

DR. HAMBRIC: These are all questions that we're trying to answer.

CHAIRMAN RICCARDELLA: Yes.

DR. HAMBRIC: And important ones too. So that's boundary conditions and dampening that we'll be able to assess for the final safety evaluation report.

CHAIRMAN RICCARDELLA: Will there be water inside the tubes when you do this?

DR. HAMBRIC: No. The reason for that is because they're instrumenting them and they can't get the wires out unless they got the hollow tubes --

MEMBER MARCH-LEUBA: Will that not affect your frequency? The mass of the tube?

DR. HAMBRIC: Yes, but that's a pretty well understood plenum. Low frequencies, displaced

mass of the fluid isn't enough if it's post --

CHAIRMAN RICCARDELLA: Square root of K over M, something like that, right?

(Laughter.)

DR. HAMBRIC: So, I think we understand how to estimate the effects of internal water and external water. Strong certainty.

So, getting back to the flow tests. The nice thing about this facility that makes it actually better than the real thing, is that they can run the flow much, much higher than prototypic.

And the reason that's a good thing, is that they can tell you, here is the threshold, here is when vortex shedding will happen, here is when fluid-elastic instability happen. That means we have X percent margin.

Now, there is some extra steps they have to take to account for uncertainties and any biases between these tests and the real thing, but still, that would be a huge number to know.

The sad thing is, that is not going to happen before the final SER. So really all we can do at this point is to ensure those flow test procedures are rigorous, that they've got contingency planning in case something happens they can identify it, hope to

resolve it by some sort of design.

MEMBER CORRADINI: Does that become a COL item though for the first plant?

That's what I want to understand. Can the Staff help me there?

MR. WONG: We are concerting the options. One of the options is to have an ITAAC for the completion of the steam generator flow test. Same for the steam generator in that final design.

MEMBER CORRADINI: The restrictors.

CHAIRMAN RICCARDELLA: Yes.

MEMBER CORRADINI: Okay, thank you.

CHAIRMAN RICCARDELLA: An ITAAC is better than a COL.

MEMBER KIRCHNER: Is it possible that, I'm just looking at this nice picture you have here, that the coldest point in the system is going to be the feedwater coming in there right at the tube sheets. Could a cold spot like that cause striking?

Now, granted coming out of the core you've got crossflow and steam generator, so they should have a fairly uniform distribution coming up the riser and turning over and then coming back down. But could that induce a effect of stripping?

MEMBER CORRADINI: I don't think the

problem number is big enough. Or small enough. But it's a really, really, really, water is a terrible thermal conducting fluid compared to what you think of, of stripping, so I can't imagine it would be a big deal.

DR. HAMBRIC: Yes, I don't understand the term.

MEMBER CORRADINI: Stripping means that you're going to get a fluctuation in flow with an appropriate flux --

MEMBER KIRCHNER: And hot and cold spots.

MEMBER CORRADINI: -- a corresponding fluctuation in temperature and you get a hold and cold flipping across the structural middle of that.

MEMBER KIRCHNER: Or just preferential higher velocity right there at the tube sheet.

CHAIRMAN RICCARDELLA: Are you talking stripping inside the tubes or outside?

MEMBER KIRCHNER: Well, outside --

CHAIRMAN RICCARDELLA: In the primary flow.

MEMBER KIRCHNER: -- and the primary flow being impacted. Changing the buoyancy. Being colder at the tube sheet there, dropping the water down preferentially and picking up the --

MEMBER MARCH-LEUBA: The coldest tube where we feed water, the water is getting out. So if you get any value it would be getting out of the tubes, not into the tubes.

MEMBER KIRCHNER: No, no, I'm talking about the primary flow over the tube bank.

MEMBER CORRADINI: I think that's what Jose is saying.

MEMBER MARCH-LEUBA: Yes, but seawater goes on the bottom.

MEMBER KIRCHNER: I know.

MEMBER MARCH-LEUBA: So when it gets there it's getting out.

MEMBER KIRCHNER: Right.

MEMBER MARCH-LEUBA: I don't know anything about it.

MEMBER KIRCHNER: But then they pick up the velocity there. Preferentially.

DR. HAMBRIC: Yes, that's probably a question for a different group.

MEMBER CORRADINI: We'll ask NuScale in the closed session.

DR. HAMBRIC: Okay.

MEMBER CORRADINI: I know what we want.

DR. HAMBRIC: Okay. All right, any other

flow induced vibration questions?

Okay, there's a lot riding on this test, it's quite important. Okay.

Here again are the steam generator and the flow restrictors. And I've already discussed this. The procedures that they have presented to us so far. So reasonable.

And we have pretty high confidence that they'll be able to confirm that their design is not a flow induced vibration issue. But as Yuken said, those results will be available after design certification. Okay.

Initial startup testing will focus on two things. One, in the decay heat removal system there is some steam flow that is passing over openings. And you can see them in the picture there on the right.

And it's possible that there could be some lock-in between the flow and the open. But then NuScale has done things to try to minimize the strength of any sort of lock-in, that would curve the opening, that's the design practice.

But during initial startup testing there will be instrumentation and they will carefully increase the flow and look for possible lock-in points. And if they occur, report them and presumably

come up with a mitigation strategy. There are ways to take care of it if it doesn't work.

MEMBER MARCH-LEUBA: When you say startup testing, you say nuclear in the real reactor?

DR. HAMBRIC: Real reactor. This is all initial startup, yes.

MEMBER MARCH-LEUBA: Because when you were talking before it was a pump.

DR. HAMBRIC: The previous slide is all preliminary, yes.

MEMBER MARCH-LEUBA: But this, now, fortunately all this is in, when the pool is outside the vessel. So, if something breaks --

DR. HAMBRIC: That is, yes.

MEMBER MARCH-LEUBA: -- not a bad problem.

DR. HAMBRIC: Yes. The next bullet is internal.

CHAIRMAN RICCARDELLA: There's a lot of tests, there's a lot of test data available on that. I mean, design the size of a cavity, right?

DR. HAMBRIC: Oh, yes.

CHAIRMAN RICCARDELLA: It's like blowing across the top of a bottle basically.

DR. HAMBRIC: That's correct. So what they have is margin against the primary flow and

stability blocking into an acoustic resonance.

Where they don't have margin is at some speeds, the secondary flow and stability. It's a full wave length the opening it could lock-in.

CHAIRMAN RICCARDELLA: Yes.

DR. HAMBRIC: It's not as strong, but it can be stronger than you think. And we've got plenty of evidence to stabilize.

CHAIRMAN RICCARDELLA: But that's under normal operation, not under DHRS operation, right?

DR. HAMBRIC: Yes.

CHAIRMAN RICCARDELLA: The concern --

DR. HAMBRIC: Well, we're looking at all industry --

MEMBER CORRADINI: I think the way Professor Hambric is asking this is, these are closed ends that they've got to survive with as it's whistling by --

CHAIRMAN RICCARDELLA: Yes.

MEMBER CORRADINI: -- under full power conditions, right? Because --

DR. HAMBRIC: Well, they're going to check all power conditions.

MEMBER CORRADINI: But you would expect it at full power conditions, will you?

CHAIRMAN RICCARDELLA: You wouldn't expect it when you opened the DHRS valves and you run on that.

DR. HAMBRIC: Yes.

CHAIRMAN RICCARDELLA: Run in that mode, right?

DR. HAMBRIC: Maybe.

MEMBER MARCH-LEUBA: But the flow would be going in --

DR. HAMBRIC: Oh, I'm sorry, yes. Yes.

CHAIRMAN RICCARDELLA: Yes. I mean --

DR. HAMBRIC: But, I mean, these are variable power reactors, right --

CHAIRMAN RICCARDELLA: Yes.

DR. HAMBRIC: -- so they're not always going to be sitting there at full power.

CHAIRMAN RICCARDELLA: Yes.

DR. HAMBRIC: So, I imagine the reason they've got a whole bunch of these modules, and NuScale, jump in if I'm wrong, is so they can deliver a certain amount of power when it's asked for. To do so efficiently.

So they are going to be operating at different speeds, and they have to make sure that there aren't certain speeds where acoustic resonance

occurs. If it does, they'll probably try to avoid them. That might be a simple mitigation strategy is, don't operate at that speed.

MEMBER MARCH-LEUBA: Going back to the testing, you can do this out of pile? I mean, this is a cheap test compared to the other one.

DR. HAMBRIC: They could. But this is the route they've elected to go and as long as we can assure that their procedure and their contingency planning is solid and they want to operate like that, then --

MEMBER MARCH-LEUBA: They have confidence in their design, this is perfectly acceptable.

DR. HAMBRIC: And then finally, we mentioned this before, but instrumentation, accept for acoustic resonance, is intended primarily just to find the unexpected. If something bad is happening, in spite of their best planning is happening, the instrumentation should be sufficient to identify it and hopefully localize it.

So they know a component is having problems, then they can go in and mitigate it. And this is obviously in their best interest too. They're going to want this happening in their plant.

Our goal is to assess their planned

instrumentation, they're claimed test procedures, they're mitigation strategies and make sure it's as solid as possible before they get approved. Okay.

And I think that's it. Just a summary of open items.

MEMBER CORRADINI: Questions from the Committee before we move on to Chapter 14? Okay, we're moving on.

Tanny, are you the next victim?

MR. SANTOS: Yes. This is the Staff's presentation on SER Chapter 14, the initial test program ITAAC.

Next slide please. So my name is Tanny Santos, I am the Chapter 14 project manager. Listed on this slide are all of the technical reviewers that participated in review of Chapter 14.

Fortunately, there is quite a lot of people involved because of the scope of the review, the information in this chapter. It includes staff from both NRR, NRO and NSIR.

Next slide please. The outline of the Staff's presentation for 14 is in two parts. The first part is on the initial test program, SER Section 14.2, and that would be presented by Taylor Lamb.

And then I will continue the presentation

on Section 14.3 on the ITAAC meeting. So with that, I'll just turn it over to Taylor for this portion.

MS. LAMB: Hello, my name is Taylor Lamb. I'm with the quality vendor inspector branch. I am the lead technical reviewer for the initial test program, Section 14.2.

But I'll reiterate what Tanny said in that several other system specific reviewers were involved with this review.

So, our review objective was to look at Section 14.2 for completeness and suitability for development of an ITP by a COL applicant. We utilized DSRS Section 14.2 in Reg Guide 1.68.

So, 5279A28 regarding COL applications, specifically requires plants for pre-operational and startup testing. However, there is no requirement for a DC applicant to provide an ITP submitted under 10 CFR Part 52 Subpart b.

But as stated, we review them for completeness and suitability for a COL applicant to be able to develop an ITP. We reviewed this against DSRS Section 14.2, which was guidance that was developed in accordance with SECY-11-0024.

So this was a slightly different review approach from previous ITP reviews in the design

certification stage where our ITP review focused on providing assurance that the risk significant SEC functions are tested and the test abstract adequately addresses design functionality, rather than a detailed review including the acceptance criteria for instance.

Next slide please. The Staff, to perform its review, the Staff utilized table 17.4-1, the design reliability assurance program, SSC functions, categorizations and categorization basis in the DCA to determine the set of test abstracts that we would review using a risk-informed approach and for efficiency.

We sent those items to NuScale, NuScale came back and requested a larger scope of review. So with that, NRC approved only those test abstracts listed in Table 14.2-1 of the SER. And then Table 14.2-2 of the SER contains a list of test abstracts that are not, will not be approved in the design certification stage.

Those test abstracts specifically must be addressed by a COL applicant. And if the design certification is approved, the Staff would recommend that the certification will include clarifying language that these abstracts are outside the scope of the certified design.

Next slide please.

CHAIRMAN RICCARDELLA: Does that mean they'll all have ITAACs?

Does that mean they'll have ITAACs on each one of those items?

MS. LAMB: No, not necessarily. And Kerri Kavanagh, who is in the corner, she might want to speak up on some of these items as well.

MS. KAVANAGH: Hi, this is Kerri Kavanagh, the chief of quality assurance vendor inspection branch.

As Taylor mentioned, ITP is not required to be reviewed under a design certification, however, NuScale did ask for us to review a certain portion, which we did. For those portions of test abstracts that we did not review, the COL applicant will have to have them review as part of that review. It's not an ITAAC.

