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

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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660TH MEETING

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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WEDNESDAY

FEBRUARY 6, 2019

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ROCKVILLE, MARYLAND

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The Advisory Committee met at the Nuclear Regulatory Commission, Two White Flint North, T3D50, 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

VESNA B. DIMITRIJEVIC, Member

WALTER L. KIRCHNER, Member

JOSE MARCH-LEUBA, Member

HAROLD B. RAY, Member

GORDON R. SKILLMAN, Member

DESIGNATED FEDERAL OFFICIALS:

DEREK WIDMAYER

QUYNH NGUYEN

MIKE SNODDERLY

ZENA ABDULLAHI

T-A-B-L-E O-F C-O-N-T-E-N-T-S

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

(8:31 a.m.)

CHAIRMAN RICCARDELLA: Good morning. The meeting will come to order. This is the first day of the 660th meeting of the Advisory Committee on Reactor Safeguards.

During today's meeting the Committee will consider the following. Technology-inclusive, risk-informed, performance-based approach for approving non-light water reactors, non-power production and utilization facilities rulemaking, Interim Letter Chapters 2 and 17 of the NRC Staff's safety evaluation reports, with open items related to the certification of the NuScale small module reactor.

Number 4, review of AURORA-B for LOCA scenarios and preparation of ACRS reports. The ACRS was established by statute and is governed by the Federal Advisory Committee Act, FACA.

As such, this meeting is being conducted in accordance with the provisions of FACA. That means that the Committee can only speak through its published letter reports.

We hold meetings to gather information, to support our deliberations. Interested parties who wish to provide comments can contact our office

requesting time after the federal register notice describing a meeting is published.

With that said, we also set aside ten minutes for spur of the moment comments for members of the public attending or listening to our meetings. Written comments are also welcome.

Mr. Derek Widmayer is the designated federal officer for the initial portion of this meeting.

Portions of the sessions, on Interim Letter Chapters 2 and 17 of the NRC Staff safety evaluation reports with open items may be closed in order to discuss and protect information designated as proprietary.

The AURORA-B for LOCA scenario meeting will be closed in its entirety in order to discuss protected proprietary information.

The ACRS section of the U.S. NRC public website provides our charter, bylaws, letter of reports and full transcripts of all full and subcommittee meetings. Including all slides presented at the meetings.

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

There will be a phone bridge line, but to preclude interruption of the meeting, the phone will be placed in a listen only mode during the presentations and Committee discussion.

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

As an item of current interests, I would like to welcome to new management and analysts to our support staff, Paula Dorm and Makeeka Compton.

MEMBER CORRADINI: They should stand. Stand up.

MS. DORM: Hi, I'm Paula.

CHAIRMAN RICCARDELLA: That's Makeeka. Hi. With that said, I'll turn the meeting over to Derek Widmayer.

MEMBER BLEY: Well, speaking on Derek's behalf, this is --

(Laughter.)

MEMBER BLEY: I'd like to welcome everybody to our December meeting to look at the Staff's proposed SECY and guidance documents on the, what we were calling the licensee modernization

project and is now called the Technology-Inclusive, Risk-Informed and Performance-Based Approach, to inform the content of applications for licensees' licenses.

At this point, Bill, am I going to turn it over to you or John?

MR. SEGALA: Yes.

MEMBER BLEY: John Segala, please introduce this for us.

MR. SEGALA: Thank you, Dr. Bley. I'm John Segala, I'm the Chief of the Advance Reactor and Policy Branch in the Office of New Reactors, and I'm appreciative of the ACRS inviting us here today.

We had previously briefed the Subcommittee back in October and we were scheduled to brief the Full Committee in early December, but due to President Bush's funeral and the Government closure at that time, we got rescheduled. So I appreciate you accommodating us today.

We have, as you said, we're moving forward with commission paper. We're also developing an associated draft regulatory guide.

We were scheduling to try to get the draft guide out the end of December. Due to the Government, the Federal Register has been closed for us. But we

also ran into some internal concurrence issues.

So we're still working to get that draft guide out as soon as possible, but I just wanted to update you on where we were with that.

MEMBER BLEY: Thank you. We look forward to seeing that.

MR. SEGALA: Okay. So I also wanted to sort of step back based on some things that have happened since we last met.

First of all, as you know, when you look at some of the designers out there that might be considered early movers, ones that would be coming in with an application using the current regulations.

We see the licensee modernization project in our draft guide as very important for helping to establish, as you said, a technology-inclusive, risk-informed, performance-based approach for establishing the licensing basis and the content of the application.

In addition, recently, the Nuclear Energy Innovation and Modernization Act was signed into law. That's requiring the NRC to develop a technology-inclusive, risk-informed, performance-based regulation for advance reactors. We call this Part 53, although it's not officially a Part 53.

But we see, we don't know the exact scope of what this is going to be, but we see the licensing modernization project as forming the foundation for this future rulemaking that we have to do by 2027.

So I just wanted to sort of set the stage for that. We're looking for the ACRS today to provide feedback on our commission paper and to provide us a letter on the commission paper.

So that's our goal for today. And we're looking forward to having discussions.

MEMBER BLEY: Thanks for that. What's the status of the paper now, I thought you were, you were hoping to get it out already?

MR. SEGALA: Yes. And we're still working on getting that out as well.

MEMBER BLEY: Okay.

MR. SEGALA: It's in final concurrences now.

MEMBER CORRADINI: So, just to clarify one thing. So, the intent is the technical basis we're going to be talking about today would probably be what you would point to in satisfaction of this new congressional action?

MR. SEGALA: It will help form the base foundation for that new rule.

MEMBER CORRADINI: Okay, thank you.

MR. SEGALA: So I just wanted to put that in perspective for you that this is where, we had always, when we had developed our vision and strategy document and our implementation action plans, we had always included in the mid-term and the long-term implementation action plans, a plan to look at whether or not we should be doing a new rule for advance reactors.

Now, with this law, we were being told to just do it. So, we had always thought that LMP would eventually help form the basis if we end up, in the future, ever did a new rule. But now that that's become a reality, we're moving forward with that in mind.

MEMBER BLEY: Well, it's nice to be a little ahead.

MR. SEGALA: Yes. For once.

MEMBER REMPE: John? You mentioned that you were hearing some of the design developers expressing interest in using what is in the NEI document and this approach, can you characterize a little bit more about how strong that interest is and the schedule when you'd anticipate them to actually trying to apply it?

MR. SEGALA: Well, I guess it depends on who you talk to. There has been, we've generally heard favorable responses from designers on using it. We're not quite sure if everybody is going to use it.

There have been, as we mentioned in a Subcommittee meeting, there's been a number of tabletops or --

MEMBER REMPE: Right.

MR. SEGALA: -- pilots of LMP. X-energy has done it, Oklo has done it.

We're looking to, I believe Kairos is planning to do it. Westinghouse, for the eVinci, is planning to do a tabletop.

And so, we're hearing a lot of interests in using it. I think the one area that we're not quite sure, that we haven't heard as much, has maybe been in more the molten salt reactors.

MEMBER REMPE: So, okay, let's pick on X-energy. Have they said, hey, we're going to use it, we're going to be here within the next year to come, or how strong is that is interest?

Or is there anyone who said, I'm going to be here in the next year?

MR. SEGALA: I can't really talk about that because that information is proprietary.

MEMBER REMPE: Okay. But without characterizing anyone, you can't tell me if anyone has said they're going to be here in the next year, the next two years, next five years?

MR. SEGALA: We are currently expecting an application within the next year or so.

MEMBER REMPE: Okay.

CHAIRMAN RICCARDELLA: Excuse me, we need to pause the meeting for a second so that we can open the phone for outside. And it's going to be a little noisy.

(Off record comments.)

CHAIRMAN RICCARDELLA: Okay, you can continue.

MR. SEGALA: So that's all I had in terms of --

CHAIRMAN RICCARDELLA: Thanks.

(Laughter.)

MEMBER CORRADINI: I'm sure the people on the line enjoyed that conversation. But that was the introduction, that's all you had.

MR. SEGALA: We're done.

(Laughter.)

MR. SEGALA: You can write the letter right now.

CHAIRMAN RICCARDELLA: Correctly.

MR. SEGALA: Do you want Bill to swear on a Bible since he's in the court of law here?

MR. RECKLEY: No, thank you. Okay, so, again, I'm Bill Reckley and I'm going to walk through some of the background, the guidance.

We still call it licensing modernization project as well, but the official document is a draft of NEI 18-04 and a draft regulatory guide which provides the background into elements of how we would approach licensing of non-light water reactors. It's not the total story but it's been, these areas are the cornerstones, if you will, of a licensing approaches. And then that feeds into the draft commission papers.

As John said, when we came in October, we were really kind of looking for a letter on both the guidance, so, down in the details, as well we the higher level, that would be addressed in the commission paper. Although things haven't really panned out as we thought.

We thought the draft guide would be out by now and so, but we're going to stick to the plan that the draft guide will be going out for comment and we'll return to the ACRS for the final guide. And that's the details, both in the NEI guidance document

and the draft guide.

MEMBER BLEY: Bill?

MR. RECKLEY: Yes.

MEMBER BLEY: At that time, will there be any additional tabletop work completed? And if so, can we include some of that in the --

MR. RECKLEY: Yes. Yes. Anything that is done and any actual insights, even from the two tabletops that have been done.

At the Subcommittee meeting we talked about the PRISM tabletop, but the report wasn't out.

MEMBER BLEY: We did get it, yesterday, I think.

(Laughter.)

MR. RECKLEY: Yes. We've provided it. I know. We'll, we only got it Friday, so it wasn't as --

MEMBER BLEY: Okay, fair enough.

MR. RECKLEY: -- if we were holding it. But now that the report is out that would be perhaps another topic, as well as any other tabletops that are done, as John mentioned, on any of the other technologies.

And any insights that we get from the commission, from the paper, ACRS, discussions at this

and any additional meetings that we have, and then the public comment itself. And then at the same time, the industry, all of the developers, or many of the developers, are looking at it in real time.

And they might provide comments, both to us and to the, to NEI, for incorporation into the final NEI document. So it's still a little bit of a fluid process, but nothing to date has been identified that really changes things dramatically.

MEMBER BLEY: If I can --

MR. RECKLEY: Sure.

MEMBER BLEY: -- with one. I'd like to hear from, at that time, from both you and folks from the industry, in the tabletops that will have been done by that point.

I'm interested in, are there any aspects of the NEI document and your guide that have not been tested.

MR. RECKLEY: Okay.

MEMBER REMPE: While we're talking about those tabletops, this is the first time I heard that something like an Oklo's reactor that is more of, really a departure from the established PRISM and the pebble bed that we've heard about for a long time.

Are you familiar with what occurred in

that tabletop? Is there a document, were you there?

Something that doesn't maybe have a PRA for example, how did that work?

MR. RECKLEY: We'll provide the report, the public version of the report today's ACRS. Actually, we --

MEMBER REMPE: Is it done?

MR. RECKLEY: There is a public version available now.

MR. SEGALA: There is one, I'm not sure it's been made public yet.

MR. RECKLEY: Okay.

MR. SEGALA: We went through the process --

MR. RECKLEY: All right.

MR. SEGALA: -- of getting a redacted version of that.

MR. RECKLEY: So, when it is public, we will provide it.

MEMBER REMPE: Can you give us a heads up, how did it go or anything, or you just got to wait till it becomes public to talk in a public meeting about it?

MR. RECKLEY: It would be better if we waited.

One of the lessons that we really look to get out of, not only Oklo but then probably some of the other micro-reactors, is, within this methodology, which has its roots going all the back into the '80's for a different technology, whether the micros do fit, whether the guidance needs to be tweaked because the micros are different enough from the MHTGRs and the PRISMs, that size, that medium size, whether the guidance needs to be tweaked, whether additional guidance might be developed for micros.

So that is one of the things we're looking to get out of some of the recent and planned tabletops.

MEMBER REMPE: And did you see that the guidance needs to be tweaked or you can't, you're still trying to decide?

MR. RECKLEY: I'm not sure that we saw that. It may be that the language here or there needs to be clarified.

But, again, I think because we're addressing these key elements, the identification of events, the classification of the SSCs and an assessment of defense-in-depth, those are things that any size reactor, even non-reactors, need to address that.

And so, I don't think there will be any fundamental shifts, but there may be areas where they're different enough, the behaviors and their reliance on inherent features for intrinsic characteristics, whatever the key phrase is there, might need to get reflected a little more in the guidance.

MEMBER REMPE: Okay, thank you.

MR. RECKLEY: So, as John mentioned, although it didn't pan out, we still expect to issue the draft guide and wouldn't really be able at this point, hopefully. It's near enough in the future that we wouldn't be able to take into account ACRS comments on the draft, but we'll come back for the final.

On the commission paper, it's changed in that we would now expect to wait for your letter before sending up the commission paper. So, as opposed to telling the commission in the paper, the little couple of sentences, you'll get a letter from ACRS, it will be, you've gotten a letter from ACRS.

MEMBER BLEY: We're hopeful in that.

(Laughter.)

MR. RECKLEY: Well, again, yes. We can always change it back.

So, just, in terms of the background and

kind of higher-level activity, I won't spend a lot of time because we have gone over this numerous times between Subcommittees and Full Committees, the non-light water reactor program, or advance reactor program, we've defined through a number of strategies and then activities within strategies.

Trying to increase the skills and capability of the staff is Strategy 1. That's training and so forth.