MEMBER CORRADINI: But it will be part of their COL.

MS. KAVANAGH: Application, absolutely.

MEMBER CORRADINI: Application, excuse me.

MS. KAVANAGH: Yes.

CHAIRMAN RICCARDELLA: And identified in the DCA as a COL item?

MS. KAVANAGH: Not necessarily. It's going to be, it's a requirement in 52.79 for the COL applicant to provide an ITP. So for those items that are not covered in the certified design, COL applicant will be responsible for providing it.

MS. LAMB: There is one test abstract that will remain open, 14.2-47, the emergency core cooling system test Number 47, in accordance with open item 3.9.6-1. So, until that is resolved, test number 47 will remain open.

We have one confirmatory item, 14.2-1. Until we receive a response from, to the Staff's review of the test abstracts in Table 14.2-1 of the SER, when we performed our review, we looked at the proposed markups. So once NuScale submits their future revision of the DCA, we anticipate that we would be able to close out the confirmatory item.

With this said, the Staff concludes using the information presented in the DCA. And pending the confirmation of the confirmatory item and closure of the open item, that the Applicant has demonstrated compliance with the NRC regulations and guidance.

MR. SANTOS: Anything else on 14.2? Next slide please.

Okay. So moving on to 14.3, ITAAC. So in

this section of the SER the Staff reviewed all the Tier 1 information in NuScale's application. This includes site parameters, interface requirements and of course of the ITAAC tables.

So the regulatory finding that the Staff in making in 14.3 is with regard to 52.47(b)(1). That is the requirement that a design certification contained the ITAAC that are necessary and sufficient to provide reasonable assurance that a plant that incorporates the design certification has been constructed and will operate in accordance with the certification of the NRC's regulations.

Now, to make this finding, Staff had several guidance documents. One of course is the standard review plan.

Another is a set of draft standardized ITAAC that the Staff provided NuScale for use in design certification application back in 2016. And many of the ITAAC NuScale submitted thus conformed with the standardized ITAAC.

The third item I'd like to list here is new, so I'd like to spend some time on it and discuss it. It's SECY-19-0034.

And this SECY describes some revised principles for reviewing Tier 1 information. So many

of the principles described in this SECY is similar to what's in the SRP right now, but it does highlight three new principles which I've listed here in the slide.

The first is that Tier 1 information should be at a qualitative and functional level of detail. Tier 1 information should also not include the level of detail that would require NRC approval for a departure that is of minimal safety significance. And lastly, then use a numerical values in Tier 1 should be minimized.

So these three new principles are trying to emphasize the importance of avoiding any unnecessary detail in Tier 1 information or unnecessary means requiring NRC approval for a departure that is of minimal safety significance.

Now, as I said, this SECY was recently issued. It was issued back in April. So the Staff has not had an opportunity to apply all of these new principles to all of the application for NuScale.

But there is an attachment to the SECY that provides as an example how these new principles could be applied to the structural review of the NuScale Tier 1 application. So in that area, these principles have been applied in the SECY.

And next slide please. So the bulk of 14.3 just documents the Staff's review of the ITAAC or points to another SER section or chapter that contains the evaluation of the ITAAC.

Several of these sections do not contain any open items, so I was not going to focus any of the presentation on these sections. The remainder of the Staff's presentation will focus on the open items and other sections.

Next slide please. Okay, so 14.3.1, selection criteria. Tier 2, Section 14.3.2 of NuScale's application describes their approach for identifying what information in Tier 2 rises to the level of being included for Tier 1 information.

They call this the first principles approach. And it's similar to NEI 15-02 and a NEI White Paper that the Staff has reviewed and provided comments on.

But since the Staff has not endorsed either of these NEI documents, the Staff has excluded from its review this first principles approach for identifying what should be in Tier 1.

So, in the SER, the Staff is not taking a position on the first principles approach. And the implication for that is, if and when this

certification were to go to rulemaking, Tier 2 Section 14.3.2 would not be incorporated by reference into the design certification rule.

MEMBER CORRADINI: I remember we discussed this, but I'm still struggling to understand by not taking a position, does that mean any other than you're tacit approving?

MR. SANTOS: No. I think if we were to say nothing, I think it could be interpreted as tacit approval. By Staff explicitly saying in the SER we are not taking the position and we will exclude it from the incorporation by reference to the rule, I think it does not need to word not approving the approach.

But I think the implications --

MEMBER CORRADINI: But you're not disapproving it either.

MR. SANTOS: Right. Right, we're not approving or disapproving.

MEMBER CORRADINI: So it could be good, but other good ways, is that what you're trying to say to me?

MR. SANTOS: Say that again?

MEMBER CORRADINI: That it's okay but there might be other okay ways?

MR. SANTOS: I think we're saying we agree with the conclusions of this approach to identify. Because basically what you have is a body of information that's Tier 2 that the Staff is reviewing and approving --

MEMBER CORRADINI: Right.

MR. SANTOS: -- and a body of information is Tier 1, that's reviewed, approved and will be certified. It's just the approach on how to identify what from Tier 2 goes to Tier 1 that the Staff is not taking a position on.

MEMBER CORRADINI: So you're okay with the result, you're not okay with the process?

MR. SANTOS: Yes. We're reviewing the results but we're not taking position on the process.

MEMBER BLEY: As a process for other people to use.

MR. SANTOS: Right. For example, if NEI were to come in later with a proposal to, for NRC endorsement, we would engage with them and maybe endorse it that way. But as of this point, since the NRC has not endorsed the NEI approach generically, we're not taking the position on the NuScale --

MEMBER CORRADINI: Okay, okay. Okay, got it.

MR. SANTOS: Next slide. Okay, so in 14.3.1 there are a couple of open items. One is actually an item from Chapter 17. It has to do with the design reliability assurance program. NuScale did not provide an ITAAC for the D-RAP.

And in SECY-18-0093, the Staff is recommending to the Commission that the use of ITAAC to verify D-RAP no longer be used. But we are still waiting a Commission decision on this SECY, so once we hear from that we'll be able to close this open item.

If the Commission agrees with the Staff recommendation it's closed, but if the Commission disagrees, then we would need to request that NuScale provide an ITAAC for the D-RAP.

The second open item has to do with a Staff review of the Tier 1 information, specifically the ITAAC. The Staff reviewed the information here for consistency and clarity.

And based on that review, in an RAI we suggested some wording changes to Tier 1 to make sure that there was consistency in the ITAAC design commitment, the ITA and acceptance criteria. And to make sure that their acceptance criteria, there's no ambiguity in the acceptance criteria, it's perfectly clear.

So this is an open item because it was an RAI that was just recently issued to NuScale. And a similar approach and review was done for the APR1400.

MEMBER BLEY: Tanny?

MR. SANTOS: Yes.

MEMBER BLEY: I know we've talked in some length about that, the first open item up there --

MR. SANTOS: Yes.

MEMBER BLEY: -- on the Subcommittee. I don't quite remember the rationale for not meeting an ITAAC for the D-RAP.

MR. SANTOS: My read of the SECY paper is it basically boiled down to, an ITAAC for a D-RAP is not necessary because it poses an unnecessary regulatory burden without a commensurate safety benefit. That's what I took out of my read of the SECY.

MEMBER CORRADINI: That's essentially all it said. It's a very short SECY.

MEMBER BLEY: Yes, I know we looked at it.

MEMBER CORRADINI: Yes, we did. We didn't comment on it, we just, we were informed of it when we were going through chapter --

MR. SANTOS: 17.

MEMBER CORRADINI: Thank you.

MEMBER BLEY: Somehow it feels a little uncomfortable to me, but there's not --

MEMBER KIRCHNER: Does it all get rolled up at the end with the final PRA, though?

MEMBER BLEY: That would be the rational I was hoping to hear.

MEMBER CORRADINI: Somebody is coming to the microphone to solve this.

(Off microphone comments.)

MS. HAYES: This is Michelle Hayes.

(Laughter.)

MS. HAYES: And we wrote that SECY. And our argument was that it was more of a programmatic program. The RAP is programmatic and they're committing to the program in Chapter 17.

We review it, we say we agree with your program as described. We don't need an ITAAC, just like we don't need an ITAAC for other programmatic issues.

MEMBER BLEY: Thanks.

MR. SANTOS: Okay, Section 14.3.2 reviews the structural and systems engineering. ITAAC, there are two open items here.

The first open item deals with three ITAAC to verify the structural integrity of the reactor

building, radioactive waste building and control building.

The Staff has concluded that the acceptance criteria for these ITAAC is incomplete because it did not address deviations between the assumed design loads and the as constructed loads. And so it did not address changes in demand that result from these deviations.

The Staff also thinks that the acceptance criteria should also state that the reconciliation analysis account for changes between design and construction should use the same methods and codes as that used in the design certification.

The second open item has to do with ITAAC for the control building. Staff finds that it's insufficient to verify that as the as-built seismic Category 1 structure is protected from adverse seismic interaction from a non-seismic Category 1 SEC.

The acceptance criteria is not consistent with the standardized ITAAC the Staff provided and is not consistent with a similar ITAAC for the reactor building because, to verify a similar, a similar form.

The next slide please. 14.3.3 is on piping systems and components. There is one open item here.

And this open item has to do with a Staff determination that an ITAAC is needed to verify the installation of the ECCS valves, the containment isolation valves, decay heat removal system actuation valves and the hydraulic lines, to make sure that each valve can perform its safety function.

The ITAAC that the Staff is looking for would involve a walkdown inspection to verify that the valves and lines are installed consistent with their, the specifications for geometric configuration, orientation, accessibility and line route, line routing.

So, with this ITAAC, with this additional ITAAC in conjunction with the other ITAAC provided by NuScale, the Staff will be able to reach a reasonable assurance determination that these valves will be able to operate under their design basis conditions.

And we had a public meeting with NuScale a few weeks ago to discuss this. We are just now working on the language for the ITAAC.

Next slide. 14.3.6 is on the electrical systems. There are two open items here. Again, the first open item is from Chapter 8.

It has to do with exemption requests from GDC 17 and 18. These two exemption requests are still

under Staff review. There are no ITAAC to verify the equipment used to meet these GDC 17 and 18 requirements.

So if the GDC exemptions are approved, then this open item can be closed. But if the GDC exemptions are not approved, any equipment used to meet these GDC would need ITAAC verification.

And the second open item in this chapter is just to correct an editorial error in one of the Tier 2 tables that provides some additional information about the ITAAC would be to perform.

Next slide. And 14.3.8 is on radiation protection. There are two open items here but it's really the same issue, it's just two different RAIs that are trying to address this issue. It has to do with the borated polyethylene shielding and a Tier 1 table, 311-1.

Now, this table is not an ITAAC table, this table is the reactor building shield wall geometry. And one of the ITAAC acceptance criteria references this table by stating that the thickness of the radiation shielding barriers should be equal to or greater than any values in this table.

So, what's happened is, over the bioshield design has evolved over time. Originally there was

borated polyethylene shielding. So there was a corresponding line item in this table for it.

When that borated polyethylene was removed, the line item was removed from the table. But then subsequently it was re-added back into the bioshield design but was not added back into the tank. So the Staff would be looking for NuScale to add the corresponding line item back into the table so that the acceptance criteria would be appropriate.

Next slide. 14.3.9 is human factors engineering. Again, two open items. The first open item here has to do with a Staff concern from Chapter 18, to try to ensure that the insights from the entire human factors engineering design process are applied to the as-built main control room.

The ITAAC provided by NuScale had a design commitment for the MCR that did not include changes to the design that could occur after the integrated system validation test of the HFE process. We have recently received an updated revision from NuScale to propose a vision to this ITAAC, and the Staff is currently evaluating that right now.

The second open item has to do with the ITAAC verifying the displays, controls and alarms. There is an ITAAC can verify this for the main control

room but not for the remote shutdown station.

NuScale has asked, requested an exemption from GCD 19, which requires equipment outside the control room have the capability to shut down the reactor in the event that the main control room is evacuated. So, again, if this exemption is approved, no ITAAC would be required to this verification.