Strategy 2 is trying to make sure we have the analytical tools, the computer codes, simulation models.

Strategy 3 is licensing processes. And that's largely what we're going to be talking about today, the licensing modernization project or NEI 18-04.

Strategy 4 is consensus codes and standards. The major activity there is ASME Section 3, Division 5 for high temperature materials.

Strategy 5 is policy issues. And I will make a mention that the checkmark on functional containment, we not only sent the paper up last year, SECY-18-96, but we got the commission decision and the Staff's requirements memorandum dated December 4th, saying that we could proceed with that approach, the

functional containment.

MEMBER BLEY: Bill, I don't think we've seen the SRM.

MR. RECKLEY: Okay. It will be --

MEMBER BLEY: I guess it's public?

MR. RECKLEY: Yes.

MEMBER BLEY: Yes, we can get it.

MR. RECKLEY: Okay. It was --

MEMBER BLEY: Didn't know it was out. And while I say that --

MR. RECKLEY: Sure.

MEMBER BLEY: -- are you going to talk about EP for us in a moment? What's the status there?

MR. RECKLEY: That's currently before the commission and we're still waiting for a commission decision on that proposed rulemaking. So the next step is expected to be the issuance of a proposed rule for public comment on how to consider potential reductions in emergency planning zones for advance reactors and other new technologies, which includes not only non-light water reactors but small light water reactors, such as the NuScale SRM. And then also, medical isotope production facilities.

And, yes, we can get you that but it's available on the commission's site.

MEMBER BLEY: Yes.

MR. RECKLEY: It's a clean SRM, so --

MEMBER BLEY: Oh.

MR. RECKLEY: -- I mean, it basically said what we addressed in the SECY paper and what the ACRS recommended in the letter, we could proceed with that approach.

MR. SEGALA: I'd just like to also add on EP, that based on your letter and our response to your letter, we have added, we're in the process of adding some wording to the draft guide for that on source term and PRA. There's a little bit that we've added. And we're going to share that with you when we send that out.

MEMBER BLEY: Okay, thanks.

MR. RECKLEY: The two boxes at the bottom here are just, as we're doing this infrastructure work, if you will, we're trying to keep an eye on potential first movers and then things like micro-reactors and the request for information that's been issued, both by the Department of Energy and the Department of Defense.

And so we're trying to keep an eye on those activities, to Dr. Rempe's point, just to try to make sure that we're not caught by surprise by an

applicant coming in sooner than what we're prepared for.

So, as things firm up, again, keeping an eye on largely the DOE and DoD activities, if we see something starting to move, we would shift and try to make sure that we have preparations underway for that application, should it come in.

Okay. I'm going to go through a couple nightmare figures here for the next couple slides.

So the first is, I've used this in previous presentations to the ACRS, it's a kind of a generic risk assessment, risk communication tool called a bowtie diagram. And it goes through a process of looking at barriers and measures to prevent a top-level event and measures that one might take to mitigate or recover from a top-level event.

So, in light water space the top-level event is usually discussed as being core damage accidents in our space since we're trying to make this technology-inclusive. We just kind of use the unplanned movement of radioactive materials from one place, where they're supposed to be, to another place where they're not supposed to be.

And that way we can address molten salts or whatever technology might be presented to us.

So, within those barriers you can see some of the activities that we have already underway. For example, we're looking at emergency planning and whether emergency planning zones might be revised as a result of the technology.

That's usually the last line of defense to protect public health and safety. So that's that last box there in the figure.

We are looking at citing. Whether the same citing guidance and regulations, established for large light water reactors dating back from the, largely from the '50s and '60s, would still be necessary or appropriate for advance reactor designs.

I mentioned the functional containment in that box on that safety arm.

In the socioeconomic arm we're looking at Price-Anderson and we owe a report to Congress in 2021 that will say, is Price-Anderson good enough as it stands, is it too restrictive, is it not restrictive enough. Whatever the conclusion would be by that time frame.

We have to look at environment, and that is another activity we have underway to say, is the way we approach environmental reviews for large light water reactors, can it be right sized or revised to

address the smaller non-light water reactor designs.

So the box in the yellow there is, what is the LMP or what is in NEI 18-04 and the draft guide. It covers how we're going to identify and address both, from the plant standpoint, the prevention and mitigation of the identified events. Both internal and external.

MEMBER CORRADINI: So, I have a question about the one thing you didn't talk about, SECY-18-0076.

MR. RECKLEY: Okay.

MEMBER CORRADINI: So, how does one map that onto a frequency consequence analysis to make sure that you're not bound, well, to at least understand where it sits relative to consequences versus consequences from --

MR. RECKLEY: The way --

MEMBER CORRADINI: -- other initiating events?

MR. RECKLEY: Right. It may not get plotted on a frequency consequence because the frequency part is sometimes hard to get people to estimate for security events.

But what we're talking about under SECY-18-0076 is more of a consequence-based approach. And

the arrow there is pointing to that part of the security program that goes to intervening if there is an assault on the facility.

So, current requirements are that operating plants have ten, minimum of ten armed responders standing by waiting to respond to an assault.

MEMBER CORRADINI: So, it's taking the current approach and applying it to --

MR. RECKLEY: Right. The notion is, looking at that particular thing, the number of armed responders.

If one can address through the consequence assessment that even if the armed responders, even if the armed assault was successful, in terms of what they were able to damage under the design basis threat, that the consequences, in terms of public health and safety are below a threshold, then you can say, you can potentially relax that requirement for ten armed responders.

And in terms of the operating reactors, ten armed responders is $5 million a year. So that is the reason that the industry picked that particular activity out.

As we look at micro-reactors in some other

areas for advance reactors, it may be possible that additional security requirements get looked at.

MEMBER CORRADINI: Okay.

MR. RECKLEY: But for right now, we've narrowed it down to just a couple things that we're going to look at to say, could relief be justified through a consequence assessment.

MEMBER CORRADINI: I got it. Thank you very much.

MR. RECKLEY: Okay. So this is the second nightmare figure. As John mentioned, one of the things that we're trying to do is to kind of go back to basics because we're starting from a technology-inclusive. All sizes, all reactor types.

So, how can we kind of develop an approach that is so generic that it can address that wide range. So, part of the reason, or part of the way we'll do that, and this goes to, I think the ACRS comments when we were talking to you about emergency planning, is to focus on the source terms.

So, at the top of this figure is a generic mechanistic source term representation. Inventory times a series of release fractions. And then you enter that into a computer code, like MACCS, for how it gets distributed once it goes off site. And you

can do a consequence assessment.

And so, by and large, what we're looking at for each technology, and each design ultimately is, how are you controlling the release fractions across the series of barriers. And from a design standpoint you have flexibility.

For gas cooled reactors, the thrust of the argument to date has been, we want to control the first one, and maybe the first two. We want to try to keep the radionuclides within the TRISO particle. If it manages to get out of the TRISO particle we want to try to keep it in the matrix, to some degree, for other particular transients.

You also go as far as the reactor, the primary system, the helium circuit and a reactor building. But by and large, the thrust has been trying to keep it within the TRISO particle.

Another molten salt reactor design may have a different strategy altogether. And they may emphasize trying to keep certain radionuclide groups within the salt, but for other radionuclides a physical barrier. The last leap path factor.

So they might put the emphasis on salts, chemistry and then physical structures, like a building. Something closer to maybe a containment.

Although the lower energy may not be a challenge in terms of needing to survive 60 pounds per square inch, or something like that.

So, each design, each technology will look and they'll come up with a strategy for, in the end, trying to keep the radioactive material from escaping from the facility. So --

MEMBER CORRADINI: So, can I take, I like the diagram. Has Staff thought it through for these generic concepts and kind of estimated the hours for the decontamination as I move from left to right and the methods used for heat removal from going from left to right?

In other words, I'm sure that the particular industry or vendor will come up with calculations, et cetera, et cetera, but it seems to me one can rough out how this might look for the various three types.

MR. RECKLEY: We have. And I'm hoping that we'll have a report within a few months. We asked Sandia to look, and to use this model, and to go back historically. So they're not doing analysis --

MEMBER CORRADINI: Sure.

MR. RECKLEY: -- they're doing historical looks at PRAs and consequence assessments from each

technology.

MEMBER BLEY: And experiments?

MR. RECKLEY: Wherever they can get data.

MEMBER BLEY: Wherever they can get information.

MR. RECKLEY: Wherever they can get data. And where they don't have data they're going to use their best guess.

Just to give us this idea, and in part, the reason we ask them to do that is, as we look for the technologies as to where we should be putting our planning and resources, it should match up to where they, that technology is going to be trying to credit which release fraction they're going to put the emphasis on.

MEMBER BLEY: Okay.

MR. RECKLEY: And so, to date, nothing really all that surprising has come out of it. But we'll have a little better tool and we'll have the calculations. And as soon as they report is issued, we'll make it available to you.

MEMBER BLEY: We look forward to that. Are they looking at different reactor types as well?

MR. RECKLEY: Because of the constraints --

MEMBER BLEY: Yes.

MR. RECKLEY: -- in terms of how much money we gave them, they picked three designs, one for each technology group. Then they picked several event sequences.

Because each, the release fractions is a function of the transient. Each specific transient.

MEMBER BLEY: Of course.

(Off microphone comment.)

MR. RECKLEY: What?

MEMBER KIRCHNER: And the design. They're separating fuel and fission products. You're in a different place on this diagram to start the incident.

MR. RECKLEY: Right. So they're looking, again, they've picked a couple models.

MEMBER KIRCHNER: Yes.

MR. RECKLEY: Specific transients, specific reactor designs. And then they're going to scale things like power level and so forth.

So, as soon as that report is available, we'll make it available to you.

MEMBER BLEY: Because, as part of their assignment, given the three generic reactor types they're looking at, is part of their assignment to identify the areas or additional research or

experimentation would be useful for each type?

MR. RECKLEY: In part, that is what will come out. That wasn't the primary mission but when we get the report and they say, we had to make major assumptions here, here and here, but over here the data was pretty good, we'll be able to get that out of the report.

MEMBER BLEY: Okay.

MR. RECKLEY: So, what can affect the release fractions? I mean, this is what the designers are going to have to identify.

So, things like in the first case, how does the radionuclides go from the fuel to the matrix, that's going to be functions of a radiation or burn off, it's going to be functions of temperature.

Temperature is expected to remain a major driver for the release fractions for all the technologies. And so, the bottom part of the figure is just a simple representation of the other two fundamental safety functions of heat generation and heat removal and how that might look and how that might get assessed.

This one shows an expected passive kind of design. And so, the emphasis is on the heat going from the core, basically out to the environment

through a series of passive mechanisms.

So, the reason to put this up here is, again, sort of like the bowtie. That we're trying to look at this from the simple, and then it gets more complex.

One of the things that the Sandia report does, for example, is they have a matrix. So it starts off really simple but then you say, what is the variables that go into making that release fraction, how you can estimate it. And it just multiples very quickly until it becomes a huge matrix.

And so, as we go into the next discussion on the events and so forth, we're just, from the Staff's point of view, tying all of this, trying to tie it together. The mechanistic source term, the event selection.

And then ultimately, even classification, SSCs, they come back. Where are you putting your emphasis. And so that will come back into the, which ones are safety related, which ones may be warranting special treatment and which ones might be backup that you're satisfied with the commercial, commercial grade equipment.

MEMBER CORRADINI: Just one thing, just to understand, Bill. The analysis that Sandia is doing,

that is all for non-light water --

MR. RECKLEY: Yes.

MEMBER CORRADINI: -- options?

MR. RECKLEY: Yes.

MEMBER CORRADINI: Okay, thank you.

MR. RECKLEY: So, all of that is kind of background. Getting into the specifics of what is in the guidance document, what's in, at a higher level, what's in the commission paper.

Again, the elements that we're looking at is, how do you use the behavior of the non-light water reactors, considering all of those things I just talked about, and come in and do things like, identify and assess licensing basis events using both probabilistic approaches, risk-informed approaches and using deterministic approaches and engineering judgment.

How do you classify the equipment, how do you define performance requirements?

One question that often comes up is, for non-light water reactors, the operating history is not as populated as light water reactors, how do you make up for those uncertainties in having less operational data?

So, that becomes important because as you

do the PRA and make your best assumptions on frequencies of the availability or the failure of equipment, along with that, you're going to define the performance requirements in order to make sure that down the road the assumptions you made are reasonable. And that the events that you analyzed and the acceptance criteria that you used are still valid.

And then lastly, the defense-in-depth assessment that's including in the methodology, to make sure that, again, largely to make sure that uncertainties are addressed, that you don't overly rely on one element, one barrier, and to bring in that engineering judgment through the integrated decision-making process to make sure that you're making conscious choices on how to address the safety for that particular design.

MEMBER REMPE: Bill? If I were thinking back on what I thought was important in 18-04, I would have identified those three bullets, but I also would have identified identifying key safety functions for that particular design.

MR. RECKLEY: Right.

MEMBER REMPE: Did you think about highlighting that as a bullet, and why did you not?

MR. RECKLEY: I guess the sub-bullet under

SSC classification function and risk considerations, that was my attempt. But I agree with you that the way the methodology lays out that in order to identify the equipment, you first identify the functions.

MEMBER REMPE: Key safety functions.

MR. RECKLEY: And then from the functions comes the performance requirements for individual SSCs.

MEMBER REMPE: And for defense-in-depth, I think you need to know that too.

MR. RECKLEY: Right.

MEMBER REMPE: And I just was thinking about it, if I were doing it.

MR. RECKLEY: And I don't disagree with you.

MEMBER REMPE: Okay.

MR. RECKLEY: One item that we like to address, and this was highlighted in, not the October meeting, but the subcommittee meeting we had before then. Although the topics that are addressed in NEI 18-04 and the draft guide are important, they're not 100 percent of the requirements that will be imposed on these reactors.

And so, it is necessary to keep in mind, the regulatory context is broad. This is a very

important part but it's not 100 percent.

And so I broke it down at the subcommittee meeting into those requirements that are associated with LMP. And for example, the maintenance rule and quality assurance programs, they're built in to how programmatic controls are used within the LMP process to provide the reliability and ensure equipment has the capabilities to do the functions of, that they're assigned to do.

The LMP then also interfaces with other requirements. And this was back on the bowtie diagram. The LMP itself doesn't get into citing, doesn't get into emergency planning or environment reviews.

But as shown on the diagram, you're doing events assessments ultimately to determine things like emergency planning and whether they can be relaxed. And so, it's a natural outgrowth of the guidance in NEI 18-04 and the draft guide that, as you're analyzing events, you're going to use those consequence assessments as part of the rational for whether you can reduce emergency planning zones.

MEMBER CORRADINI: So, maybe you, I think I can guess the answer but, so if I, you said they're disconnected, but in some sense the source term used

to construct the FC curve so that you can do an analysis, has got to decide where you stop on frequency, below what you don't consider on frequency, to understand the consequences that you apply to emergency planning --

MR. RECKLEY: Right.

MEMBER CORRADINI: -- at the site?

MR. RECKLEY: Yes. And that's why said --

MEMBER CORRADINI: Is there guidance in the considered version of 1353 that verbalizes that or is it just implied?

In other words, how do I know when I stop the AP and citing?

MR. RECKLEY: Yes, we'll get into that.

MEMBER CORRADINI: Okay, fine. Sorry.

MR. RECKLEY: No, that's fine. But, that's why it's called an interface. It's really a hand off. It is part of the same decision-making process --

MEMBER CORRADINI: Okay.

MR. RECKLEY: -- it's just that you don't see in NEI 18-04, here's the additional work that you need to do in order to do the emergency planning. But 1353 references 1350 and 1350, the reg guide for the EPC, references back to 1353. So, it's recognized

that the two things work together.

MEMBER CORRADINI: Okay. I'm smiling because I just don't want to create an infinite loop that doesn't --

(Laughter.)

MEMBER CORRADINI: The way you said it, it sounds like I'm --

MR. RECKLEY: Hopefully not.

MEMBER CORRADINI: Okay.

MR. SEGALA: There are some things that would need to be considered, in LMP it's like a 30 day dose and EP they're looking at a 96 hour dose.

MEMBER CORRADINI: Right.

MR. SEGALA: So, if you're less than one rem for 30 days, they're going to be less than one rem for the 96 hours.

MR. RECKLEY: And then lastly on the slide, there are requirements, such as routine effluents, worker protections and elements of security that aren't addressed within LMP.

So, getting to the event selection and much of the focus of the discussions often comes down to looking at the frequency target. Frequency consequence target figure.

So, at the highest level for the

commission paper, we're basically just saying what the categories are and how we're using the figure and the emphasis, as its stated at the top, that the targets are not intended to be interpreted as being actual acceptance criteria.

One of the things I did to this figure was went ahead and added the two orders of magnitude zone that's used in the defense-in-depth assessment as risk significant licensing basis events.

Just to be clear that you're not looking at the solid bright blue line but you're looking at, where does the event map onto the frequency consequence, what's keeping it from going up or down and the general message of, the closer you are to the line the more attention you should pay as to what's limiting the consequences.

So, I think that was basically all for the SECY paper, was the level of detail we were providing to the commission. The note off to the side, there is, and maintains, a deterministic approach. The traditional Chapter 15 approach.

That is the design basis accident category that are events that are taken from the mid-range, the design basis event category, and then analyzed with more traditional approaches of using only safety

related equipment in the assumptions.

And then what's not shown on the figure, but one also needs to keep in mind, is in addition to the plotting of the event sequences and looking at each sequence in terms of what is keeping it at an appropriate place on the frequency consequence.

Target, in terms of the availability and reliability of equipment and the capability of that equipment to prevent a release.

You're also looking holistically at the design and comparing it to aggregate goals, like the commission's safety goals.

MEMBER MARCH-LEUBA: Okay, before you move. All of these results are based on you knowing the frequency. The y-axis in this figure.

So what degree of certainty do you require from an applicant, to believe the frequencies he tells you?

MR. RECKLEY: Well, yes. One of the things that the methodology includes is you're not only plotting the mean frequency as your best guess of what the frequency is, but you're plotting the uncertainty bands.

And so, as you look at the uncertainties, it might be very possible that those uncertainty bands

will be much wider than people are accustom to seeing on, maybe for light water PRAs.

MEMBER MARCH-LEUBA: But those are --

MR. RECKLEY: But --

MEMBER MARCH-LEUBA: Those are the estimates from the applicant, which has a bias towards, per this position, where he decides his PRA.

Where I would like to see some emphasis is on requiring from the Staff, when they review those PRA, that there be an aggressive, thorough and complete review. Not just, let's review what the applicant said and check their math.

If you're going to build a reactor like this, Five Mile is upwind from my house, I want you to raise your right hand and tell me, I know these frequencies, I dually agree with them, not just a cursory review of the math of the applicant. Because the applicant has a bias when they develop their PRA.

And we have some examples when some people go and tells us the probability of failure of this system is ten to the minus 11. That does nothing.

MR. RECKLEY: I guess all I can say is I think the staff always does that.

MEMBER MARCH-LEUBA: Well, they're not doing it in this case.

MR. RECKLEY: Okay. That you might want to take up --

MEMBER MARCH-LEUBA: I would like to see, on the guidance and on the --

MR. RECKLEY: Right.

MEMBER MARCH-LEUBA: -- procedures, some emphasis that the Staff will do an aggressive review of what's missing on the PRA and what's bias.

MR. RECKLEY: Okay. Again, I won't attest to any particular ongoing or past review, but I would say that's the goal of the NRC Staff for any review.

And certainly we'll be coming before the ACRS and you can challenge not only the applicant but the Staff on the thoroughness.

MEMBER MARCH-LEUBA: I've done a lot of reviews for the Staff and we tend to check the math of the applicant more than looking --

MR. RECKLEY: Okay.

MEMBER MARCH-LEUBA: When the consequences of you being wrong are so large, I mean, when we're talking about, are you violating CHF or not in a small reactor that has no consequence for safety, I mean, you can be a little more forgiving. But when the consequence of you being wrong are so large --

MR. RECKLEY: No. And that, to me, that's

one of the nice features of the frequency consequence target figure is, you're not only looking at the uncertainties associated with the frequencies, which move you up and down, but your uncertainties in terms of the consequences.

And there may be events in which the uncertainties and frequencies are very large, but the consequence uncertainties remain very close to the area where you would have no concern.

The closer you are in either, to the target area, the risk significant LBE region, the more attention you're going to pay to the uncertainties associated with, not only the consequences, but also the availability of the equipment.

MEMBER MARCH-LEUBA: Yes, I just wanted to put you on the record.

MR. RECKLEY: Yes. Nope.

MEMBER MARCH-LEUBA: There's an issue of availability of resources at the time to review. We have to do it in 18 months or we have to do it in 12 months now. We don't have time to do a thorough check. And that should be emphasized.

MR. RECKLEY: Okay.

MEMBER MARCH-LEUBA: That everything is based on, we know the y-axis.

MR. RECKLEY: Okay.

MEMBER REMPE: So, with this figure, if you have a micro-reactor that doesn't have a PRA, do you just assume that the accident happens or do they have some sort of hazard assessment where they had higher frequency hazards and lower frequency hazards?

I mean, how far did this tabletop go? I mean, they don't have a detail PRA, they don't have data for qualifying a lot of their new designs.

MR. RECKLEY: Well, again, to me that just is reflected in the uncertainty events. When you say they don't have a PRA you --

MEMBER REMPE: Do they have some sort of hazard assessments, so there was some sort of --

MR. RECKLEY: Yes.

MEMBER REMPE: -- simplified PRA?

MR. RECKLEY: Right.

MEMBER REMPE: So no one came in without a PRA is what you're telling me in the tabletops?

MR. RECKLEY: Right.

MEMBER REMPE: Okay. I don't know whether these designs are.

MR. RECKLEY: Right.

MEMBER REMPE: So they do need to have a PRA of some sort --

MR. RECKLEY: Right. And NEI 18-04 discusses that since this is related to the design process, and ultimately to the licensing process, it's an iterative process.

And so you start off with maybe more traditional hazards. Maybe failure modes and effects analysis or process hazards with less focus on the frequencies but just identifying what can go wrong.

Then as you progress through the design process you start to ask the question, not only what can go wrong but how likely is it, such that you can put it on the frequency consequence curve.

But, by the time the design is submitted for a licensing application, the expectation is that they will have, not only what can go wrong but how likely it is.

I'll say, one potential caveat is, if there is a reactor design, and I'll stress the if, that you could model maybe as, on the non-reactor side there's processes to assess unmitigated releases, right? Just, you've got a source term, just let it go, what happens?

Well, if it ever was that the design, the inventory was small enough or the design so straight forward that you could kind of do an unmitigated

release and show that it was a minimal consequence, then maybe you wouldn't bother with doing this more --

MEMBER REMPE: In our discussions over the last, I don't know how many months, you mentioned that earlier and I wasn't sure where these tabletops were going, and I wondered if they did come in with --

MR. RECKLEY: We haven't seen one go that route yet.

MEMBER REMPE: Okay.

MR. SEGALA: Yes, all of them so far have used a PRA.

MEMBER MARCH-LEUBA: Let me reemphasize my point. Can you go back a couple slides before on the specification of SSCs. I think it's like --

MR. RECKLEY: The next slide.

MEMBER MARCH-LEUBA: -- 6 or 5. Go backward. There. Okay.

Those SSCs classified as a non-safety related with a special treatment. The example we saw during the Subcommittee was, the way I read it, and I'm oversimplifying, is an SSC that the PRA said you didn't have to worry about. And then the committee said, you're crazy, you have to worry about it.

Isn't that what that classification is? Non-safety related with a special treatment. Why did

you add it?

MR. RECKLEY: The non-safety related with special treatment is a category of equipment that does have some risk importance. Some safety functions.

It's not needed necessarily for the design basis accident, but it's needed to control where you are on the frequency consequence target.

MEMBER MARCH-LEUBA: And it's decided by this committee that reviews at the end? The defense-in-depth committee I believe it's called.

MR. RECKLEY: The integrative decision-making panel will play a role in that, yes.

MEMBER MARCH-LEUBA: All right. So, isn't that an example where the PRAs have told you, you needed to make it safety related, and you didn't?

MEMBER BLEY: No.

MR. RECKLEY: No.

MEMBER BLEY: No. They set out, you might want to talk about this, specific definitions of what is safety related in the future --

MR. RECKLEY: Right.

MEMBER BLEY: -- under this program. These would be cases that don't meet those rules but need a risk criteria.

MEMBER MARCH-LEUBA: I don't know if we

can talk about the particular example we talked during the subcommittee, it's an open session. But it involved some sodium water reactor.

And in my opinion, it nearly pointed to the fact that the PRA was deficient, and they decided to go this route instead of --

MR. RECKLEY: Okay.

MEMBER MARCH-LEUBA: But that's my opinion.

MR. RECKLEY: All right. So, as Dennis said, the second element within the methodology is really the establishment of safety classes and performance criteria for the equipment.

For safety related equipment it's defined there in the bullet. For non-safety related, as we were just mentioning, it is those SSCs that are playing a role. And then non-safety related with no special treatment are all other SSCs.

I would go as far as to say you got to be careful because even equipment that's not safety related with no special treatment does not mean that it serves no purposes in controlling, in contributing to either a risk or lack thereof within a facility, it's just an SSC that you don't need to put particular performance measures or address through other than

commercial procurement.

CHAIRMAN RICCARDELLA: Bill, go on back to that frequency consequence curve. Could you briefly describe the rationale for why there is that step change at one rem?

MR. RECKLEY: There's a number of ways to construct a frequency consequence target. And the closer you try to get to marrying it to a regulatory limit, the actual more steps you have. If you go back, for example, and look at NUREG-1860, it had like ten steps, because as you go through the various regulations.

So, the reason for the step in this particular figure that we accepted from the industry is, the top line for the higher frequency events, you're really trying to derive the dose considerations from Part 20, something close to normal effluence.

The bottom point, in terms of the dose and frequency, is largely derived from the safety goal, at the lower end. And the LMP decided to connect a value at E-2 and one rem, based on traditional event assessment criteria, with the safety goal kind of number down at E-7.

And you end up with this break in the curve. It has no particular significance to us, you

could have drawn a straight line.

In general, there's a preference in risk evaluations to have a slope greater than one, kind of to make it a little more risk-adverse, so that you're addressing the bottom end a little more conservatively than you would, that's largely because of uncertainties and so forth.

So, all of that is in there.

MEMBER CORRADINI: But, I mean, I think Pete's asking the question is, or my way of thinking about it is, once you get close to this knuckle, you start looking closely. Whether I look -- right?

MR. RECKLEY: Yes.

MEMBER CORRADINI: That's how I view it --

MR. RECKLEY: Right.