Next slide. 14.3.11 is on containment systems. There's one open item here. This one is related to another exemption request from an integrated leak-rate test, 10 CFR 50 Appendix J, for the Type A test.

No ITAAC was provided for the Type A test. The Staff's evaluation of this exemption is in Chapter 6. But since Chapter 14 was being issued to process before Chapter 6, an open item was created in Chapter 14 regarding the acceptability of not having such an ITAAC.

Chapter 6 has now, I think, been issued. And it's concluding that this exemption request can be approved so therefore this actually closes out this open item in Chapter 14.

With the Staff's discussion of the basis for granting this exception would be discussed with the Committee at the June meeting relating to the

Chapter 6.

Finally, the conclusions. As I said, there are some sections with open items and for those sections we're not able to finalize any conclusions at this time.

But for those sections that do not have any open items, conclusion is basically that pending the resolution of any confirmatory items in those sections, the 10 CFR 52.47(b)(1) requirement has been met.

Any questions?

MEMBER CORRADINI: Members, questions? Okay, I think there are no questions.

MR. SANTOS: Great.

MEMBER CORRADINI: So, what I proposed to do, Mr. Chairman, is we take our break now and we come back at a quarter to 3:00. And then we attack Chapter 19 and all its derivatives.

CHAIRMAN RICCARDELLA: I accept --

MEMBER CORRADINI: Chapter 21.

CHAIRMAN RICCARDELLA: I accept your suggestion and I will be on recess until quarter to 3:00.

(Whereupon, the above-entitled matter went off the record at 2:29 p.m. and resumed at 2:44 p.m.)

CHAIRMAN RICCARDELLA: Okay. The meeting will come to order. Dr. Corradini?

MEMBER CORRADINI: Okay, we're back in session. We have another group in front of us, all smiles. That will change.

(Laughter.)

MEMBER CORRADINI: Okay. Who is going? Dr. Chowdhury, you're going to lead us? You're going to start us off?

Oh, thank you very much. There was a question to the members. Thank you very much.

Do we require of the people, of the staff, that we had questions about 392 that require a closed session discussion? I thought not, but I wanted to check. We'll probably have a closed session discussion about some things in Chapter 19. There's a burning desire here, but nothing in 392? No? Okay.

CHAIRMAN RICCARDELLA: There was that one question about the clearances, but I don't know --

MEMBER CORRADINI: I don't think that's something that's a burning desire at this point.

MEMBER MARCH-LEUBA: I don't think they know the answer.

MEMBER CORRADINI: Okay.

MEMBER MARCH-LEUBA: And you'll have to

ask NuScale to call somebody.

MEMBER CORRADINI: Right. So, that answers that question. So, I'm sorry. Go ahead.

DR. CHOWDHURY: That's all right.

Good afternoon. My name is Prosanta Chowdhury. I am one of the project managers at NRO.

So, this is Chapter 19, full Committee meeting. The staff is presenting. And Greg Cranston was the one who introduced Chapter 19 at the Subcommittee meeting on May 15th, who was covering for Rani Franovich, who is the Chapter PM. So, today I'm covering for Rani for Greg.

(Laughter.)

MEMBER CORRADINI: So, you're the second cover?

DR. CHOWDHURY: I'm the second cover, well, backup. In any case, Greg couldn't be here. But, on behalf of Greg, Rani, and the rest of the staff, I thank you for the opportunity to present the staff's evaluation of the NuScale PRA and severe accident analysis. As I mentioned, the Subcommittee meeting on this chapter, specific sections, was held on May 15th, 2019.

This full Committee presentation will provide an overview of the staff's review of the

topics listed -- and I will show you the topics -- except for -- well, let me go there. These are the topics, so except for 19.3 related to RTNSS and 19.5 related to aircraft impact. However, the staff is available to answer any questions members may have in those areas that are not being presented.

It should also be noted here that Section 19.4, related to loss of large areas of the plant due to explosions and fires, is part of staff's Chapter 20 evaluation. The staff plans to present this topic to the ACRS at a meeting tentatively scheduled for July 2019.

So, with this introduction, I turn it over to Alissa Neuhausen.

MS. NEUHAUSEN: Good afternoon. My name is Alissa Neuhausen, and I'm a risk and liability analyst in the Office of New Reactors.

I'm going to start with a description of the staff's review, and then, I'm going to turn it over to the topics from the Subcommittee meeting that were requested. So, that's the ECCS valves, passive safety system reliability, and then, open items for 19.1 and 19.2

Staff reviewed the quality, completeness, and consistency of the information in the DCA Rev 2,

in accordance with the SRP Section 19.0 and ISG-28. Staff created ISG-28, recognizing limitations of the DCA stage, such as no plant operating experience and a lack of maintenance practices and procedures to support the review of a DCA PRA performed in accordance with the PRA ASME/ANS PRA standard for acceptability. And NuScale committed to using the PRA standard as endorsed by Reg Guide 1.200 and modified by ISG-28.

At the DCA stage, the staff reviews the PRA description and results to identify the risks, insights, and vulnerabilities. These include ensuring that the dominant severe accident sequences risk, significant SSCs, and key operator actions are identified. Insights from currently-operating plants are evaluated for significance to the NuScale design. So, in its review of vulnerabilities, staff noted specifically some of the contributors to CDF that were eliminated for the NuScale design. So, some of these are: the primary system has fewer components, reducing challenges associated with external piping, and the elimination of reactor coolant pump seal failure events and sump blockage concerns.

Staff also evaluated the PRA results with respect to Commission goals for the core damage

frequency and large release frequency and conditional containment failure probability, and evaluated how the PRA results are used as inputs to other programs and processes, such as RTNSS, D-RAP, and ITAAC.

Another focus of the review was ensuring that the appropriate key assumptions are included in the DCA. These are related to sources and model uncertainty, scope or level of detail, and are important because the results depend on these assumptions.

The staff applied the enhanced safety-focused review approach during its PRA review to support integrated decisionmaking and increased focus on safety. Sharing information related to the risk significance of systems and components among technical staff helps align staff on the most risk significant areas of the review.

A couple of examples of where this was applied. One example is the reactor building crane. It was applied due to its novel uses, new consequence, frequency of lifting, and because it is shared across multiple modules. Staff expended additional effort compared to other reviews and alerted crane reviewers to the importance of the module drop.

Another example is on the key assumptions.

Staff focused on ensuring that the COLA item for these key assumptions as described in the SER and RAI response was adequate. And staff's review resulted in multiple additions to some of these key assumption tables in the DCA.

Staff also considered ESFRA when issuing RAIs. So, if it was determined that a safety finding could be made based on available information, then we would not issue RAIs if we could make the safety finding.

And I will turn it over to Ayo to talk about the ECCS valves failure rates.

MR. AYEGBUSI: All right. Good afternoon. My name is Ayo Ayegbusi. I'm a risk and a liability analyst in the Office of New Reactors.

So, I'm going to talk about two items. One has to do with the ECCS valves and the design, and the second has to do with RAI 8840, as requested by the Subcommittee.

The staff ordered the documents detailing NuScale's ECCS valves failure rates and the sensitivity studies that they performed for those valves. Specifically, the staff looked at the ECCS PRA notebook and the probabilistic analysis of the ECCS valve reliability.

For the ECCS valves failure rates, NuScale based those failure rates on operating experience data which comes from the licensee valve reports. And then, also, generic data, which comes from the 6928 NUREG, and some NuScale-specific design assumptions.

As far as the operating experience data that comes from the LERs, the staff reviewed that and found that acceptable, based on the fact that the approach that was taken is similar to the approach that the agency takes when developing NUREG-6928. And that approach includes using Bayesian update -- well, looking at the demands in the industry, looking at the failures that have occurred, and using the Bayesian update to develop the failure rates.

Okay. And then, lastly, from our review, we identified the Applicant performed a number of sensitivity studies, one of which was basically saying why they developed their failure rate for the valves, the ECCS system valves; what if they used the generic industry failure rates, what would the results look like? And so, the staff reviewed this particular sensitivity study and found it reasonable. And the reason why the staff found it reasonable is because, when they did the study, there wasn't a significant impact on the ECCS system failure vulnerability, which

subsequently would not have a significant impact on the CDF.

MEMBER MARCH-LEUBA: Was that because of the IAB, you know, the inadvertent actuation block valve?

MR. AYEGBUSI: Was it?

MEMBER MARCH-LEUBA: The valve failure probability --

MS. NEUHAUSEN: The failure to actuate mode doesn't actually model the IAB. So, it contributes to the way they model various operations, but not for the failure to actuate.

MEMBER MARCH-LEUBA: I think it would if the IAB fails --

MS. NEUHAUSEN: Well, it's not modeled in the fault tree for failure to actuate.

MEMBER BLEY: So, you did review the fault tree?

MR. AYEGBUSI: Yes, yes. To be clear, right, NuScale's current PRA models NuScale's current design, as they understand it, right? And so, the IAB, it's not included because it is not deemed to impact the functionality of the ECCS in this case.

MEMBER MARCH-LEUBA: The ECCS is what the agency is about. I mean, it doubles the -- the

probability of failure multiplies. I mean, something doubles it.

MR. AYEGBUSI: So, that's not our current understanding, but we'll have to rely on NuScale or the ECCS valve people to answer that question.

MEMBER MARCH-LEUBA: The ECCS valve, the RRV can only open if the IAB allows it to. So, if the IAB has failed, the RRV will never open.

MR. AYEGBUSI: That's not our current understanding, but I would rather we --

MEMBER MARCH-LEUBA: But it is reality.

MR. AYEGBUSI: I would rather we defer to NuScale or our ECCS valve folks.

MEMBER MARCH-LEUBA: So, the IAB is not modeled in this PRA analysis?

MR. AYEGBUSI: Correct.

MEMBER BLEY: We're going to see the details when we go visit the site.

MEMBER DIMITRIJEVIC: Or maybe in the closed session today.

MEMBER BLEY: No, they're going to show it to us when we go out there.

MEMBER CORRADINI: Does staff have a --

MR. LUPOLD: This is Tim Lupold from the Mechanical Engineering Branch.

It's my Branch that looks at the ECCS valve and the operation of the valve. You're correct, the IAB does have to function in order for the valve to function properly. The IAB has to close in order to prevent the valve from opening, and then, it has to move again and open to allow the valve to open up. That's physically how it works.

Now I believe what happened is that NuScale considers this valve IAB to be extremely reliable, and therefore, does not assume a single failure. And that was the subject of a SECY -- what was it? -- 19036, that we sent and it's with the Commission right now.

MEMBER BLEY: Well, yes, but that SECY and that argument about single failure has to do with normal regulation. When you're doing a PRA, you model how it works. You don't use those kind of arguments to design your PRA model.

MR. LUPOLD: I am not making any arguments on that. I'm just --

MEMBER MARCH-LEUBA: You are not a PRA guy.

MR. LUPOLD: I really wanted to state how the valve works. That was my objective.

MEMBER MARCH-LEUBA: But the IAB is

modeled with seeing the probability to failure under the PRA.

MS. NEUHAUSEN: Well, there's still the probability that the ECCS valve doesn't open, but the IAB is not included the failure to actuate.

MEMBER CORRADINI: I think we have another person at the mic --

MEMBER DIMITRIJEVIC: But there is a model for the ECCS valve itself. And that is what Dennis asked you. Did you see the fault tree which included, you know, SOV for opening the small -- that should probably be relevant?

MS. NEUHAUSEN: Yes. Yes, we saw the --

MEMBER DIMITRIJEVIC: But was the IAB part of that fault tree?

MS. NEUHAUSEN: The IAB is not a part of the failure to actuate fault tree. It is a part of the spurious actuation fault tree.

MEMBER BLEY: Only part of spurious?

MEMBER MARCH-LEUBA: Let's get it from the horse's mouth.

(Laughter.)

MS. NORRIS: This is Rebecca Norris with NuScale.

So, that IAB is not modeled in that

failure tree because, if the IAB fails, it can contribute to spurious opening, but does not affect a failure to open. So, it will still open, even if the IAB does -- and we can discuss this more in the closed session.

MEMBER CORRADINI: Let's do that.

MEMBER BLEY: We're supposed to see the fault trees when we go out there.

MEMBER CORRADINI: Right.