MEMBER CORRADINI: -- is that, when I get to this little stair-step, if I'm starting to get near it, I have to ask, in terms of uncertainty and frequency and uncertainty and consequence --

MR. RECKLEY: Right.

MEMBER CORRADINI: -- to make sure I'm below your buffer, whatever, your dark yellow versus your light yellow or whatever it is.

MR. RECKLEY: Right.

MEMBER CORRADINI: Okay.

MEMBER MARCH-LEUBA: Short question on this topic. In previous presentations, you've been very careful to tell us that NRC was not sponsoring these numbers, not even accepting them. Are we now to a point in which NRC approves them or accepts them? Or where are we?

MR. RECKLEY: We're going to accept, or propose to accept, that this frequency consequence target for the identification of events, for defense-in-depth assessments, and everything that's within the methodology that we talk about.

The caution has always been, we just don't want the line to be interpreted as acceptance criteria. That will remain, to include the possible use of engineering judgment --

MEMBER KIRCHNER: Well, 10 CFR 50.34 is very explicit that this is not a goal, 25 rem.

MR. RECKLEY: Right.

MEMBER KIRCHNER: It's expected that the applicant will demonstrate well margin below that.

MR. RECKLEY: And even the 25 rem number, we've historically had troubling saying what frequency is it associated with? And so, that's why, although this is plotted at 25 and E-4, we're saying, don't interpret our regulations to be E-14 and 25 rem.

MEMBER BLEY: To Jose's point, I think back in October, when you were with us, you had told us that you guys were still considering whether this is the right target or you ought to have something different.

MR. RECKLEY: Well, definitely during the briefings on the functional containment paper, we said, don't focus on the numbers, we're --

MEMBER BLEY: Oh, yes.

MR. RECKLEY: -- just trying to get the concept. But at the Subcommittee meeting, what we intended to say was, this is the figure --

MEMBER BLEY: Okay.

MR. RECKLEY: -- that we're saying is acceptable for use, within the limitations we talk about.

MEMBER BLEY: I have my meetings mixed up, perhaps.

MEMBER MARCH-LEUBA: Then, would it be appropriate to -- are you expecting an evaluation of that from ACRS in our letter, I mean, in our recommendation, of that line? The wisdom of using such a line?

MR. RECKLEY: We propose in the Commission paper that the way events will be selected,

categorized, and analyzed, and the way SSCs will be classified and performance measures established, and the way defense-in-depth assessments will be done, will use this figure.

MEMBER MARCH-LEUBA: Okay.

MR. RECKLEY: And so, yes.

MEMBER MARCH-LEUBA: So, the answer is yes? You --

MR. RECKLEY: Yes.

MEMBER MARCH-LEUBA: -- would expect us to, at least in the discussion, mention it?

MR. RECKLEY: Right. And I'll get into that in a second, when we get into the paper.

MEMBER KIRCHNER: Bill, may I just throw out a caution? This figure is really derivative from the LWR experience. And implied in this is an unfolding of an accident scenario and time. And without making a pejorative statement, let me see how I can explain my point.

There can be events in other non-LWR designs that could lead to large, instantaneous large inventory release, which is different than how we anticipate, shall I say, an LWR event proceeding.

And where I'm going with this is, for example, time becomes of essence, because the PAG of

one rem could be exceeded before you could even sound a general alert or respond, depending on where the location is of the EAB and the local workforce and population.

So, I just throw that at that, as I think about this, the implicit here is, we have an unfolding over time, which allows ample time to make decisions about protective action, et cetera, that may not be the case for alternate designs, that might have --

MEMBER BLEY: Let's have a little --

MEMBER KIRCHNER: -- a large inventory.

MEMBER BLEY: -- among the many discussions on this one. I don't quite see that, Walt.

MEMBER KIRCHNER: Okay.

MEMBER BLEY: Because the one you're suggesting, although it happens fast, there's no time on here, but it would fall outside of this curve on consequences. At least, that's what I think you're getting at.

So, when it's all done, you plot the point on here where you end up and if it's outside of that line, it's unacceptable, whether it happens very quickly --

MEMBER KIRCHNER: No.

MEMBER BLEY: -- or not at all. And that

--

MEMBER KIRCHNER: No, I agree with you.

MEMBER BLEY: -- includes modeling carrying out protective actions as well.

MEMBER KIRCHNER: Okay.

MEMBER BLEY: So, you just couldn't do it --

MEMBER KIRCHNER: Or the EAB may be --

MEMBER BLEY: -- in that case, yes.

MEMBER KIRCHNER: -- a significant distance.

MEMBER CORRADINI: Right.

MEMBER BLEY: Yes.

MEMBER CORRADINI: You would have to change the distance --

MEMBER KIRCHNER: You'd go back to the --

MEMBER CORRADINI: -- you evaluate.

MEMBER KIRCHNER: -- design and change the EAB. Anyway, that's -- thank you.

MR. RECKLEY: The -- yes, I would go as far as to say, I agree with you that time is a key variable and it's a key variable in a number of ways. In some reactor designs, you might have a puff and you'd have to control that --

MEMBER KIRCHNER: Right.

MR. RECKLEY: -- and that will be a quicker release than maybe large light-water reactors.

The other way it comes into play in this mechanistic source term assessment is, there may be designs in which particular radionuclide groups migrate through, and that time needs to be assessed, such that, by the time that you get to the leak path factor for the building, it might be the release, and some of the stuff that we're seeing is, sometimes the releases from non-light-water reactors can be many days. So, the releases can be longer.

MEMBER KIRCHNER: Yes.

MR. RECKLEY: So, both of those will have to get looked at and assessed within, as Dennis mentioned, a 30-day dose on the figure.

So, lastly, within the methodology, or next to last, I guess, is the assessment within the process for defense-in-depth, which looks at, again, the risk-informed assessment techniques, PRAs, and before PRAs in the design process. Again, maybe you're using failure modes and effects, a process hazard kind of assessment tools.

But ultimately, by the time it's licensed, you would be looking also at the question of how likely are failures and what reliability requirements

would be needed for SSCs, down under the programmatic controls? So, all of those things to support the PRA.

You're also looking at deterministic criteria, through both the Chapter 15 analysis and also, the defense-in-depth assessment being done through the Integrated Decision-Making Panel is looking at deterministic or engineering judgment kind of criteria.

So, again, for the purpose of the SECY paper, the notion that the defense-in-depth assessments are being done is about the level that we're talking about and that it includes both plant-level hardware-oriented measures, as well as programmatic measures.

MEMBER BLEY: Bill, a couple things about this. One, it's in the flavor of the Integrated Decision-Making Process that's in 1174.

MR. RECKLEY: Yes.

MEMBER BLEY: But now, we've tagged a panel with carrying that out, which you always needed in some form.

The only way we'll really see if that panel is doing a good job is careful dissection of the tabletop exercise reports, I think. And I wonder how much you guys have thought about that.

The other is, the panel is described under the defense-in-depth section, but it seems they have a role in the SSCs and in the selection of licensing basis events, which is kind of saying did the PRA leave anything out that we ought to be looking for?

MR. RECKLEY: Yes, I --

MEMBER BLEY: Will you talk about that ensemble of things I've put together?

MR. RECKLEY: Yes. I think what you just said is true, it's an Integrated Decision-Making Panel and the integrated includes how all of those pieces fit together.

And so, thinking of it from a design perspective, the designer, and in this particular case, the process or the panel, has all those things in play, because they're trying to make design decisions.

What equipment do I want to make safety-related? What equipment might warrant being additional special treatment requirements?

Going back, that panel will contribute to -- maybe going back and saying, maybe we should make a design change to actually affect the event selection. So, yes, it only works if all of those things are in play.

MEMBER BLEY: Now, somewhere in the things I've read for this meeting, you talk about how, or someone talks about how the panel is originally set up by the designer and eventually, this role moves over to the licensee, as the design comes to completion and the machine moves over to an owner.

Can you say anything about the requirements of what kinds of people need to be on this panel? Including if you need a facilitator of some sort who really understand the whole process?

MR. RECKLEY: Yes. The panel, as it's discussed within the guidance, points over to the 50.69-related guidance, in terms of how to set up a multi-disciplinary or Integrated Decision-Making Panel.

Those models are basically the same, whether we look at what we did for the Maintenance Rule or what the industry did for the Maintenance Rule, what it's done for 50.69, what it's done for risk-informed tech spec initiatives.

The notion of an Integrated Decision-Making Panel or multi-disciplinary panel is basically the same, or at least very similar, between all of those and it's going to require people from the risk arena, the PRA arena, operations, design, some

mechanical, civil, structural, depending on the elements.

So, I'm not personally an expert in that, other than to just say, it's really borrowing from the use of that particular tool, multi-disciplinary or Integrated Decision-Making Panels, from all of that experience. Again, the tech specs, the Maintenance Rule, and more lately, the 50.69.

On the next slide, I do address --

MEMBER CORRADINI: But just to make sure I understand your answer to Dennis, you're looking at this decision-making panel, is not the final judgment, but I'll call it the final decision-making recommendation to this is safety-related or not safety-related? This is an appropriate defense-in-depth or not? This is essentially the LBEs that ought to be the DBAs? Is that my understanding?

MR. RECKLEY: Well, I can say, from the staff's point of view, we have the luxury of only looking at the outcomes of all those decisions that have been made.

MEMBER CORRADINI: But if we went to the example, tabletops, that's what you would be expecting this to be the answer, is that decision-making panel examined each of these features and said, yes, well,

we understand the PRA, but we were concerned, therefore, just to be sure, this will become safety-related, or this will be an additional defense-in-depth necessary?

MR. RECKLEY: Right. And the rationale that they laid out for why that was added and why it was enough. Again, from our standpoint, we're focusing on what the outcome of that process is, more so than actually the mechanics --

MEMBER CORRADINI: Understood.

MR. RECKLEY: -- of it. Which goes to the first bullet here, and again, I think --

MEMBER RAY: Bill, can I interrupt you for a second?

MR. RECKLEY: Sure.

MEMBER RAY: Dennis, you referred to the licensee. And of course, now, our thinking is in terms of certification applicant, for example, which may or may not be what you meant by licensee, because there's another step, it's a process that involves both a licensee of a plant that they own, as well as potentially in this process, a certification applicant that doesn't own a plant, is only producing something that they're marketing.

MEMBER BLEY: I was referring to something

I read, and I don't remember exactly where it was, but it, at least to me, it implied that this process ought to continue from early in the design into operations of a facility.

MEMBER RAY: Well, and I guess --

MEMBER BLEY: Which would be a real licensee.

MEMBER RAY: I just want to make a note that the step between somebody who may be seeking a certification that they then want to market, to somebody who ultimately, maybe a long time down the road --

MEMBER REMPE: So, Harold?

MEMBER RAY: -- is a purchaser of that certification, I don't imagine it as a continuity that seems to be implicit in the question.

MEMBER REMPE: Harold?

MEMBER RAY: Yes?

MEMBER REMPE: I'd argue that it has to be, because they have to have site characteristics to fully apply this.

Once they finally have a licensee that owns it, they will have to go through the process again and assume, in order to get the dose and the consequences, the actual characteristics of the site,

they may make some tweaks in the design-basis events and the classification of the equipment, right?

MEMBER RAY: Well, I'm just asking to clarify. You're talking about, basically, some assumptions that may be made in certification that then have to be --

MEMBER REMPE: Right.

MEMBER RAY: -- reassessed by a COL applicant --

MEMBER REMPE: Right.

MEMBER RAY: -- if it's a Part 52. And I don't know whether it is or not. But the point is, I was just trying to understand what Dennis was referring to.

MR. SEGALA: I think you should keep in mind, too, that -- this is John Segala from the staff -- that for non-light-water reactors, we're looking at all possible licensing process.

They could come in under Part 50 with a construction permit operating license. They can come in under 52 with a design cert, and then, switch over to a COL. They could come right into a COL, with a full design siting review all at once.

So, there's a wide variety of situations that we're going to be having to prepare for. And

this will be an iterative process.

MEMBER RAY: I understand that to be the case, what you just said, which is maybe why I asked the question to begin with.

I think we need to keep that in mind as we're going through and talking about this and asking questions and so on, are the answers different depending on which process somebody comes in with?

Joy just explained that, well, presumably, if one does seek a certification, you make assumptions about the site conditions, those then have to be validated by the COL holder and modified as necessary later on.

But that process may affect what we're talking about here. It's not as easy as just saying, well, if I'm just a certification applicant, I'll make some assumptions and then, anybody who purchases that certified design has to validate those assumptions that I've made or change them, whatever the case may be. That's enough, then, thank you.

MR. RECKLEY: Okay.

MR. SEGALA: And we do that under the current reviews, the design certs have a bounds for the site characteristics and then, we have to validate to make sure that there's no exceedances at the site

when it's selected.

MEMBER RAY: That's what we're striving to do, I'm not sure we've done it yet. But that's part of the dialogue that's going on, is assumptions made in a certification, how do you know what they were and how do you validate them when you go to use the certified design? So, okay.

MR. RECKLEY: So, related to the same topic, out of the Subcommittee meeting, Dr. Rempe had asked what our experience was with Integrated Decision-Making Panels or the process.

And so, we did go back and look. And I took the question, do we have something that actually watched and then, said, we like the way it's working, how the interchange between the experts or the panel members works, is there best practices in maybe how to set that up?

And unfortunately, I guess, my reply is, no. To the degree we've watched, we've not documented. Again, all those processes I mentioned that have included these, we've looked at outcomes, but we've not really documented, per se, how the panel worked within that process and maybe what best practices was.