MEMBER BLEY: Personally, I would rather wait until we actually have them in front of us and we can talk to them, and how all these pilot valves, including that one, interact and how that's modeled, and what data they're using as to whether it's moving in one direction under hydraulic force or moving in the other direction under spring actuation. And all of those affect how this ought to be done, and I'd rather wait until we see all of that together. So, they could do it in the closed session, but we're going to do it again when we get out there.

MEMBER CORRADINI: Proceed.

MR. AYEGBUSI: Okay. So, the last thing I wanted to mention on this slide is that there's a lot of tension on the ECCS valves and the potential concern on the failure was of these valves, right?

And so, one of the things that the staff looks at is that, when you have items like this, that they're included on the key assumptions list, which requires the COL applicants to review and verify or establish that there's still confidence in the values that were used.

MEMBER KIRCHNER: Wait a minute. Wait a minute. The COL applicant? We're certifying the design here and this is fundamental to this design, absolutely critical and fundamental. So, how can you punt this to the COL?

MR. AYEGBUSI: So, we're not punting to the COL. What we're saying is the -- well, if I can start with where Alissa started, right, what we look at, at the DCA stage, we look for the risk and size for those that have been identified, and we look to make some reasonable judgment on how the CDF and LRF compares to the Commission safety goals, right?

So, in order to do that in this case with a design that doesn't have operating experience, right, our approach was to look at how they determined the failure rates for each of the different valves that make up the ECCS system, right? And when we looked at that, we looked at their methodology, and their methodology is similar to how we develop the

generic data we provide in our NUREG.

And all we're saying is, because there is no operating experience that supports the data that they've used, right -- well, I have to be careful there. Because there's no operating experience with this particular valve, I should say, right, typically, our process is to have the DCA Applicant included as one of the key assumptions, which, then, the COL applicant is required to review and verify if they have additional information.

MEMBER KIRCHNER: That's just unacceptable.

MR. AYEGBUSI: Okay.

MEMBER KIRCHNER: Now that's one person's opinion, but this design is based on this. So, putting this off or putting off resolution of -- you already said several things that suggest you need a test program to demonstrate --

MS. NEUHAUSEN: Yes, yes. Could we also add that in the design space there is a test program going on, and they're working on that now. It's just the specific PRA numbers are to be validated at the COL stage, not like the whole design of the system.

MEMBER KIRCHNER: So, what assumptions are you using in generating your PRA numbers? Because you

had no operating data --

MS. NEUHAUSEN: Well, the assumptions that we are using now are that, like the numbers that they have based on licensee event reports, the number of demands that they took out of the generic data and NUREG-6928, and then, some specific assumptions are reasonable for us at this stage. And then, there's the whole design assurance testing program that's going on right now. And then, those numbers need to be validated at the COL phase as well.

CHAIRMAN RICCARDELLA: But are you saying there's a test program to evaluate these, but it won't be completed --

MS. NEUHAUSEN: Not the reliability, not the reliability numbers, but the design.

MEMBER MARCH-LEUBA: Okay. So, what you're saying, you need this program to see if they work when they're supposed to?

MS. NEUHAUSEN: Right, the test program is not running a thousand runs are anything.

MEMBER MARCH-LEUBA: But the relative values that you're assuming of 10 to the minus 5, 10 to the minus 15, or whatever they are, how are they going to validate it?

MS. NEUHAUSEN: They're following the

typical process.

MEMBER MARCH-LEUBA: Okay. You gave us a NUREG which IT confiscated our computers, so I cannot get it out yet.

(Laughter.)

CHAIRMAN RICCARDELLA: They're replacing them.

MEMBER MARCH-LEUBA: Well, they're giving us new computers and they want access.

Some failure rates for power-operated valves is 15 percent on that PNNL. I'll give you a reference tomorrow when I get my hard drive back.

(Laughter.)

MR. AYEGBUSI: So, in this case, we can specifically about these valves, right. So, there are a couple of ECCS valves, right? There is one that is hydraulically-operated, and there's another -- I'm trying to remember --

MS. NEUHAUSEN: Solenoid.

MR. AYEGBUSI: -- solenoid-operated, right. So, if you look at the generic data for current industry operation, right, they're on the order of, I think one is like 10 to the minus 3; one is on the order of 10 to the minus 4, if I remember correctly.

MEMBER DIMITRIJEVIC: Forty to the minus 4 for solenoid and 60 minus 5 for the hydraulic.

MR. AYEGBUSI: Industry generic data?

MEMBER DIMITRIJEVIC: No, that's NuScale.

MR. AYEGBUSI: Yes, that's --

MEMBER DIMITRIJEVIC: Industry data, they don't tell you.

MR. AYEGBUSI: Well, we're referring to the NUREG-6928. So --

MEMBER MARCH-LEUBA: There is a NUREG that compiles LER data. It was done by PNNL. And some type of data -- it happened to be pilot operators -- had a 14.3 percent failure rate.

MR. AYEGBUSI: Understood. And again, I guess the other aspect here is looking at the current design of NuScale, the current NuScale design of the valve, and comparing to the valves that are in that report, right, so these valves are --

MEMBER MARCH-LEUBA: Hopefully, they design it better, but --

MR. AYEGBUSI: Well, these valves don't include some of the -- these valves are simpler. The current design is simpler than some of the valves that are captured in NUREG-6928.

MEMBER DIMITRIJEVIC: By the way, why did

they not include generic data in the table 19.41-9? I wanted to ask them that question because they include generic data, but for not for these two specific valves. They say, "Not applicable."

MEMBER PETTI: Just as a question, how much different is the generic data from the values that NuScale used? You talked about these being updated. Did it change the value at 25 percent? Did it change it by a factor of 3? I can't tell --

MR. AYEGBUSI: So, I think, well --

MEMBER DIMITRIJEVIC: They said they don't -- well, it would be interesting to, I mean --

MEMBER CORRADINI: Let him answer him before you ask him another question.

MR. AYEGBUSI: So, we don't require them to put the data in the table, right?

MEMBER DIMITRIJEVIC: Right.

MR. AYEGBUSI: They've already told us in the description that in some areas they utilized NUREG-6928. For those specific valves, we have to order the documentation, right? And as I said earlier, there was methodology in developing the data they used, right, which is similar to how we developed the data in coming up with the NUREG-6928. So, we don't require them to put the generic data in the

table. So, that question I would have to defer to NuScale.

MEMBER RAY: What's the design certification based on?

MR. AYEGBUSI: The design certification?

MEMBER RAY: The reasonable assurance of adequate protection that's the basis of design certification, what's it based on in this regard?

MR. AYEGBUSI: So, in this regard, as Alissa commented earlier, right, a couple of things. One is identifying vulnerabilities. The other is identifying risk in sites --

MEMBER RAY: No, no, no. No, what's it based on? What does the licensee have to comply with?

MR. AYEGBUSI: So, I mean, the regulation is that the licensee has to provide a description and results of the PRA.

MEMBER RAY: That's the basis of the design certification, is that the licensee provides a description of the PRA?

MS. NEUHAUSEN: That's the only regulation that the PRA has to --

MEMBER RAY: So, there's no required reliability of these components?

MEMBER CORRADINI: I think we have some

help at the back table.

MR. AYEGBUSI: So, I mean, there's no regulation on each component like --

MEMBER RAY: I'm not talking about regulation. The certification describes a plant that's a certified design. It's not something revisited later on. What does it require in terms of their performance?

MR. AYEGBUSI: So, Commission policy is that for conditional -- core damage frequency, right, it's that core damage frequency is lower than 10 to the minus 4, and large release frequency is lower than 10 E minus 6.

MEMBER RAY: So, the certification is based on demonstrating that the actual components will comply with that?

MR. AYEGBUSI: The plant CDF and the plant LRF, not just individual specific components.

MEMBER RAY: Yes.

MR. AYEGBUSI: So, when you monitor an entire system, you comply with that.

MEMBER RAY: Okay. And that's a required for the license for the plant to operate, to be operable?

MR. AYEGBUSI: Typically, if you meet

those goals, if you conform with those goals, then we find it acceptable; we find it reasonable.

MEMBER RAY: I think we're mixing up two things here. I'm mixing them up for you. You're saying the certification requires that some combination of component reliabilities exist, such that the overall core damage frequency is met by the license holder?

MR. AYEGBUSI: Correct.

MEMBER RAY: And that's as far as it goes?

MR. AYEGBUSI: Correct.

MEMBER CORRADINI: And then, for the level 2 part of it, there is a requirement to show that you meet the estimated failure of probability of containment.

MEMBER RAY: Okay. Another way to do it would be to specify minimum reliabilities of the individual components, but they're not doing that in this case here.

MEMBER CORRADINI: No.

MEMBER DIMITRIJEVIC: That cannot be done because the model is too complex.

MEMBER RAY: Okay.

MEMBER DIMITRIJEVIC: However, what I wanted to say, and it's in your sensitivity analysis,

when you have a percent of common cause, which I remember this discussion because they use a very conservative number, and we can even take 14 percent and it will not reach that number. However, that common cause should show that they are very sensitive to that because it came with results 40 to the minus 6. So, you have a 10 to the minus 9 and 40 to the minus 6; they both satisfy the safety goal, but this is a completely different plan. This is not any more negligible risk and all your risk insights are not valid anymore.

So, the question is, because you said first you want to see these insights. And these insights are different when you are 10 to the minus 5 and when you are 10 to the minus 9. So, therefore, if the sensitivity shows that there will increase a thousand times, even if they still meet the safety goal, you don't have good risk insights. So, it shows sensitivity and something you should look into. That's what's my opinion.

MS. NEUHAUSEN: Right. So, that common cause was for like all the common cause --

MEMBER DIMITRIJEVIC: And I know, and I think it was completely unnecessary sensitivity. That didn't tell us anything and it showed that they're

very sensitive, and nobody is surprised.

The thing is they should run the different sensitivity on the factors, those rates and the ECCS, but they ran it on this delta P failure rate --

MS. NEUHAUSEN: And they did run some. They did one on the delta P. They did one on the passive system reliability --

MEMBER DIMITRIJEVIC: Right.

MS. NEUHAUSEN: -- which is in the model.

MEMBER DIMITRIJEVIC: Yes, I know.

MS. NEUHAUSEN: And then, the generic --

MR. AYEGBUSI: So, I think one of the things there is you're seeing the system, you're seeing the PRA sensitivity studies that were done.

MEMBER DIMITRIJEVIC: Right.

MS. NEUHAUSEN: In individual notebooks they have some sensitivity studies that were done. So, your concerns are addressed in individual PRA notebooks for a system, right? That's one aspect.

But the other aspect is, when we say "risk insights," right, we don't specify how the sensitivity study should be done. We look at the reasonability of it, right, and we look to see if, for example, a component has a low failure rate. If you increase the failure rate, right, this will come out as being

sensitive. But also --

MEMBER DIMITRIJEVIC: Your risk insights is everything but the important components or the important systems, the important human actions. That completely changes when your risk goes to 10 to the minus 6 or 10 to the minus 4. It's not just sensitivity studies, your risk insights; everything that you get from PRAs, these insights.

MR. AYEGBUSI: Okay.

MEMBER CORRADINI: You get her point, right?

MR. AYEGBUSI: I have to think through it.

MEMBER CORRADINI: I'm not a PRA person, but I think what she's saying, when something is a thousand times smaller, and then, I do just enough sensitivity to show that I have a big margin, the margin is a factor of a thousand, that's good, but it tells me nothing about what's driving that factor of a thousand. Is it the valves? Is it the DHRS? Is there any dominant aspect of the design that takes me from here to there when I do a broad, sweeping sensitivity? Am I getting it approximately correct?

MEMBER DIMITRIJEVIC: No.

MEMBER CORRADINI: No?

MEMBER DIMITRIJEVIC: What I'm saying,

once when you get this thousand increase, it's a completely different story. It's not the same PRA. The conclusions are not the same anymore.

Let's say that this is right and that those valves are a thousand times higher failure rate. That invalidates all of the conclusions from this PRA. That's my point. You still meet the sensitive goal, but conclusions are invalidated.

So, I'd just like to say, in that case, we should say we are very sensitive to that. We shouldn't say, oh, we meet safety goals, so we don't care. We should say we are sensitive to this and it's something we should keep track of.

MS. NEUHAUSEN: Well, I think we know that were sensitive to the ECCS valves. I mean, that's in there, right, and --

MEMBER DIMITRIJEVIC: Well, that's what I just want to say. We cannot say, yes, we meet the safety goal. Okay. That's --

MR. AYEGBUSI: Yes, I think we understand that. I think we try to capture that in our Safety Evaluation Report. We're not looking to say, you know, 10 to the minus 4, are you lower than that, right? We're kind of looking to say all the Applicant has done, do we have a sense that they're not higher

than 10 to the minus 4? So, it's more of a sense than saying you meet a specific number.

MEMBER DIMITRIJEVIC: And one of the things which I also object to on the sensitivity, I want to tell you that they didn't run any combination. And sometimes there could be some things in combination together, you know, like, say, increase the valve failure probability and that the delta P, opening of the low delta P. The things are virtually the same cut-sets. If you run a combination, you can get some proof of finding that something increases CDF significantly. I did not see any combination in the sensitivity studies.

MR. AYEGBUSI: Yes, I think, in general, we would agree with that, but there are a couple of things there. If you look at the top, the significant cut-sets, right --

MEMBER DIMITRIJEVIC: Yes.

MR. AYEGBUSI: -- a lot of these are driven by common-cause failure.

MEMBER DIMITRIJEVIC: That's true.

MR. AYEGBUSI: Right, which is --

MEMBER DIMITRIJEVIC: CVCS, DHRS, yes.

MR. AYEGBUSI: Correct. Which they did do some level of sensitivity study on, right? Now,

again, we agree with your point that it was a --

MEMBER DIMITRIJEVIC: I know, but you're going to say, okay, they put in the two, and now they still have the 10 to the minus 4, so we are fine. That's all --

MR. AYEGBUSI: Well, no, actually, that's not how we would look at it. How we look at it is they've increased the common-cause failure. And I would agree with you that maybe they should run it, they could run it only for two systems or the combinations, right, and not all the common-cause failures. But the reality is those systems are already risk-significant, right?

So, at some point we have to make, going back to the enhanced safety-focused review, we have to make a judgment and say -- because you're asking questions -- are these questions going to be required for us to make a safety finding, right? And what we did was we said we don't believe we need to ask these questions for us to be able to make a safety finding based on the information we have now.

MEMBER DIMITRIJEVIC: Okay. Well, I can see your point. At the same time, when you have a small number, the sensitivity and uncertainty are the most important.

MR. AYEGBUSI: Understood.

MEMBER DIMITRIJEVIC: They have to show you what are some things that you really need to consider. For example, you can notice that this opening on low the delta pressure doesn't have a common cause even in the assumption. You know, .1, it still is independent, which is really I won't put common-cause events since this assumption just reflects our knowledge, I mean using your judgment.

So, you know, the thing is that, if you miss those little things there, the whole picture on sensitivity and uncertainty can be askew. It's something worth looking, in my opinion --

MR. AYEGBUSI: Okay.

MEMBER DIMITRIJEVIC: -- to get a little more information, a little better understanding what does that mean "no risk".

MEMBER PETTI: To me, given the uniqueness of the design and how different it is, it's almost like the risk insights are more important. I know there's this legal thing about you've got to be below CDF and LRF. But we don't have a lot of understanding. Ask yourself if we've done a PRA on Shippingport. You know, it's great. You just don't know the uncertainty that's there. The risk insight

piece, even though the numbers are low, are really important, I would think. That we don't lose track of that, that's all I'm --

MR. AYEGBUSI: Yes, I guess what I would say to that is that's why it's important -- and I think Alissa covered this earlier -- that's why it's important to us that the uncertainties, the potential concern around uncertainties are captured under the key assumptions, right, and that's tracked to the COL and it continues to be a focus item, right? So, it's not lost, right? I mean, that's why it was significant for us to specifically focus on that.

So, I would say we definitely did not spend all our time focusing on if they met the Commission safety goals. That was probably, I would say, the least of our insights.

MS. NEUHAUSEN: Yes, but I think the slide that I would keep referring back to is the slide 5. I mean, we have Commission safety goals on here, but it's not the only thing that we look at, right? You mentioned the risk insights, the vulnerabilities. Really important are really the programs and processes, too, and it's, I think, what you keep alluding back to.

MEMBER CORRADINI: Okay.

MR. AYEGBUSI: All right. All right.

MEMBER KIRCHNER: Let me ask you a question. Is failure of one of these valves a design-basis event?

MS. HAYES: Maybe we need someone from Chapter 2 to help us out there.

MR. AYEGBUSI: Right.

MEMBER CORRADINI: I think the answer to that is yes, because they've got three RVVs and two RRVs. And the assumption is a single failure --

MEMBER KIRCHNER: A single failure would have one of these --

MEMBER DIMITRIJEVIC: A LOCA.

MEMBER KIRCHNER: -- a LOCA situation.

MEMBER CORRADINI: Right.

MEMBER MARCH-LEUBA: Let's wait for Chapter 15. I think that's the basis of safety, that the RRVs cannot fail because of the IAB. The IAB, you know, the actuation block.

MEMBER CORRADINI: I think we have a member of the staff that is going to help us.

MR. NOLAN: This is Ryan Nolan from Reactor Systems.

It is addressed in Chapter 15, both an inadvertent opening as well as the single failure of

the main valve from opening. Certainly the IAB is being looked at as well. At a high level, the failure of an ECCS valve is addressed in Chapter 15.

MR. AYEGBUSI: All right. I'm being told to speed along.

So, we're talking about the ECCS system as a whole. The sensitivity studies that were performed -- we talked about using generic data to evaluate if the NuScale specific data, how they compared to each other, right? But, then, NuScale also did other sensitivity studies and these are in the PRA notebooks, not in the FSAR, right? So, I wanted to point that out.

But they did sensitivity studies by looking at increased failure probabilities of the passive heat removal function of the system, right? And then, the ECCS would go to differential pressure of the valve actually on that condition. And then, the common-cause failure using a significantly higher failure probability for common-cause failure of all components.

And so, based on our review, what we found was, basically, the insights that come out from just the PRA by itself have captured what came out during the sensitivity studies, and that these sensitivity

studies were not significant, did not change the CDF or LRF significantly.

And I think you already mentioned the one in the common-cause failure where that was probably the most significant one, where our CDF came down to 10 to the minus 6, on the order of that.

So, the results of the studies demonstrate that, again, the CDF and LRF Commission safety goals are met, but, more importantly, that the risk insights have adequately been captured in the FSAR, right, and risk-significant SSCs, key assumptions table, key insights table, and for all the different hazards and modes.

All right. So, that's all I had on ECCS valves, unless there are additional questions

Okay. So, moving on to RAI 8840, this RAI was actually a pretty detailed RAI. I'm going to cover one question out of multiple questions in that RAI. And this is probably the one that took a while to complete.

But, basically, this particular question had to do with the fact that the normal-type design is, if you had a LOCA inside containment, the containment actuation valves would go closed. What we saw in the PRA modeling was that the PRA didn't model

the containment actuation valves going closed. And based on that, I guess NuScale, they provided their supporting documents for us to audit. And then, we also internally performed our independent analysis to evaluate how they came to their conclusions. And eventually, we were satisfied with not modeling the containment isolation for a LOCA inside containment, given the fact that, even in that condition, you would still have core cooling and heat transfer to the pool.

This RAI is now in confirmatory space. And basically, how we resolved this concern that we had was NuScale included in the FSAR, the DCA, a discussion about why this was not necessary, why containment isolation is not necessary in LOCAs inside containment. And that satisfied our concerns that it was not captured somewhere in the DCD.

MEMBER CORRADINI: So, I want to make sure I understand this.

MR. AYEGBUSI: Yes, sir.

MEMBER CORRADINI: Okay? So, it's now turned to a confirmatory item? That last thing I don't understand.

MR. AYEGBUSI: Yes, it's now a confirmatory item.

MEMBER CORRADINI: And the confirmation

would be what?

MR. AYEGBUSI: So, the confirmation is NuScale submitted to us a supplemental RAI response, which includes a markup of the text, the DCD text. And we found that acceptable. And so, during the next go-round, when the next revision of the DCD is sent in, we'll verify that.

MEMBER CORRADINI: Okay. Thank you. Okay.

MEMBER MARCH-LEUBA: Sorry, but you have seen the calculation with LOCA inside containment when isolation doesn't happen?

MR. AYEGBUSI: Yes, sir.

MEMBER MARCH-LEUBA: Because after LOCA, you rely on the steam that leaves the vessel condensing into the containment. And if you are not isolated, the steam leaks out and you never have the heat conduction to the vessel.

MR. AYEGBUSI: So, I don't know -- you know, I can speak to all the details you want. I just don't know if some of it crosses into closed space.

But what I would say is you're not losing enough to impact heat transfer.

MEMBER MARCH-LEUBA: And you have seen a simulated calculation, a real calculation?

MR. AYEGBUSI: Yes, we have seen their calculation and we have done our own calculation.

MEMBER MARCH-LEUBA: Okay.

MR. AYEGBUSI: Yes.

MEMBER KIRCHNER: Which LOCAs did you consider?

MR. AYEGBUSI: Which LOCAs? I think, so the LOCAs are on the valves. I'm pretty sure there's a LOCA on the valve.

MEMBER KIRCHNER: You have several things that could do that, the valves, the piping --

MR. AYEGBUSI: I'm sorry. The ECCS valves and the CVCS line.

MEMBER KIRCHNER: CVCS line is one that could do it.

MR. AYEGBUSI: Yes. CVCS line, the charge and the discharge line --

MEMBER KIRCHNER: And that's a smaller one. CVCS is probably more --

MEMBER CORRADINI: I think the RVVs might be the largest piping system. I think CVCS is smaller than that.

MEMBER KIRCHNER: Yes, the RVV is the biggest LOCA probably. So, as Jose said, you lose all your inventory.

MEMBER MARCH-LEUBA: What he's saying is that you do condense some of the steam. Not all of it leaves the steam line. But you have to run a calculation to see how much is left.

MR. AYEGBUSI: Well, so, I mean, obviously, it's directly there's the steam coming out, steam going to containment and cooling it, right? But the reality is you don't have a lot of penetrations that will be where steam can escape from containment, right? Some penetrations are in closed state --

MEMBER MARCH-LEUBA: The steam line -- oh.

MR. AYEGBUSI: Some penetration is in closed state. There are very few penetrations that you have to be concerned with. I think there's only actually one penetration you would be concerned with, and the size of that penetration, it's not big, right? So, it's not top numbers, I guess.

All right. And that's all I have.

MS. POHIDA: Hi. I'm Marie Pohida. I'm going to be discussing the staff's review of the passive system for liability evaluation. This is going to be high-level. So, I don't go into proprietary territory. And I understand that the Applicant will be discussing their analysis this afternoon in the closed session.

Okay. I audited documents related to the passive system reliability analysis, and my review focused on the general approach to the screening and binning of accident sequences that were modeled; the identification of key phenomena for the NRELAP evaluation. These sequences that were binned were those that include contribute at least 1 percent of the CDF. They assume a successful scram due to low frequence of ATWS, and sequences that required inventory addition to prevent core damage, like a CVCS LOCA outside containment that's not isolated, that was not in scope.

So, these scenarios that were considered for the pass of a liability evaluation for ECCS was a spurious opening of the reactor recirculation valve with a single reactor vent valve available. The second scenario is a CVCS LOCA outside containment that is successfully isolated with DHRS not available, and the RPV pressure increases until a reactor safety valve cycles and sticks open, where, then, ECCS actuates on high level.

For evaluating the passive reliability of the decay heat removal system, the Applicant considered a general transient with just one train of the DHRS available, and no other system was credited.

I looked at the NRELAP inputs and the ranges, such as assumptions of non-condensable gases in the CNV and the decay heat removal system. And I looked at the general approach to the quantification of the passive system reliability. I also looked at the distributions of the inputs, were they assumed to be uniform or normal. I did need additional information to understand how several of the inputs affected the passive system reliability results, including the assumptions on non-condensable gas volumes, the non-condensable gas distributions, and the assumed initial CNV pressures.