And so, I'll just leave that as has been

talked about, that that will be a key focus area for us as we go forward, and also for the developers, that they'll have to look during the process, because the importance of the Integrated Decision-Making Panel members is to address the uncertainties.

And we will be looking and asking the same questions that they should be asking of themselves. But the short answer is, no, we couldn't find a document that actually looked at the performance of a panel.

Another question -- I guess I can go back to -- I was hoping we would find something, but we didn't.

MEMBER REMPE: Thank you for looking into it.

MR. RECKLEY: Okay. The second question, or another question to come out of the Subcommittee was on the reliability of passive heat removal and the need to look, not only at the design, but then, also degradation mechanisms and challenges to those.

And we acknowledge that. I passed along some references from Argonne in regards to the reactor cavity cooling system, but that's an example, that's not an exhaustive set of references.

But for the purpose of the SECY paper,

this is maybe one level of detail down. As we go back and look at the draft Guide and the NEI document, we'll revisit whether we need to include some discussion of making sure the degradation mechanisms and so forth.

That was the intent, we'll just go back and make sure it clearly states that that needs to get looked at.

MEMBER BLEY: In the Reg Guide or --

MR. RECKLEY: Both NEI 18-04 and the draft Guide.

MEMBER BLEY: Okay, I think that would be great.

MR. RECKLEY: Okay. Then, we talked about tabletop exercises, the ADAMS accession numbers for the two that we have. Then, additional ones are planned or underway, and we've talked about that.

And then, John also mentioned the Nuclear Energy Innovation and Modernization Act. I'll just mention that the Act includes a couple of requirements for the NRC.

One is, within the current construct, to come up with a technology-inclusive, risk-informed, that's this activity. So, when we report back to Congress and say, what are we doing under the current

requirements?, that's this.

As John mentioned, the Act also says, do the Part 53 or do a rulemaking to develop a framework. We're hopeful that this is also establishing the groundwork for doing that. But we're just at the beginning stages of talking about that rulemaking.

MEMBER REMPE: Bill, just for the record, the PRISM application does not go into an Integrated Decision-Making Panel for defense-in-depth assessment, is that true?

MR. RECKLEY: They're on --

MEMBER BLEY: I did a quick look and saw that they do talk about the Integrated Decision-Making Panel, but I didn't get a chance to read it --

MEMBER REMPE: I don't think --

MEMBER BLEY: -- in detail. Maybe --

MEMBER REMPE: -- they did. From my quick look, they didn't go into defense-in-depth evaluations yet. So, that part of the process hasn't been evaluated in a tabletop, unless this new one for Oklo did, I don't know. But I just wanted -- can you clarify that part --

MR. RECKLEY: Do you recall?

MR. SEGALA: Yes, I think they were limited in what they did in that.

MEMBER CORRADINI: Yes, I think they -- I seem to remember you asked that question of the PRISM people at the Subcommittee and I thought, at that point, they had not.

MEMBER REMPE: That's what the report also indicated, and I just wanted to make sure. And then, I'm just trying to understand how far the process has been explored in tabletops, is why I'm asking the question on the record.

MR. RECKLEY: Okay.

MEMBER BLEY: Bill, just a comment. I'm surprised you couldn't find anything. The -- this is really like an expert elicitation process --

MR. RECKLEY: Yes.

MEMBER BLEY: -- like you do in PIRT, like you do in technical expert elicitations, a whole variety of areas. There's a vast literature about how that works and how it fails.

And a key piece in the places where it's worked well is defining the role of the facilitator very well and how to protect against biases. That's missing in most of our guidance documents for this sort of panel. But it's available.

MR. RECKLEY: And maybe I just need to be clear, I didn't find it an NRC assessment and

definition.

MEMBER BLEY: I agree with you.

MR. RECKLEY: Okay.

(Laughter.)

MR. RECKLEY: There are -- yes, if you Google multi-disciplinary or expert panels --

MEMBER BLEY: You're buried for months.

MR. RECKLEY: -- yes, you can find a lot of references on how to do it. But I just didn't find an NRC assessment of one of those.

MEMBER REMPE: I didn't have a lot of time to look at the PRISM report, but I liked that, just because I'm not so familiar with the design, there were a lot of differences in the selection of the licensing basis events. It provided a more documented approach on why they selected it, so if they changed, I think that's nice.

There were a lot of recommendations on how to improve the process on educating the members and things like that. So, I really wanted to emphasize that I think these tabletops are very useful.

MR. RECKLEY: And it helped having the PRISM design, which has a well basis, it had people available at GEH that were familiar with the design, familiar with licensing, who became familiar with this

process. And so, yes, we agree, it was --

MEMBER REMPE: And DOE had funded a new PRA, so a lot of other people had gotten involved. So, it was a nice time to do that work.

MEMBER BLEY: Just another comment, since we're on this train. Often, when looking at Reg Guides and this sort of thing, we've pushed the staff to include examples.

But it seems to me, because this is such a large integrated process, that having a series of tabletop reports will look less like a cookbook and more like the kind of thing that will be helpful in the future, showing people various ways to go at this problem.

MR. RECKLEY: Thank you. Well, and I really should thank the industry, the industry is doing the tabletops and coordinating those.

So, I'll spend the next few minutes going through the paper, because, again, it is the paper that we're expecting to be addressed in the letter and we'll come back for a letter on the draft Guide.

Anyway, that's the way we had kind of left it, it's obviously up to the Committee to decide how to do this. But we are asking the Commission to make some decisions and I'm sure that they would value the

ACRS input on the proposal.

So, the paper is just organized -- and by the way, it hasn't changed. Neither has the draft Guide changed as we've really gone through the process, more than some clarifications and editorial changes.

So, it's organized by the paper itself. An enclosure with background that goes into the previous activities, going back into the 1990s and then, up to current day.

And then, Enclosure 2, which talks about the process, which is a higher level summary of the discussions in NEI 18-04 and DG-1353.

So, in terms of background, I'm not going to go into a lot. There were a couple key papers brought before the Commission.

One, SECY-93-092, back in the early 1990s. This was coming out of the initial PRISM review, considerations of the modular high-temperature gas reactor, and some other designs.

There was a lapse for a while, in terms of the scale of our activities, we came back in the early 2000s. And a key paper for this current discussion is SECY-03-0047, Policy Issues Related to Licensing Non-Light-Water Reactor Designs. And I'll come to that

one in particular.

And then, also, building off of all the other risk-informed activities. The time frame for a lot of the non-light-water reactor work was overlapping with other risk-informed, performance-based activities, leading to things like NUREG-1860 proposals and advanced notice of proposed rulemaking and some of those things that, as projects kind of lost their momentum, got set aside.

But there was progress made. And as I mentioned, one of the key ones was putting before the Commission proposals and having them make actual decisions on a couple key policy issues.

And so, in SECY-003-0047, the staff asked the Commission to approve the use of a probabilistic approach for the identification of events, a probabilistic approach to safety classification of SSCs, and a relaxation or a change to the design process to move from single failure criteria over to a broad assessment of events across a wider range of frequencies and to replace the single failure criterion with a probabilistic or reliability-based approach. So, the Commission approved those in an SRM related to that SECY paper.

And so, for the current paper, we go

through the major elements that are addressed in the draft Guide, again, at a higher level, and we try to point out the key areas where we think they are consistent with the previous Commission decisions, where it might be a new decision or a logical extension of past decisions.

And then, also, to ask the Commission, finally, you're going to get to see a picture of how the pieces fit together. We want to make sure that this is in line with what you think is appropriate.

So, the biggest decision out of the paper is how the pieces fit together and then, there are a couple areas where the Commission has not made a specific decision and we are going to ask them to make sure that they're okay with the direction we're going.

MEMBER MARCH-LEUBA: Very quickly, because the time is getting there, have you given any thought of how this will be implemented? Say, for example, NuScale, NuScale could have used this, they didn't, but they could have, for the design certification.

MEMBER CORRADINI: I don't think they could, they're not a non-light-water reactor. They'd have to --

MEMBER MARCH-LEUBA: It's a small -- it's an SMR, right? Well, what -- okay. Somebody that

wants to do a design certification, and they choose the events early in the process.

Is there a way, whether you tie it -- when you're finally done and you have a COL and all those 150 ITAACs get resolved, that this gets reanalyzed and verified that all the events -- that you didn't miss one?

Because I can guarantee you what's going to happen, they're going to choose some events out of whatever draft PRA they got, and then, they are going to change them.

MR. RECKLEY: The gist of the process is that you don't really get to choose your events. You have a design and you're going to assume failures of all of the various combinations of SSCs that you have. What you get to estimate, perhaps, and what will get a lot of attention --

MEMBER MARCH-LEUBA: They do it based on a draft conceptual PRA, incomplete always.

MR. RECKLEY: Yes. Yes, as they go through, again, it's iterative. And so, what they start out estimating through the process hazard or the failure modes and effects, and then, ultimately, through the PRA. By the time it's submitted to us, it will be complete and it will be supported by the PRA

they're providing to us.

MEMBER MARCH-LEUBA: Yes, but then, eventually, there's going to be -- there's a lot of ITAACs and COL items that get pushed back. Is there a thought that, whenever you want to build a plant, you have to redo this -- the final PRA is not done until two days before you load fuel, right?

MR. RECKLEY: Right.

MEMBER MARCH-LEUBA: And that --

MR. RECKLEY: Well, it's some period --

MEMBER MARCH-LEUBA: Okay. A --

MR. RECKLEY: -- six months or --

MEMBER MARCH-LEUBA: -- couple of weeks.

MR. RECKLEY: Yes.

MEMBER MARCH-LEUBA: But --

(Laughter.)

MEMBER CORRADINI: I was going to say, I think there's a definable time period.

MR. RECKLEY: Right.

MEMBER CORRADINI: I can't remember if it's a year --

MEMBER MARCH-LEUBA: I'm exaggerating with a couple of weeks, but very late in the process. Is there a thought that the events have to be rethought, verified that you didn't miss something, when you

actually have the real PRA?

MR. RECKLEY: Or that the PRA has to verify --

MEMBER MARCH-LEUBA: Yes.

MR. RECKLEY: -- what you've modeled and how you've laid it out, yes.

MEMBER MARCH-LEUBA: But that should be, I wouldn't call it codified, but it should be understood that that's -- there is a process that would have to be followed.

Because we're pushing a lot of things to the construction side and something will be forgotten. And not just forgotten, once you have your design-basis events specified, it's going to be very hard to change them, even if the PRA changes.

MR. RECKLEY: Okay. So, just going through the highlighted area of what we're asking the Commission, we just basically describe what we've already described here, in terms of the event selection.

From the Commission's point of view, or the staff's point of view, we're saying the use of the probabilistic approach to the identification of events is consistent with our previous SECY paper and Commission decision in 2003.

The use of frequency consequence targets to support the capabilities and reliabilities is consistent. And the replacement of the -- or not including the assumption of single failure within the design process, based on a probabilistic and establishing performance criteria for SSCs is consistent.

The one thing the Commission didn't specifically address in those previous decisions, and I think it's something Dr. Corradini brought up earlier, was the notion of having a cutoff below which you're saying there is some residual risk of this facility, and it's not address specifically within the LBEs and the measures taken to prevent or mitigate those LBEs.

And so, we want to point out to the Commission that we think that that is a logical outgrowth of using the probabilistic approach. There has to be, at some point, where you say, we're not going to address that. That's within the current processes, it'll be within the process going forward.

We think it's just -- the process going forward actually has more thought given to what you're not going to address than what the current one does.

But also, within the discussion, the fact

that this isn't, or shouldn't be viewed as a hard line, such that 5E-7 is some magic number and if I'm able to show that I'm at 4E-7, I'm just free to just dismiss that.

You have to address the uncertainties, where the defense-in-depth assessment, the consideration of cliff edge effects, all of those things that we've learned that we need to do is built into the process, such that you're making a logical decision for what you do not need to address within the licensing basis events.

The safety classification and performance criteria element within the paper is, again, generally consistent with the discussions that were going on in the 2003 time frame, and so, consistent with the Commission decision in 2003, to use a probabilistic approach for safety classification.

Assessing defense-in-depth, again, the paper just outlines, and we've gone through this, so I won't repeat.

It includes things like the Integrated Decision-Making Panel that we've incorporated into 50.69 and 50.65, the Maintenance Rule, our consideration of risk-informed tech specs. So, this is, again, generally consistent with other actions

that the Agency has taken.

One thing we point out in the paper is that there was a time frame and a decision made related to SECY-15-0168, was the risk management regulatory framework proposal.

And in that paper, the question was posed to the Commission, should the Agency define defense-in-depth? Should we define a specific policy statement, where we're very clear on what it means? And the Commission said, no.

And so, what we point out in the Commission paper is, this process does include a defense-in-depth assessment as part of the process. We are not planning to impose this on anybody else, but if you're using this process, an assessment of defense-in-depth is an integral part of the process.

So, we just want to make sure that the Commission's comfortable, for this particular case, for non-light-water reactors using this methodology, that it does include an assessment of adequacy of defense-in-depth.

MEMBER MARCH-LEUBA: Yes. Bullet 3 there, it kind of -- it's very interesting. It kind of provides how you do the defense-in-depth, right? You make sure that if one fails, the other one works. Is

this a fancy way of saying, single failure criteria?