Following that RAI response, the Applicant then updated the tables of key ECCS and decay heat removal system phenomenon in Chapter 19.

Next slide.

All right. There was a sensitivity analysis that was performed of ECCS and DHRS reliability where all the parameter distributions for the NRELAP inputs were assumed to be uniform. The results, I don't want to get into details because this is an open session, but the results of that sensitivity analysis for ECCS reliability and DHRS did meet the Commission goals for CDF and LRF.

The Applicant adequately documented their

key ECCS and DHRS phenomena in the DCA in Chapter 19, and their analysis was consistent with the goals of our SRP in Chapter 19.

So, that concludes my discussion. Are there any questions?

MEMBER DIMITRIJEVIC: I was surprised when I saw distribution of those numbers because it was very narrow. Did you check that uncertainty analyses that did -- I'm trying to find where I saw this. You can enter a factor of 2 or something, which is really strange, I mean.

MS. POHIDA: I'm slow here because I don't want to go into proprietary territory.

I reviewed the sensitivity analysis, and that analysis was where they assumed that all those distributions assumed -- all those distributions --

MEMBER DIMITRIJEVIC: Correct.

MS. POHIDA: -- were assumed to be uniform.

MEMBER DIMITRIJEVIC: Yes, so there's some uniform and some -- yes.

MS. POHIDA: Yes, and those results I think need, if I need to go into detail, they need to be reserved for the closed session.

MEMBER DIMITRIJEVIC: Okay. All right.

MS. POHIDA: Thank you very much.

Oh, this is me. Okay.

I do have an open item. It's RAI 9659. And it's looking at the consequences of a module that's being moved for refueling. As it's being moved in the operating bay, if it's dropped, it can impact up to two operating modules.

And I'm going back to Revision 1 of the DCA. There's a statement that says, if a module is dropped on an operating module near the top, it could impact DHRS piping or the heat exchangers.

Revision 2 that we received last October of the DCA was augmented to state that, "Additional pipe breaks may occur, leading to a CVCS line break outside containment."

So, we issued an RAI. We've received it and we're evaluating it for the completion of risk insights. And it's basically what pipes are assumed to fail? CVCS, decay heat removal system, and the containment flood and drain system, what pipes are assumed to fail? And more importantly is the capability of the containment isolation valves to close compromised, given that you have a strike from an operating module, I mean given a strike from a dropped module that hits an operating module that has

sufficient force to cause pipe breaks? So, that's being reviewed as we speak.

And that's all I have on this slide.

MEMBER DIMITRIJEVIC: But they make the case, it seems, that this module drop frequency is very small compared without the initiating event frequency. So, for operating module drop was never considered initiating. So, okay, you are concerned about containment isolation and the operating module, right?

MS. POHIDA: I'm concerned about the consequences if a dropped module that's being removed for refueling hits an operating module.

MEMBER DIMITRIJEVIC: Right, but that operating module doesn't have an initiating event module drop.

MS. POHIDA: No, but what's being postulated in Revision 2 of the DCA is that that dropped module hits an operating module near the top and causes pipe breaks --

MEMBER DIMITRIJEVIC: Right.

MS. POHIDA: -- of the CVCS system outside containment.

MEMBER DIMITRIJEVIC: Right.

MS. POHIDA: Which would, then,

necessitate containment isolation.

MEMBER DIMITRIJEVIC: Right.

MS. POHIDA: And the question is, is the capability of the containment isolation valves to function compromised if, you know, if an operating module is struck with sufficient force to cause pipe breaks?

MEMBER DIMITRIJEVIC: Okay. I'm only pointing to you that that event is not part of PRA at all. It's only part of a PRA for a shutdown module. It's not a part of the PRA for an operating module. So, there is not any place in PRA where they consider containment isolation.

MS. POHIDA: It's considered qualitatively in the multi-module risk section of the DCA. And the reason why I'm asking these questions is to make sure that our understanding of the consequences of this event are complete and that the risk insights are complete.

MEMBER DIMITRIJEVIC: All right. I just want to say that they don't have really good place to consider this because they made the case of the initial infrequency to do the module drop. Anything else is small compared by the frequency rates.

MS. POHIDA: May I ask a clarification on

that? Are you referring to the analysis of single module drop, where a module is being dropped --

MEMBER DIMITRIJEVIC: No, but that --

MS. POHIDA: -- but the addition of striking an operating module is not being postulated?

MEMBER DIMITRIJEVIC: No, there is a story, a qualitative story, about that. I'm just pointing there is no quantitative -- there is no initiating event on the operating module which comes around that drop.

MS. POHIDA: Yes, it's being evaluated qualitatively --

MEMBER DIMITRIJEVIC: Right.

MS. POHIDA: -- in the multi-module section of DCA.

MEMBER DIMITRIJEVIC: Right.

MS. POHIDA: Yes. And according to our SRP, there's no requirement that they quantify, but we need to make sure that our understanding of the risk insights is complete.

CHAIRMAN RICCARDELLA: I would assume that, if the probability was high enough, it would be part of the CDF for an operating module.

MEMBER DIMITRIJEVIC: Yes, that's why I say maybe after they complete that, they will have to

add the new initiating event. I mean, I don't know. I'm just saying that's not in the PRA.

CHAIRMAN RICCARDELLA: You know, it's, do they have a reasonable basis for their assumption on the probability of dropping the module?

MS. POHIDA: For single module drop?

CHAIRMAN RICCARDELLA: Yes.

MS. POHIDA: That doesn't impact another module?

CHAIRMAN RICCARDELLA: Regardless, what's the probability of dropping a module, whether it impacts it or not?

MS. POHIDA: Okay. I just discussed this in a prior meeting. It's about an order of magnitude lower than an EPRI report where they assessed the probability of a dropped spent fuel cask. Okay? And it's about, roughly, two orders of magnitude lower than what was estimated in a NUREG -- I can't remember the number now -- for heavy load drops greater than 30 tons.

What we did is we used the --

CHAIRMAN RICCARDELLA: So there's not justification for those orders of -- is there some justification why those are so much lower?

MS. POHIDA: I will speak to that. If the

Applicant has further information -- it is, in the NUREG most of those failures were due to rigging failures. Okay? Whereas, in this design they have a designated module lift adapter with designated attachment points to the containment to move the nuclear power module. Does that help?

CHAIRMAN RICCARDELLA: Yes, that helps for the second one, but what about the --

MS. POHIDA: But this information is being reevaluated in context of this multi-module drop event.

MEMBER DIMITRIJEVIC: Well, in that case, I have an additional question.

MS. POHIDA: Thank you.

MEMBER DIMITRIJEVIC: You asked them to put the insights for a module drop in Chapter 19, but --

MS. POHIDA: Yes.

MEMBER DIMITRIJEVIC: -- that wasn't done? And so, I can understand some and understand that is --

MS. POHIDA: For a single module drop, yes.

MEMBER DIMITRIJEVIC: Yes. Okay. All right. For me, all right, there is some percentages

the single module becomes multiple, but that's all right, a single module.

And that's all right because some of these things are in different tables, as I saw in your ICI. However, I would object to you not ask them in design -- you know, this is not final design and, you know, the claim is not safety system.

So, my question is for human action, which you notify there is action of commission, which is the most important contributor to module drop. I think that these actions should be in Chapter 19 and it should be in the -- I think it is Table 7, teaching why it is important --

MS. POHIDA: Human actions?

MEMBER DIMITRIJEVIC: Yes, human actions, yes, for the shutdown.

MS. POHIDA: That is being reevaluated in context of this RAI.

MEMBER DIMITRIJEVIC: Oh, excellent. All right.

MS. POHIDA: Okey-dokey. Are there any more questions?

Thank you.

MS. NEUHAUSEN: So, due to the open item on multi-modal risk that Marie just discussed, the

staff can't make a finding on the description in DCA Part 2, Tier 2, Section 19.0 and 19.1.

And then, the only other comment I have to make is that we were provided some SER comments during the previous meeting, and we agree with them. And so, phase 4, there will be changes associated with those comments.

And 19.2.

MS. GRADY: Okay. And for the severe accident portion of Chapter 19, there are two open items. And I can describe them briefly because they're both still in evaluation.

One of them is the equipment survivability evaluation, and that is being impacted by the fact that the Applicant has proposed a new method of determining an accident source term. And whatever source term finally gets agreed upon is going to impact the equipment survivability program and what components are involved and what conditions they're going to be evaluated under.

And that's it for equipment survivability.

MEMBER CORRADINI: And just to be clear, so staff now has a Revision 3 of the source term --

MS. GRADY: Yes.

MEMBER CORRADINI: -- and it is under

review?

MS. GRADY: Absolutely.

MEMBER CORRADINI: Okay.

MS. GRADY: And I should also mention that, coincident with that and coincident with the equipment survivability evaluation, the Applicant has also submitted an Exemption Request No. 16, which is the post-accident sample system exemption request, which is significantly related to this accident source term. And all three of those are being evaluated simultaneously.

MEMBER CORRADINI: Okay.

MS. GRADY: And that's the open item.

And I was here on the Subcommittee meeting and described the other open item, which is under hydrogen generation and control. And this is also still under evaluation. There has been identified an accident by NuScale where there could be a CVCS line break underneath the bioshield. And that could, in fact, produce detonatable or combustible conditions. And if it did, it would lead, then, to multi-module risk; that the bioshield wasn't designed. So, we are reviewing our analysis of that, and that is still ongoing. I'm expecting a confirmatory calculation on what conditions will be for these under the bioshield

later on this week. So, by phase 4, I should have an answer as to whether or not this leads to that.

And because there are two open items in Chapter 19.2, we can't say that it's final yet. And the two open items are the equipment survivability and hydrogen generation and control.

MEMBER CORRADINI: Questions by the Committee?

If not, we're going to go on to Chapter 21, I have a kind of feeling.

Who's handling 21? I had that feeling. You're back.

DR. CHOWDHURY: Me, too. So, should I proceed?

MEMBER CORRADINI: Yes, please do.

MEMBER DIMITRIJEVIC: I have an objection. I have an objection on the title of this chapter because the chapter definitely is not multi-module design consideration because the only thing which is here is the systems and common systems. So, I don't call it "multi-module design system consideration". The risk does not consider the accident drops the -- the hydrogen explosion. Human action is different from the very important things moving the module around, and all I see for this section. So, don't

call it "the consideration".

DR. CHOWDHURY: Okay. I'll answer to that question in just a second.

So, once again, Prosanta Chowdhury. I'm the project manager. And this is Chapter 21.

MEMBER REMPE: Is your microphone on?

DR. CHOWDHURY: Yes.

MEMBER CORRADINI: He's just a very quiet person.

DR. CHOWDHURY: Once again, this is a full Committee meeting on Chapter 21, "Multi-Module Design Considerations". And I will answer your question, or try to. I'll try to.

What happened is that this is a new and unique chapter in design certification application. So, we never had Chapter 21. We do not even have an SRP standard section on Chapter 21. This is the title that the Applicant used to summarize the multi-module shared systems' interactions and their effects, and compiled and consolidated everything under this chapter.

So, we utilized the same, so that we -- the chapter titled "consideration". In this chapter, we never documented any staff's findings. We simply pointed to where those multi-module consideration and

assertions and shared systems' interactions have been evaluated and documented.

So, could we name it differently? Probably.

MEMBER DIMITRIJEVIC: Well, the only thing which I want to say, it's not module consideration. It's the system consideration. Because all new and unique things were not considered. The unique thing is that you move the modules; you can drop them. That's unique. The unique thing is that you can have a hydrogen explosion affecting multi-modules. That's unique. Unique thing is that you have an operator responding to that, multiple events, which is also not considered here. The only thing considered is the systems. So, it should be "multi-module design system consideration". I disagree that new and unique things are covered.

DR. CHOWDHURY: I understand.

MEMBER DIMITRIJEVIC: More than half of them are not covered.

DR. CHOWDHURY: I understand, but here, also, multi-module includes systems that support the multi-modules. But if NuScale chooses to provide any insights into the nomenclature, please do so.

Okay. So, I'm going to move on. Thank

you for the comment. I appreciate it.

So, this is the same list of technical staff, and some of the staff are here today to answer any questions, including Mary Pohida. Thank you for joining me here.

And then, this is what is presented. On May 15th, we presented to the Subcommittee this Chapter 21, where we said that Chapter 21 didn't have any open items or confirmatory items. And staff looked at number of shared systems that used the standard review plan, and, also, design-specific review standards were applicable.

And staff documented that evaluation in multiple sections of different chapters which are listed here. I had a table there that listed which systems are evaluated where.

And then, there was, I understand, a question from the Subcommittee whether loss of any shared system would result in any module shutdown. And I want to point to two areas of the Applicant's Design Certification Application, Part 2, Tier 2, Section 21.2.2 that states, "A total functional failure of certain shared systems may lead to an automatic or a manual trip of up to 12 NPMs." Now NPMs stands for NuScale Power Modules. "But these

failures do not present safety-related NPM functions."

MEMBER REMPE: So, that I don't think is quite the question that this member of the ACRS Subcommittee asked. I asked, is there guidance? Because you had manual trip there. And I think during the Subcommittee meeting we were told that, yes, there are some shared systems, there are certain shared systems where we were told, yes, the operators are going to have to shut down and they will be guidance provided. And we have been told regularly, oh, the guidance comes at the COL applicant stage. And where I asked, is there enough guidance in what will be certified by the staff that they understand, yes, if you lose whatever system, you've got to shut this thing down? So that whoever is around when they actually have a COL applicant, because we know a certified design can be picked up by somebody else, will know what they're supposed to do, and the staff will be able to monitor what is being done by the COL applicant that they know, yes, if you lose "X" system, you've got down four, five, six, whatever number of modules.

DR. CHOWDHURY: Correct.

MEMBER REMPE: Is that guidance somewhere once they're certified?

DR. CHOWDHURY: Yes. Thank you for clarifying your question.

If you remember, when we presented Chapter 13, part of Chapter 13, 13.1 and 13.5, NuScale submitted what is called genetic technical guidance. And the staff has been reviewing it, has reviewed the initial, the first edition of it, asked multiple questions. The questions were responded to. A new revision just came in, generic technical guidance, just the end of last month, May 31st.

So, the generic technical guidance provides the guidance to develop procedures. So, those will be the plant-specific, operator-specific procedures. So, there is a process in place to develop specific procedures for operators to follow.

And my assumption here is that the shared systems' failures and their impact, how the operator will react to it, will be included in those procedures. So, that's my understanding.

MEMBER REMPE: So, my question now, knowing that this document has come into the NRC --

DR. CHOWDHURY: Uh-hum.

MEMBER REMPE: -- on May 31st, is for you to provide that formally, someone from your staff provide that to ACRS, the answer to the question. We

looked at this revised guidance, and they clearly said, given enough information, that we know, if system "X", shared system "X" goes down, that this number of modules must be shut down. And there is enough information in what the staff's going to be certifying that it's not a question that you're assuming it's there; it's actually there? That's what I'm trying to get to.

DR. CHOWDHURY: Okay. What the staff, at this point, what I assume the staff will do is inform the Committee and document in the SER what they have reviewed and whether this guidance is adequate for the COL applicants or license holders and operators to develop their detailed operating procedures based on this guidance. Because those will be the plant-specific, and they should cover the aspects of operation under the guidance of those GTGs.

So, I think --

MEMBER REMPE: Am I clear enough on what I would like to see?

DR. CHOWDHURY: Yes.

MEMBER REMPE: And we'll hear back?

DR. CHOWDHURY: Yes. But what I want to mention here is that I am not in a position at this time to tell you exactly whether your exact question

will be answered. However, the staff will provide their findings based on the Revision 1. That had led to some open items also.

MEMBER REMPE: That's fine, if you even say, hey, it's not totally adequate; there are some open items. I just want to make sure you understand the question and --

DR. CHOWDHURY: It may be at a higher level.

MEMBER REMPE: -- that I will get an answer.

DR. CHOWDHURY: Right, right. It may not be very specific; it may be at a higher level, but yes.

MEMBER REMPE: Okay. And let me know if it's such a high level. I'm a little dumb sometimes and I might not catch it if it's too high.

(Laughter.)

MEMBER REMPE: But it has to answer my question because I'll be asking it again later.

DR. CHOWDHURY: Sure.

MEMBER REMPE: Thank you.

DR. CHOWDHURY: Okay. That's it. That's all I have.

MEMBER CORRADINI: Okay. Questions by the

members for Chapter 21?

MEMBER KIRCHNER: It seems like your answer for that leads one to believe that the only thing being certified here is the module itself as a standalone entity, or at least that's my interpretation. Because we know several systems that are shared, it seems to me one can be a lot more explicit about what their impact is. And, again, to leave it to COL applicant -- I'm thinking of the CVCS system, in particular. It's not risk-important, and yet, it's an actor in so many different scenarios that I don't know how that determination was made. I'm still puzzled by that.

But that's a good example where generic -- you need to go further in suggesting generic tech specs or something to develop those procedures.

MEMBER MARCH-LEUBA: They are reluctant to put it in tech specs because it implies safety-related. In a perfect world, CVCS will be in the technical specification, because anymore you cannot operate without it.

MEMBER KIRCHNER: Well, they even go as far as to rely on it operating all the time because they want a constant sparging effect and to pressurize it. So, I'm --

MEMBER REMPE: My take on his response was we've got some additional information. And he is assuming that that information will be sufficient that it will say, if "X" system goes down, four, five, six, however many it's supporting, modules must be shut down. And he hasn't looked at it yet. He thinks that's what it's going to have, but I think we have to have a clear answer. Is that not what I -- I got that he is going to make sure that information exists, even if he has to have a COL item or something. It will be identified that we need more information --

MEMBER DIMITRIJEVIC: And maybe we tell them that they need to be shut down. That's interesting, how long it will take them to shut down the --

MEMBER REMPE: All of those things, I want to see the additional information, but this is the first I heard that another document is coming in, because before there wasn't.

DR. CHOWDHURY: No, this document came in already. We are just looking at the Revision 1 of it, and we had questions on Revision 0 that we asked lots of questions and we got answers. And there was an open item. We need to verify the GTGs against the ISP testing that they have done. So, that is going on

right now or will be going on.

I also want to point out, on my slide No. 4, that NuScale has two tables in Tier 2, Table 21-2 and 21-3. And that's where NuScale shared systems have the potential of an adverse system interaction or an undesirable multi-module interaction, are summarized in those two tables.

MEMBER CORRADINI: I think Chapter 21 is strictly for shared systems, Walt, and CVCS is not a shared.

MEMBER DIMITRIJEVIC: No, but CFDS is.

MEMBER CORRADINI: CVCS is not shared between modules.

MEMBER DIMITRIJEVIC: CFDS is.

MEMBER KIRCHNER: For boron injection --

MEMBER CORRADINI: Well, boron injection is one thing, but I thought you were talking about the CVCS system. Each module has its own CVCS system.

MEMBER MARCH-LEUBA: Am I wrong? Am I mistaken? Are there only two CVCSs for the --

MEMBER CORRADINI: No. You're thinking of maybe component cooling.

MEMBER MARCH-LEUBA: No. There's only one BIS.

MEMBER DIMITRIJEVIC: CFDS.

MEMBER CORRADINI: Correct. Other questions for Mr. Chowdhury?

(No response.)

MEMBER CORRADINI: Okay. At this point, what I want to do is I want to get public comments before we go into closed session.

So, I am told both lines are open.

Is there anyone in the room that wants to make a public comment?

No. So, please on the phone lines, could someone please at least acknowledge that the phone lines are open, please?

PARTICIPANT: The phone lines are open, and I don't have a question.

MEMBER CORRADINI: Okay. Go ahead with your comment, please.

MEMBER BLEY: She doesn't have one.

MEMBER CORRADINI: Oh, I thought she said she did. No comment?

Does anybody else have a comment on the line?

Okay. Hearing none, why don't we close the lines? And let's verify that, and then, we can go into closed session to discuss some of the other questions we had about Chapter 19.

Is NuScale coming up for this?

CHAIRMAN RICCARDELLA: Let's take a 10-minute break, so 10 minutes after 4:00.

(Whereupon, the above-entitled matter went off the record at 3:58 p.m.)

Reactor Oversight Process Enhancement Initiative

ACRS Briefing
June 5, 2019

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

Background

- 99 recommendations received for enhancing the ROP
- Discussions at Operating Reactor Business Line and Transformation Commission meetings (fall 2018)
- ROP enhancement project initiated (October 2018)

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

ROP Enhancement Goals

- Make the ROP more risk-informed and performance-based
- Further improve consistency with the NRC's Principles of Good Regulation

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

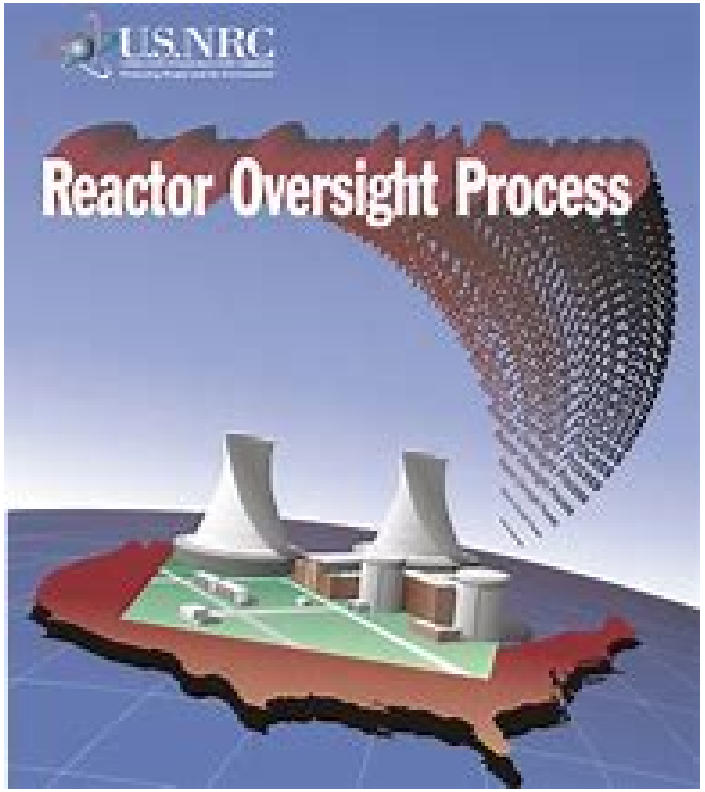
Objectives

- Focus on issues of higher safety significance
- Enhance Significance Determination Process (SDP)
- Improve inspection program
- Improve communications with industry

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

Guiding Principles

- Leverage ROP self-assessment process
- Maintain ROP strengths
- Develop a strong basis for important changes
- Obtain extensive stakeholder feedback
- Take into account alternate views



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

Project Infrastructure

- NRR Director is the Executive Sponsor
- Recommendations binned into eight themes
- Each theme assigned a team leader and SME(s)
- Held internal alignment meetings/seminars, numerous public meetings with industry/NGOs and RIC session
- Created a public ROP enhancement website
- Established project management tools, including an internal SharePoint site
- SECY paper to the Commission by end of June 2019