MR. RECKLEY: I wouldn't say -- it has some similarities to it, but in large degree, the single failure criterion, I'll simplify, led to two trains. Often, two redundant trains, not necessarily two diverse trains.

This will say, I'm not putting all my eggs in one basket, but it probably would lead to more diversity versus --

MEMBER MARCH-LEUBA: But you --

MR. RECKLEY: -- simple redundancy.

MEMBER MARCH-LEUBA: But you did use independent, you didn't use diversity.

MR. RECKLEY: Right.

MEMBER MARCH-LEUBA: On purpose, I assume.

MR. RECKLEY: But that would come, really, out of the risk assessments. And it's an expected outcome, but not necessarily a required outcome.

MEMBER MARCH-LEUBA: So, when they're doing this verification in Bullet 3, they should at least consider diversity or common-cause failures of the two systems?

MR. RECKLEY: Yes.

MEMBER MARCH-LEUBA: Because if you put two check valves next to each other, they get broken by

the same seismic event?

MR. RECKLEY: That's right.

MEMBER MARCH-LEUBA: Okay, thank you.

MR. RECKLEY: Then, lastly, within the paper, we bring up that we're really looking to take this as a stepping stone to providing additional guidance on the content to applications.

To try to make sure that the developers, ultimately the applicants, are able to provide us the most directed, concise application that they can bring us, addressing the measures that assure the safety of that particular design.

We think this approach feeds that capability pretty well, because the design process, the licensing process, as it's defined here, is all trying to focus in on what's the most important, and from our point of view, therefore, what should be the focus of the application?

What areas do you need to provide the most information? What areas might you be able to provide less information? And possibly, what areas don't you need to include any information?

And so, although the Commission has previously told us many times, in different papers and different initiatives, to include risk-informed,

performance-based approaches in our reviews, it's not quite been as emphasized that it should also be used in actually deciding what's put in an application.

So, we want to put before the Commission, we want to take this, expand upon it, and actually use this approach to define what needs to be in an application.

MEMBER REMPE: So, Bill, now, the NEI document acknowledges that not all the regulations will be met.

MR. RECKLEY: Right.

MEMBER REMPE: Are you saying, then, in light of the fact that not all regulations will be met using this approach, it's just for selecting licensing basis events and --

MR. RECKLEY: Right.

MEMBER REMPE: -- et cetera, classifying equipment, are you saying the applications don't have to include anything else about the design to meet the other regulations?

MR. RECKLEY: No. No, but if you look at an application -- they will still have to address all the other regulatory criteria and how they are meeting that and what aspects of the design.

But to be fair, when you look at what

drives the level of information on particular systems, structures, and components, and the bulk of an FSAR, that is this big, it really is the events and the safety classification, and to some degree, the defense-in-depth assessments, not so much for current applications.

But what you need to do for those other rules tends to be much more direct. Here's the rule, here's what we're doing to address it. That will still need to be there.

MEMBER REMPE: Okay, thank you.

MEMBER CORRADINI: So, this is an optional path for non-light-water reactors. So, if they choose not to go this path, they must meet current regulations and take exemptions to the general design criteria, et cetera, et cetera?

In other words, I'm trying to understand -- and the reason I'm asking the question like this is, although defined, and I typically think it's quite a good approach, it could create a conversation for the first few of these that could be viewed as interminable.

So, the other option path is to essentially follow the current regulations and then, take exemptions? I mean, that's how --

MR. RECKLEY: Yes.

MEMBER CORRADINI: -- the gas-cooled reactor did it, that's how --

MR. RECKLEY: You could do that approach. You can come forward with principal design criteria, your barriers.

You could take the standard ANS 51.1, 52.1, for light-water reactors and try to say, here's our events, based on functions like decreases in heat removal, decreases in inventory, reactivity transients, and here's how we're going to address those within our designs. One could construct that --

MEMBER CORRADINI: I understand.

MR. RECKLEY: Yes, you could take a shot. We're going to end up asking you many of the questions that would have been answered through this process.

MEMBER CORRADINI: I figured that.

MR. RECKLEY: I mean, so --

MS. CUBBAGE: This is Amy Cubbage. I just wanted to clarify something. Under both approaches, they both have to propose PDCs. And in either case, would they need an exemption to do so, because the GDCs don't apply.

So, in both cases, if you use LMP or an alternative approach, you have to propose PDCs. And

both approaches would be under the current regulations and both approaches would likely have some level of exemptions. The use of LMP wouldn't necessarily obviate the need for exemptions or otherwise.

MEMBER CORRADINI: Okay. So, your point, though, is that it would, in theory, streamline the choosing of what LBEs go into DBAs, et cetera, et cetera --

MS. CUBBAGE: Which is one way of fulfilling the current regulations. Another way of fulfilling the current regulations is to use, as Bill said, more of the standards and traditional engineering judgment and deterministic thoughts to determine what the events are.

MEMBER CORRADINI: Okay.

MR. RECKLEY: Right.

MEMBER CORRADINI: Thank you.

MR. RECKLEY: But then we would go from, for example, in the area of non-safety-related with special treatment, you would go, and if you're going to say, well, we'll going to try to use something much closer to what we do now, then you would go over to regulatory treatment of non-safety systems or RTNSS.

And the criteria that are defined are sometimes hard to follow and sometimes, they're light-

water reactor specific, as to how they were derived. You would have to propose something in that arena to say, here's how we're going to go.

My personal opinion is, it's going to come out looking a lot like, well, we're going to have an Integrated Decision-Making Process to try to help us assess what needs additional regulatory treatment.

MEMBER CORRADINI: So, okay. I want to just test the other pathway. The other part of this, though, that I wanted to make sure I understood is, you're not necessarily looking for a detailed PRA, but you're looking for a comprehensive look at the system, so that I might be able to make, I'll use the word conservative or bounding estimates on frequency or consequence.

As long as it's complete, as complete as you can get it, it doesn't have to be highly detailed. Because some of these systems are such that, to get a highly detailed one would be a challenge.

MR. RECKLEY: I think that's true.

MEMBER MARCH-LEUBA: How can it be complete and not detailed?

MEMBER CORRADINI: Because you can make bounding assumptions. In some --

MEMBER MARCH-LEUBA: Okay.

MEMBER CORRADINI: -- other applications, that we shouldn't --

MEMBER MARCH-LEUBA: You mean conservative?

MEMBER CORRADINI: -- talk about in public, they've had relatively conservative assumptions on what the accidents are and what the responses to those accidents are. And that made it complete, but it was not very detailed.

MR. RECKLEY: Time will tell. The thought is, many of these designs would have more straightforward or simpler PRAs, just reflecting the simpler designs, right?

If I have an active component that then relies on active cooling and AC power and all of those dependencies, that is what drives the complexity. And sometimes, as you mentioned, I make assumptions on those supporting things or how far down I go.

In the passive arena, hopefully, they're less complex simply because they're less complex.

MEMBER CORRADINI: Right. But I --

MEMBER BLEY: Often, this -- not going at the detail, making what appear to be conservative assumptions, are conservative for what you're thinking about, but may be optimistic for other scenarios.

So, your consideration of scenarios better

be pretty thorough, to make sure if you do make bounding assumptions, that they're really bounding for everything.

MR. RECKLEY: Or you make different assumptions for different scenarios.

MEMBER BLEY: Which is the right way to do it.

MR. RECKLEY: Yes.

MEMBER CORRADINI: Okay. All right, thanks.

MEMBER MARCH-LEUBA: As we are getting to the closing arguments, I wanted to reemphasize what I said before, that the staff is always going to be reinventing, retransforming, reengineering, pick the name, which means, have less money available to the reviews.

This type of PRA is not the place to save money, doing the review. Because the consequences of being wrong on those frequencies, having missed a sequence, are very large. So, whenever we retransform again, don't save money on this PRA review.

MR. RECKLEY: Okay. And we hope, I didn't mention it here, we mention it within the draft Guide and it's mentioned in NEI 18-04, we look, hopefully to help in that arena, the ASME/ANS non-light-water

reactor PRA standard, that will call -- provide guidance for how to do that or include peer reviews and so forth, to help make sure that the PRA is good enough to support this activity.

MEMBER BLEY: You're all done? I think it's time to see if any of the members have further questions. And then, we'll go for public comment.

MEMBER KIRCHNER: May I ask?

MEMBER BLEY: Sure.

MEMBER KIRCHNER: Bill, I just want to test the last lines of 19. So, do you see -- this approach, I think should inform where the NRC puts a great deal of its attention, but how substantively is that going to change the scope and level of detail in the application?

MR. RECKLEY: That will be design-specific. As an example that I've used in the past is, the current requirements to describe within the essentially complete design is to describe the power conversion systems in some detail.

And for light-water reactors, that makes sense, because power conversion, upsets on the secondary translate very quickly to upsets on the primary, and you're dependent on heat removal and so forth. And so, secondary plant systems are described

in some detail for light-water reactors.

If a design can show that their heat removal is not through the secondary, and a secondary plant upset doesn't cause a transient, a fast-acting transient on the primary, because the heat's being absorbed by the graphite or the heat capacity of the sodium or whatever the argument would be, then that argument would be, they don't need to describe the secondary plant as much as the light-water reactor has done.

That would be an example. But they would have to show that an upset on the secondary doesn't --

MEMBER KIRCHNER: They would have to show enough to demonstrate to you that it doesn't have an impact?

MR. RECKLEY: Right. But having shown that, they then wouldn't need to describe the secondary as much.

MEMBER BLEY: Anything else from the members? Charlie?

MEMBER BROWN: Yes, a little bit on, since I haven't said anything about the I&C world. But when you -- level of detail of information to be included, following up on Walt's comment, where when I first got here, ten years ago plus change, ESBWR was coming

through for an application.

And the level of detail provided for the I&C systems were sparse, to say the least. Little information on how they achieved independence and just words that says, in the application, we'll follow the rules and the rule for IEEE 603, et cetera, and the various Reg Guides.

It was -- you just had no idea how they were going to accomplish this with the software-based systems. Has -- now, I understand that for event selection, that's a different issue.

But here, are reactor protection and reactor trip or safeguards actuation type functions, where there's a fairly standardized approach, and have there been any discussion on whether those would be, quote, under the risk assessments, say, we don't need them at all?

MR. RECKLEY: I haven't seen --

MEMBER BROWN: Because these plants are so safe?

MR. RECKLEY: I haven't seen any go as far as, we don't need them at all. The -- you do have, in the non-light-waters, again, the additional thermal capacities or the longer time constants can reduce the importance of how fast your reactivity control systems

work.

Which then can show up in simpler reactivity control systems and simpler instrumentation to drive it, because I don't need the instrumentation and the control rods to respond in two seconds, I might have a much longer time period.

And so, those physical things can get reflected in the descriptions and in the application, but it's because you've shown that they're less important, not a priori, I'm not going to describe them.

Once you show they're less important, then you might be able to describe them in less detail or have less complex systems.

MEMBER BROWN: That's fairly mushy.

MR. RECKLEY: Yes.

MEMBER BROWN: Okay.

MR. RECKLEY: Because we won't know until we see a design and how they craft the safety arguments that they're trying to craft.

MEMBER BROWN: Well, time response is one issue. I mean, a few seconds versus 250 milliseconds or 500 milliseconds.

There's -- I mean, we've got some scenarios that are seconds in response today, yet our

systems fundamentally reflect fairly responsive and parallel independent systems, to make sure something happens --

MR. RECKLEY: Right.

MEMBER BROWN: -- regardless of whether you have ten or 15 minutes to do something.

MR. RECKLEY: Right. But again, one of the fundamental or primary safety functions, the generation of heat or reactivity control, will continue, I think, personal opinion, to always require you have those protection systems, and they'll have to be described as to how they work.

There will just be a little more discussion for the non-lights, I think, as to how that also pairs with intrinsic reactivity feedback mechanisms and other things that come into play, maybe more than light-water reactors have. But we'll see. I don't --

MEMBER BROWN: Thank you.

MEMBER BLEY: Okay. And I think at this point, we'll go to public comments. If we can get the phone line open?

While we're waiting for the phone line, if anyone in the audience would like to make a comment, please come up to the podium right behind me, state

your name and your organization, and give us your comment.

Is there anyone on the phone line who would make a comment? Who would like to make a comment? It's really open? Okay. I don't hear anything.

Okay. I think we're finished. Mr. Chairman, back to you.

CHAIRMAN RICCARDELLA: Thank you.

MEMBER BLEY: Exactly on time.

CHAIRMAN RICCARDELLA: Very well done, we're exactly on time at 10:30. And it shows that we have a 15-minute break. We will reconvene at 10:45 to discuss Non-Production and Utilization Facilities Rulemaking. Thank you.

(Whereupon, the above-entitled matter went off the record at 10:30 a.m. and resumed at 10:47 a.m.)

CHAIRMAN RICCARDELLA: Okay. I think we have a quorum.

We will now move to NPUF, non-production and utilization facilities rulemaking. And I will turn the meeting over to Subcommittee Chairman, Matt Sunseri.

MEMBER SUNSERI: Thank you, Mr. Chairman.

This discussion on the non-production and utilization facilities rulemaking is a continuation of a process that we've been going through for a couple of years now.

There was a previous subcommittee and a letter written in 2016. And we recently had a subcommittee meeting in January. And this will be the briefing from that meeting. And we intend to roll into letter preparation, letter report preparation following this presentation today.

So, with no further ado, I'd like to turn it over to Ms. Lund for introductions here.

MS. LUND: Thank you very much. Good morning. I'm Louise Lund. And I'm the Director of the Division of Licensing Projects --

MEMBER SUNSERI: Can I just -- hold on for a second. So the acoustics in this room are pretty challenged here. So what I ask you to do is just to make sure that the microphone is clearly aligned with your voice, because I couldn't hear what you were saying.

MS. LUND: Okay. Does this work?

MEMBER SUNSERI: That --

MS. LUND: Okay. Great. Thank you. Good morning. I'm Louise Lund. And I'm the Director of

the Division of Licensing Projects in the Office of Nuclear Reactor Regulation.

The NRC is here today to provide an overview of the draft final non-power production or utilization facility rulemaking, which we call the NPUF rulemaking.

Seated at the table over there to the side are Bob Beall, the Rulemaking Project Manager from the Office of Nuclear Material Safety and Safeguards, and I am sure that you're aware that rulemaking moved over as a group to NMSS, and Duane Hardesty, Senior Project Manager, and Al Adams, Senior Project Manager. And they're both from the Research and Test Reactor Licensing Branch in the Office of Nuclear Reactor Regulation.

And I think we mentioned probably at the subcommittee meeting that Al Adams is now in phased retirement. But he's still in the group helping us out with a number of projects. So that's really good for us.

So we also have working group members and management from the offices of NRR, Office of General Counsel, Office of Research, NMSS, and the Office of New Reactors.

Key staff members include Duke Kennedy,

who is the Acting Branch Chief in the RTR Licensing Branch, Rich Clement, Michael Smith, Kevin Folk, and Kos Lois from NRR, Tony Gomez from NMSS, Howard Benowitz from OGC, and Michael Eudy from research to assist in answering any questions that come from the committee.

And to support this rulemaking, the staff has developed a draft final rulemaking package which consists of a Commission Paper, Federal Register Notice and a new regulatory guide, Reg Guide 2.7, preparation of updated final safety analysis reports for non-power production or utilization facilities, and I'll tell you a little bit more how that factors in, and other supporting documents that provide the details of the proposed regulatory changes and the benefits to the licensees and NRC staff.

There are nine regulatory actions which are changes included in the draft final rule. Okay.

The most transformative action is elimination of fixed license terms for research reactors, which is consistent with the requirement of the Atomic Energy Act to impose minimum regulation on these licensees and reduces the burden on licensees and the NRC staff, and most importantly, maintains adequate protection of public health and safety of the

environment. And there'll be more discussion as to how that works.

We look forward to an informative interaction with the ACRS today. And I want to thank the ACRS for its review, its comments, and feedback to the staff on this very important rulemaking.

To start today's presentation, Bob Beall will provide an overview of the NPUF rulemaking. And Duane and Al will then provide a detailed discussion of the nine recommended regulatory changes. Thank you very much.

MR. BEALL: Okay. Thank you, Louise. So the draft final rule here that's before you and I'm here to discuss implements the direction the staff got from the Commission to streamline the license renewal process for non-power reactors in NPUF type facilities.

And they wanted us to create a more efficient and effective regulatory framework for these facilities.

And during the process over the past couple years the staff has used their own knowledge and also comments from the public to come up with innovative and transformative approaches, which you'll see in a few minutes that we've come up with some

interesting ideas on how to accomplish this for these non-power licensees.

And those ideas are all contained in the nine rulemaking objectives that Al and Duane will be going over in a few minutes.

For the proposed rule, we issued a proposed rule on March of 2017 that was out for a 75-day comment period. And we also held a public meeting on May of that year to assist the public in formulating their questions. They came in and we were available, the staff was available to answer any questions or comments they may have about the proposed rule.

And at the end of the comment period, we received 16 comment submissions. And in general, all the comments were supportive of the rulemaking process that we were proposing.

As Matt mentioned, we were here just a couple weeks ago in January to present to the subcommittee. And during that meeting, the TRTR chairman stated that he felt that the draft final NPUF rule was a win/win for both the NRC and the NPR community. So that was a very nice endorsement he gave us.

So, with that, I'd like to turn it over to

Duane and Al. And they will go through the nine regulatory changes that the staff is proposing to make.

MR. HARDESTY: Good morning. I would like to start by showing this slide, this graphic here, which is a generalization of the types of facilities that are affected by this rulemaking.

Section 101 of the Atomic Energy Act provides the authority to license production and utilization facilities. And the types of non-power production or utilization facilities or NPUFs are given in both Section 103 and 104 of the Act.

Currently, the NRC regulate 36 NPUFs, which includes 30 research reactors, 1 testing facility, 1 of which is dual licensed as a medical therapy facility under 104(a), and then the 5 remaining facilities are 2 medical isotope production facilities which have construction permits, and 3 class 103, I'm sorry, 3 104(c) facilities that are in decommissioning.

As we go through the slides, you're going to see this graphic each time. And it will be grayed in and out to show the effectivity of the particular objective that I'm talking about.

You're also going to see some red text on

those slides. And that denotes changes between what was in the proposed rule and what's in the draft final rule.

So the first objective of the rule is to address inconsistencies in definitions and terminology that were in our regulations. The draft final rule creates a definition for non-power production and utilization facilities which is flexible enough to capture all of the non-power facilities licensed under Part 50, including the medical isotope facilities.

The NPUF definition was modified in the draft final rule because the staff realized that the definition was too broad.

The definition in the proposed rule excluded fuel cycle facilities, or I'm sorry, fuel reprocessing facilities. But we determined we also needed to exclude production facilities that were designed for the formation of plutonium or uranium-233 or designed for the separation of plutonium, both which are captured in Part 1 and 2 of the definition of production facility in 50.2.

The staff also received a public comment on the definition of testing facility and research reactor, which I will talk about next.

So the National Institutes of Standard and

Technology submitted a comment recommending a more risk-informed definition for testing facility and for research reactor and recommended the use of the one rem accident dose criteria that we established for research reactors as being the demarcation threshold between them. Next slide. Okay.

The NRC agreed that use of the postulated accident dose is a more risk-informed, performance-based approach to distinguish between NPUF facility types and modified the definitions of testing facility and research reactor to be based on that accident dose criteria.

The staff also made conforming changes to the definition of non-power reactor and standardized the use of terminology throughout the NRC regulations. Next slide.

MR. ADAMS: Good morning. I'd like to talk about the second objective, which entails eliminating license terms for certain NPUFs.

The Atomic Energy Act does not establish a license term for class 104(a) or 104(c) facilities. The term is limited only by 10 CFR 50.51(a) to 40 years or less. The staff currently licenses NPUFs for 20-year terms for both renewals and initial licenses.

The staff's analysis of license terms did

consider terms that were longer than 20 years other than indefinite, but determined that with the addition of regular FSAR updates there's no significant nexus between safety and the license renewal process.

The regulations allow 40-year licenses. And several licenses with 40-year terms were issued in the late 1950s and early 1960s.

The staff determined that 40 years was too long of a time to go without an SAR update and adopted the practice of 20-year terms after a decision was made in the 1970s that license renewal was no longer a simple administrative action.

The staff's experience with renewals show that even going 20 years without a formal process to update the licensee basis documentation contributed to a loss of licensing basis and contributed to the last backlog of license renewals. Thus, the staff concluded that longer license terms would further aggravate the difficulties that were experienced.

During the proposed rule phase, it was suggested that we both extend the terms of licenses and require FSAR updates. However, feedback from public meetings showed that the RTR license community would not support a proposal that included both FSAR updates and license renewal for research reactors.

The staff agreed that both were not needed to protect public health and safety. The staff's view is that the non-expiring license is consistent with the Atomic Energy Act Section 104(a)(2), quote, impose only such minimum amount of regulation under this Act to promote the common defense and security and to protect public health and safety.

The next two slides discuss how health and safety of the public is maintained with a non-expiring license. Next slide.

This slide provides technical reasons based on design and operational characteristics of class 104 NPUFs for discontinuing license renewal for NPUF licensees due to their low risk.

This discussion is applicable to the medical therapy and research reactors. It is not related to testing facilities or commercial and medical ISO facilities who will still be subject to license renewal.

While commercial facilities may have some of the attributes of non-commercial facilities, potential pace and scope of commercial activities justifies the additional scrutiny of class 103 licensing process.

Under this rule, class 104 NPUFs other

than testing facilities will have a maximum accident dose criteria of one rem TEDE. These facilities operate at low power levels, have a small inventory of fission products, and operate at low temperatures and pressures preventing a low potential radiological risk to the environment and the public.

These facilities are also simple in their design and operation. And, therefore, the scope of aging-related concerns is limited. The staff has found no significant aging issues because NRC currently imposes aging-related surveillance requirements on NPUFs via their technical specifications.

In addition, the design basis of these facilities evolves slowly over time. The NRC receives approximately five license amendment requests each year from all the licensees combined. Further, on average, each of these facilities reports only five 10 CFR 50.59 evaluations per year. Next slide, please.

MEMBER KIRCHNER: Al, before you go on, just as a footnote, could you just specify where that dose is measured?

MR. ADAMS: So the dose is to the maximally exposed person, wherever that person might happen to be.

MEMBER KIRCHNER: So there's no distance implied, just the maximally --

MR. ADAMS: Right.

MEMBER KIRCHNER: -- exposed person?

MR. ADAMS: Right.

MEMBER KIRCHNER: Okay.

MR. ADAMS: Sometimes the distance is to the fence or to the -- you know, the boundary of the restricted area of research reactors is very small. It could sometimes be the, you know, the room in the engineering building.

MEMBER KIRCHNER: Yes. All right.

MR. ADAMS: So we considered the nexus between license renewal and safety. When the first power reactors are facing license renewal, research reactor license renewal is already an established process.

We looked at the framework that was being developed for power reactor license renewal and focused on aging of structures, systems, and components important to continued safety.

We did not include research reactors in the power reactor framework for Part 54 because we already had an established license renewal process. Also, we could not envision what license renewal would

encompass if limited to aging issues for research reactors.

So the question is, without notable aging issues, what does taking a snapshot of a research reactor only once every 20 or 40 years contribute to safety. We came to the conclusion that there was nothing of safety importance.

There are other processes in place that ensure safety on a continuing basis. And the actions we have taken or are proposing to take contribute more than continuing safety than performing a license renewal every 20 years.

NUREG 1537 is our format and content guidance for licensees and the standard review plan for the staff for NPUF licensing actions. It was issued in 1996 with two interim staff guidance documents issued later. There was no comprehensive guidance for research and test reactors before 1996.

As an entrance criteria to being ordered into a non-expiring license, all of the facilities will undergo a license renewal review using the guidance of NUREG 1537. This ensures a comprehensive and consistent licensing basis using established guidance for the licensees.

For the staff, we have a licensing basis

that was reviewed and documented in the safety evaluation report using the standard review plan. So we will have the solid, documented basis of the safety of the facilities entering into the non-expiring license process.

The oversight and inspection program is a comprehensive look at all aspects of facility operation. Inspectors are on site up to several times a year. Any deterioration in licensing performance will be discovered, documented, and corrected.

Inspection results are reviewed for adverse trends that could indicate new aging issues. Licensees also report maintenance, which includes component issues, in their annual reports, which would allow the NRC to identify new aging issues if they were to occur.

As such, the staff believes that the regulatory oversight and requirement for FSAR updates by the final rule will provide the safety benefits currently afforded by the license renewal process.

I'll turn it back over to Duane at this point.

MR. HARDESTY: All right. So, moving on to the third objective under the draft final rule, the staff wished to consolidate the license renewal

requirements for current and future NPUF licensees licensed under 10 CFR 50.22 and all testing facilities.

There are no new requirements under 51.35. However, we did make minor modifications to the draft final rule to make the renewed license effective immediately. It used to be effective in 30 days. That was to add flexibility for implementation of the staff and the licensee working together to give flexibility.

Then we also removed some text which unnecessarily limited a renewed NPUF license to less than 40 years. A 40-year term is allowed by the Atomic Energy Act. And so that was an error that we corrected. Next slide, please.

For the fourth objective, the staff has extended the requirements for updates of final safety analysis reports under 50.71(e) of the Code of Federal Regulations to be applicable to all NPUFs.

This is kind of the key part of our entire package in that we are relying on the FSAR updates to be the basis, to maintain the licensing basis for our licensing, or licensees.

These updates were not required previously. And history has shown that licensees were

having difficulty providing documentation to fully describe the details of their licensing basis.

Under the draft final rule, NPUFs will be required to provide five-year updates to the FSAR ensuring more timely documentation of changes to the facility. The updated FSAR is important for the NRC's inspection program and for effective license operator training at the facility.

The five-year periodicity that we chose reflects the more slowly evolving basis that Al just mentioned for NPUFs. But it's also frequent enough to maintain the licensing basis given the staff's findings for typical number of facility changes and the staff turnover at the facilities.

We also generated a Reg Guide, Reg Guide 2.7, which provides guidance to the licensees on preparing and submitting FSAR updates.

MEMBER SKILLMAN: Duane, what inspection requirements changed when the five-year updates became required? Did --

MR. HARDESTY: When will they be required?

MEMBER SKILLMAN: No. You have a licensee who has now agreed to have an unexpired, an unexpiring license. And for that privilege, you require a five-year update on the FSAR, right?

MR. HARDESTY: Actually, all NPUFs, even the ones that undergo license renewal, have to do the updates.

MEMBER SKILLMAN: Okay. So what inspection requirements did you change? Did you institute a thicker magnifying glass for that FSAR update so that you really, really know those licensees are toeing the line?