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

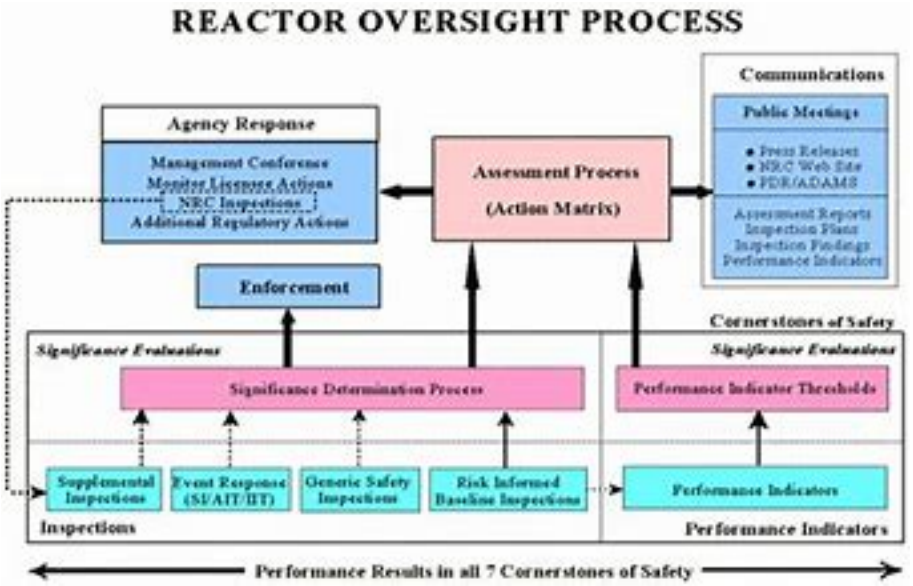
Completed Actions

- Reinforce press release guidance for White findings
- Revise approach to IMC 0609, Appendix M
  - SDP using qualitative criteria
- Improve communication with licensees about inspection results

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

Early Opportunities

- "Right-size" inspection follow-up for White findings
- Modify White and Yellow finding descriptors
- Refrain from expanding baseline inspection program in the future



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

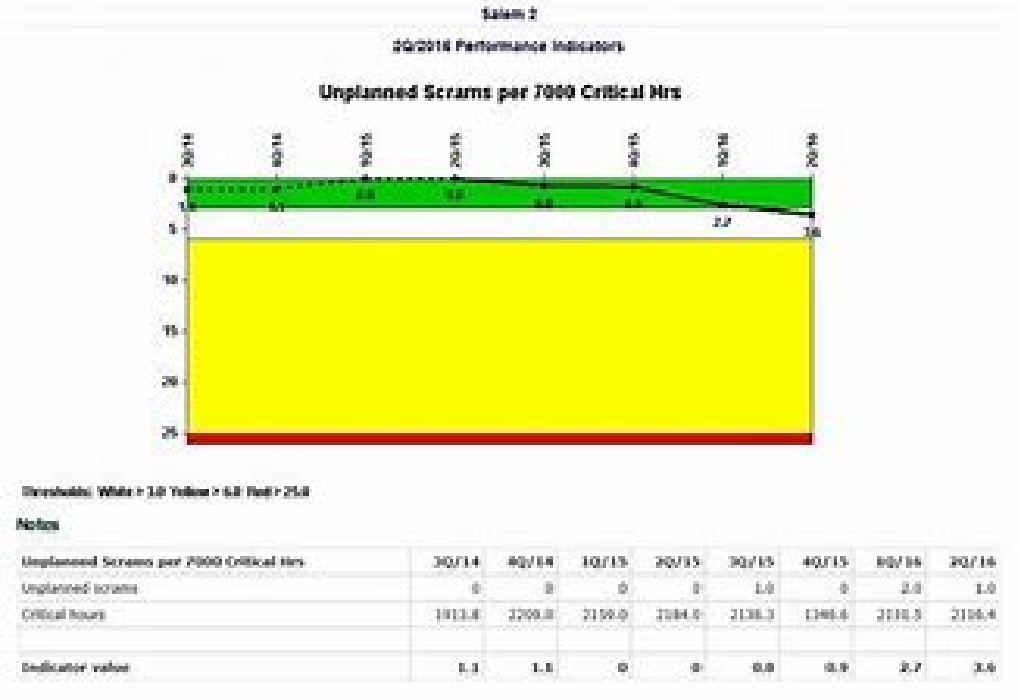
Commission Approval

- Optimize Baseline Inspection Program
  - Review IPs to verify optimal efficiency and effectiveness
  - Eliminate unnecessary overlap and redundancy
- Eliminate the four quarter requirement for closure of greater-than-Green inspection findings
  - Option to establish requirement that PIs remain inputs until supplemental inspection complete (consistent treatment)
- Specific changes to the SDP for Emergency Preparedness (EP)
  - Distinguish significance of certain EP planning standards

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

Next Steps

- Evaluate revisions to performance indicators
- Perform comprehensive review of Problem Identification & Resolution Inspection Program
- Perform effectiveness review of the Cross-Cutting Issues Program



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

Next Steps

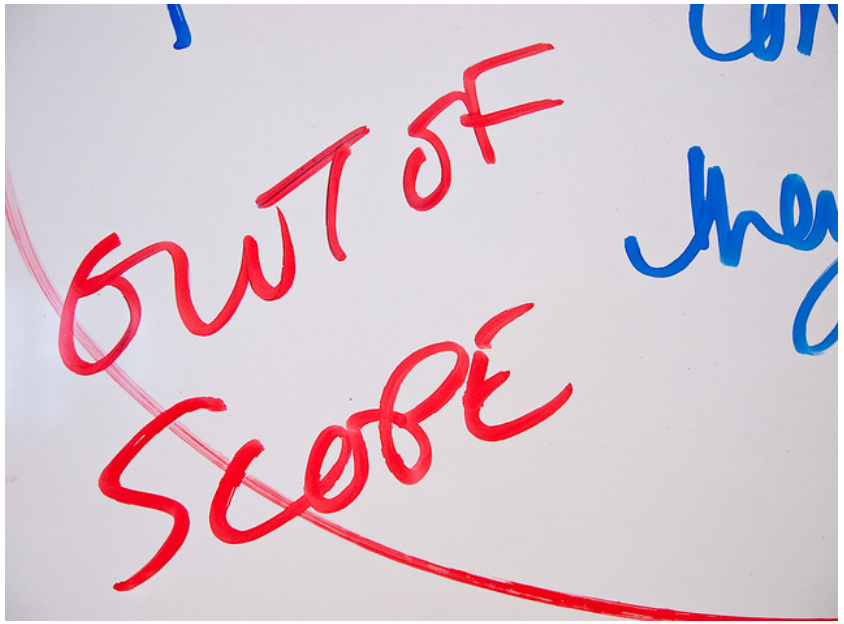
- Optimize Independent Spent Fuel Storage Installation and radiation protection inspections
- Evaluate SDP infrastructure improvements
- Assess additional actions identified in EP focused self-assessment

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

Out-of-Scope Recommendations

- Regional structure and organization
- Low risk compliance issues and backfit and licensing basis recommendations
- Inspection report streamlining

Publicly available memo to disposition all 99 recommendations



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

Discussion

NEI Perspectives on the NRC's ROP Enhancement Project

Martin Murphy, Xcel Energy &
NEI Regulatory Issues Working Group

June 5, 2019

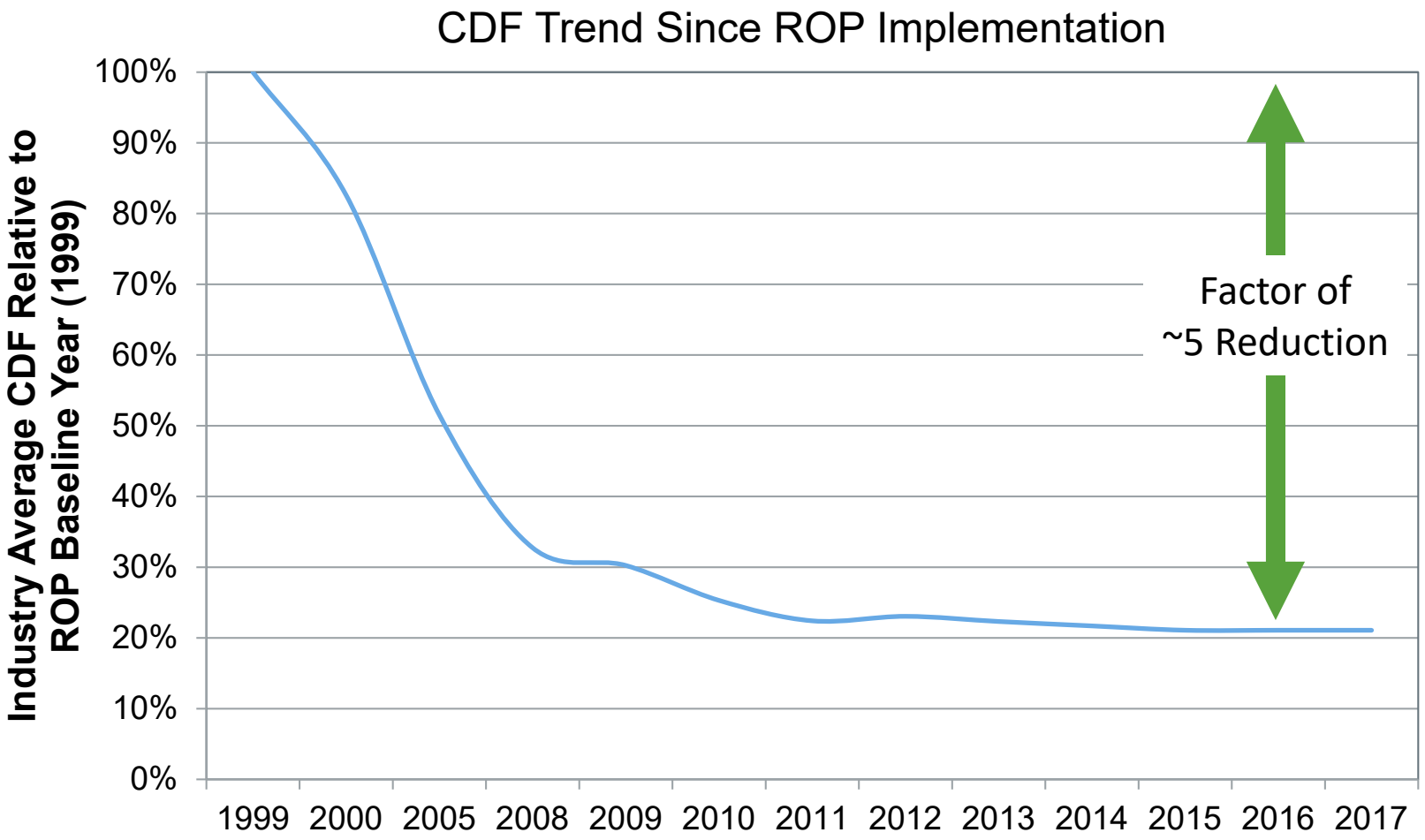
Overview

- Basis for Our Recommendations
- Our Understanding of the Staff's Proposal
- Challenges
- Opportunities

Unprecedented Industry Performance

The Combination of Performance and Margin Should Enable Transformation

Basis for Our Recommendations



Our Understanding of the Proposal

- Based on public briefings only
- Three key areas:
  - Response to White Findings
    - Prompt closure after successful IP 95001 inspection
    - Change in labeling
    - More flexible IP 95001 effort
    - Change in closure of White performance indicator
  - Baseline Inspection Program Changes
    - Optimize inspection hours and samples based on experience
    - Review and revise PI&R inspection
  - Significance Determination Process Changes
    - Better risk-inform the EP SDP
    - Merge Mitigating Strategies SDP into At-Power SDP
    - Improve interactions with licensee during SDPs

Challenges

- Response to White Performance Indicators
  - Staff proposes to change the means to close a White PI, likely making this White input to the Action Matrix endure longer
  - In our view, staff has not provided an adequate basis for the Commission to make an informed decision on the proposal
- Baseline Inspection Program Changes
  - Staff proposes some modest changes in eight inspection procedures
  - In our view, staff could go farther in reducing the burden and improving effectiveness of the BIP
- Significance Determination Process Changes
  - Staff's ideas for the EP SDP look promising; the devil will be in the details
  - The basis for combining the Mitigating Strategies SDP with the At-Power SDP, but not the B.5.b SDP, is not clear to us

Opportunities

- The June SECY on ROP Enhancement should be seen as a first phase of a multi-phase effort
- The second phase should address other areas for improvement, including:
  - Making IP95001 a “smarter” inspection
  - Streamlining ISFSI inspections
  - Optimizing Radiation Protection program inspections
  - Improving realism in the RASP Handbook guidance for SDPs
  - Completing the holistic review of PI&R inspections
  - Looking for performance indicators that would allow further focusing of inspections on risk-significant areas unsuitable to oversight by performance indicators
- The proposed review of the cross-cutting aspects program should include all possible outcomes