MR. HARDESTY: Not per se. There is part of the inspection program where they look at the facility as changed, whether it be via amendment, which the licensing branch would look at, as well as whether it would be under 50.59 without prior notification to the NRC or prior approval of the NRC.

And that is documented by the licensee in an annual report to us. So we see those changes much more frequently. And additionally, our project managers interface with the facilities to understand the changes to the facility.

So we see that, any changes that come in both from the inspections program where they go out and look at the facilities from these annual reports. And then we'll see a consolidation of that into the five-year updates, which the staff will review as part of the new licensing or the regulatory requirement.

MR. ADAMS: Can I just add something? So, when these updates come in to NRC, they're not licensing actions. But the project managers will sit down, review the FSARs. And, you know, they already know what they expect to see in it because they've been involved in issuing the license amendments. They've been involved in looking at 50.59 reviews.

So, if they don't see what they expect to see, then they can, then through the inspectors they can feed back through the inspection program a process where the inspectors would discuss this with the licensees when they're on site.

MR. HARDESTY: Right. And even now without this, when the project manager and the inspector want to discuss the facility, they'll schedule something prior to the inspector going out for a routine inspection. And the project manager has the opportunity to have the inspector ask any additional questions or look at any additional records that might be reasonable for understanding what is under, what changes are being made at the facility.

MEMBER SKILLMAN: Thank you.

MR. HARDESTY: So the fifth objective is to amend the timely renewal provision under 10 CFR 2.109 for the class 103 NPUFs and for all testing

facilities, which are the two types of facilities that will continue to undergo license renewal.

The change is to make the requirement such that they have to submit an application two years prior to the expiration of the license. Current regulations allow that NPUF licensees can submit as soon as 30 days or as late as 30 days prior to the expiration of the license.

Again, historically that 30 days has proven to be insufficient time for the NRC staff to make a determination of the acceptability of the application and to adequately assess, I mean, to ask for the licensee to supplement the application.

So what we've done in the past is we've basically accepted the application as is, which is, which increased the burden to both the NRC staff and the licensees because all of those deficiencies had to then be addressed through other means such as the request for additional information process.

The proposed rule also would have eliminated the requirement for also class, all class 104 NPUFs because they didn't have license renewal anymore, so we didn't need them to be in 2.109.

However, during the draft final rule discussions, we realized that there's a timing

situation in which at least one facility will be subject and getting ready to go through license renewal, which is one of our entrance criteria under NUREG 1537, after the final rule goes into effect.

So we basically would have put them into a box where they didn't have a timely renewal provision because they couldn't meet the two-year window because they were less than that.

So we modified the language slightly so that it didn't go away for anybody that might be doing license renewal that's an NPUF. But it also changed it to two years for those that we intend to have future license renewal, which would be the class 104 test, 4(c) testing facilities and all 50.22 facilities. Next slide, please.

So this is the objective for the accident dose criterion that we alluded to a couple of times already. So we created a new accident dose criterion for all NPUFs other than testing facilities in 10 CFR 50.34.

So, prior to this, the staff didn't have an accident dose criteria in the regulations. So the licensees were asked to meet the Part 20, 10 CFR Part 20 requirements for accident dose criteria.

In May 1972, the NRC Atomic Safety and

Licensing Appeals Board suggested that the standards in Part 20 were unduly restricted as accident dose criteria for research reactors.

In 1991, the NRC amended Part 20 and lowered that public dose from .5 down to .rem. Still at that time the staff was using the Part 20 requirements for NPUFs other than testing facilities as the accident dose criteria for demonstrating worst-case accidents to a member of the public for the maximum hypothetical accident.

MEMBER REMPE: So --

MR. HARDESTY: However, in 1992, the Environmental Protection Agency published protective action guidelines. And in January 2017, the EPA published an update to the PAGs and the PAG manual that had dose guidelines that supported their decision to protective actions such as staying indoors, evacuation or evacuation to protect the public during a radiological incident.

In the early phase of radiological incidents, the trigger for the protective action of sheltering in place or evacuation of the public range is from one to five rem. So the EPA PAG manual does not provide a protective action recommendation for the public when the projected dose to an individual from

an incident is less than one rem.

So, putting that all together, the staff realized that we were unnecessarily limiting the accident dose criteria or we were severely limiting the accident dose criteria for our research reactors and, indeed, also our testing facility. And they were able to meet that.

However, not having that accident dose criteria and the fact that the trend is that Part 20 continues to go down in dose limits, we wanted to provide an accident dose criteria that was specifically applicable to those non-power production and utilization facilities other than testing facilities, which were governed under Part 100.

The staff believes that that one rem criteria aligns well with the PAG guidelines, being as if there is no protective action guidelines recommendations under one rem. And the staff has determined that there is a benefit to the licensees without undue risk to the public by establishing this actual accident dose criteria.

The staff did make a small change in the final rule. It was an administrative change of where it was located in 50.34. Where we had put it inadvertently placed it under power reactor criterion.

And we moved it out there to be where all of the other facilities would be other than power reactors. Next --

MEMBER SUNSERI: Duane, let me ask you a question. Joy, did you have a question? Did you want to ask him?

MEMBER REMPE: It's not on this point. It was actually an earlier one. But --

(Simultaneous speaking.)

MEMBER SUNSERI: Okay.

MEMBER REMPE: Well, I'll ask it later when --

MEMBER SUNSERI: Okay. Go ahead.

MEMBER REMPE: Oh, okay. Well, since we've interrupted and you're not -- I thought you had a question on item 6.

MEMBER SUNSERI: No, no, I was --

MEMBER REMPE: Okay.

MEMBER SUNSERI: I was stopping him so, because I thought you had a question.

MEMBER REMPE: I did. It was on 5 I believe where you talked about there are a couple of facilities that you left the 30-day timely renewal provision in there. I've forgotten now if this was in the original review when we did the letter a while

ago.

But if it's only a couple of facilities and in light that it's hard for the staff to turn things around in 30 days, is it wise to leave that as a, to leave it in? I mean, it was a couple of exceptions is what I think I heard you say. And should -- the two years is really where you want to go, right?

MR. HARDESTY: So the specific issue is that the new regulation would, as it was written in the proposed rule would have established a two-year timeframe.

MEMBER REMPE: Right.

MR. HARDESTY: The one particular facility will be within about a year of timely, needing to submit their application. They won't be eligible for timely renewal because it's less than two years the way it was written.

So, basically the flow of 2.109 the way it's written is, unless you're this or this or this, it falls out to 30 days.

So we left that waterfall in so that when this particular facility looks at that regulation for applicability it automatically goes down to 30 days. That's to protect them from being in violation of the

regulations when they do come for license renewal.

MEMBER REMPE: And no other facility will ever fall into that category in the future is what I'm trying to get to. It was just this one.

MR. HARDESTY: Correct.

MEMBER REMPE: And I just wanted to make sure I understood that.

MR. HARDESTY: Yeah.

MEMBER REMPE: Thank you. Sorry --

MEMBER SUNSERI: No, no, it was a good question. So they built in the transition period into the regulation so that you didn't have to deal with an exception afterwards or something, right?

MR. ADAMS: That's correct, because right now, you know, when the rule would become effective they would already be within two years of submitting an application.

MEMBER SUNSERI: Right.

MR. ADAMS: So --

MEMBER SUNSERI: Thank you.

MR. HARDESTY: Okay. The seventh objective is to extend the applicability of 10 CFR 50.59 to NPUFs that have had their fuel removed from their site in preparation for decommissioning.

50.59(b) did not apply 50.59 to NPUFs

whose license were amended to reflect permanent cessation of operations and that no longer had fuel on site because these facilities have returned their fuel to the Department of Energy.

The former language stated that 50.59 applied to licensees whose license has been amended to allow possession of nuclear fuel but not operation of the facility.

So what the staff had to do when we reached that situation was we would essentially write a license condition to give them the same 50.59 allowance that the regulations would normally do. So this is just simply an administrative change to the wording to prevent that and make 50.59 applicable to all facilities regardless of their status for the fuel. Next slide.

Objective 8 clarifies the existing environmental reporting requirements. The NRC is required to prepare either an environmental impact statement or an environmental assessment as appropriate for all licensing actions pursuant to 10 CFR Part 51 unless a categorical exclusion applies.

For most types of license, Part 51 specifies that an applicant must submit environmental documentation in the form of an environmental report

or a supplement to a previously provided environmental report to assist the NRC in preparing the National Environmental Policy Act documentation.

A new section was added to 10 CFR Part 51 to clarify the NPUF environmental reporting requirements. 51.56 clarifies that an applicant's existing requirement for meeting the provisions of 51.45.

Again, the change is not a new requirement. It's just for regulatory certainty we wanted to provide clarity such that it was clear in the new requirements that environmental report submissions were required from the applicants for licensing actions. Next slide.

And finally, the ninth objective is to eliminate NPUF financial qualification information requirements. Before this final rule, 50.33(f) of the Code of Federal Regulations required NPUF licensees that requested license renewal to submit the same financial information that was required in an application for an initial license.

In 2004, there was rulemaking where the NRC discontinued financial qualification reviews for power reactors at the license renewal stage except in very limited circumstances. The Commission at that

time stated that the NRC had not found a consistent correlation between licensees' poor financial health and poor safety performance.

So, if the licensee postpones inspection repairs that are subject to NRC oversight, the NRC has the authority to shut down the reactor and take appropriate action if there is a safety issue. So that's independent of any financial information or qualifications.

So, on a similar reasoning, we determined that it was valid for NPUF licensees seeking license renewal to also be excluded from this NPUF, or rather this financial qualification requirement.

At the NPUF sites, the NRC's inspection enforcement programs serve as an important tool for evaluating licensee performance and assuring the safe operation. And the inspection program examines all aspects of facility operation to ensure they're safe.

The NRC is similarly not aware of any connection between an NPUF's financial qualifications at license renewal and the safe operation of the facility.

The NRC found that the financial qualification information did not meaningfully contribute to the NRC's determination for the license

renewal application.

And so the elimination of NPUF license renewal financial qualification requirements is recommended for, or is listed as part of the draft final rule to reduce the burden associated with license renewal applications while still enabling the NRC to obtain the information necessary to conduct its review for license renewal. Next slide.

MR. ADAMS: Next slide. So the staff made changes in the draft rule to arrive at the final rule. And that was as a result of public comments and work group considerations. So this slide summarizes the more significant changes.

So we revised the proposed definition of non-power production and utilization facility to exclude a production facility designed or used primarily for the formation of plutonium or uranium-233 or designed or used for the separation of the isotopes of plutonium.

Based on a comment from this, we revised the existing definition of non-power reactor, research reactor, and testing facility to base the definitions on radiological risk rather than reactor power level. This is the most significant change made from the proposed rule.

Where appropriate, we made conforming changes to the terms and definitions throughout 10 CFR Chapter 1 to add, correct, or standardize the terminology and definitions.

The proposed 10 CFR 50.135 was revised so that renewed licenses will be effective immediately. Time for the licensee to implement the renewed license would be determined on a case-by-case basis instead of by rule to allow more licensee flexibility in operation.

We also clarified the proposed 10 CFR 135 to maintain up to a 40-year term for renewed licenses. The wording of the draft regulation inadvertently could limit license terms to 30 years.

We also maintained the 30-day timely renewal provision for facilities licensed under Section 104(a) and (c) of the Atomic Energy Act that still needed to undergo license renewal to be subject to a non-expiring license.

Finally, we revised the location within 10 CFR 50.34 of the accident dose criterion. We realized that we could place the criterion in the section of 50.34 that would allow greater clarity for the application. Next slide.

So this is our final slide. This slide

summarizes the nine final --

MEMBER KIRCHNER: Al, just a minor point, why did you stick with testing facility? Testing facility to me is rather vague. Why didn't you call it reactor testing facility or test reactor or something?

Is there some historical legal basis for that or -- I mean, testing facility, there are a lot of reactor-related testing facilities that don't have radioactive sources or don't use a test reactor.

MR. ADAMS: Yeah, no, we didn't. And, indeed, you know, I completely understand what you're saying, because in the past we did look at a petition for rulemaking to change the terminology.

All I can tell you is that in the regulations there was testing facility, testing reactor. They call themselves test reactor. For no good reason, we left it alone.

MEMBER KIRCHNER: Okay. That's it. Thank you.

MEMBER REMPE: So, while you're, again, interrupted. Let's talk about what you did in the past when they had to submit their financial qualification updates.

Did they -- it costs a lot to D&D a

facility. Did they used to say, yeah, we had this money when we got it licensed and we know that prices have increased, so they included the increase in price?

MR. ADAMS: So the financial requirements for decommissioning are in 50.75 and decommissioning is in 50.82. Those aren't changing. Those requirements aren't changing. The financial --

MEMBER REMPE: Oh, okay.

MR. ADAMS: The financial requirements we're talking about is that as part of the license application you would have to tell us normally for the first five years of the renewed license where you were getting your money from, how you were spending your money.

MEMBER REMPE: Okay.

MR. ADAMS: So it was basically a pro forma financial statement.

MEMBER REMPE: Okay. So they still have to show they can --

MR. ADAMS: They still have to show capability to fund decommissioning in accordance with the regulations. And there's a requirement to keep that cost estimate up-to-date.

MEMBER REMPE: Good. Thank you.

MR. ADAMS: That's not changing.

So this is our final slide. It summarizes the nine final rule change areas of the NPUF rule showing the facilities each of the changes are applicable to.

Along with Louise, I'd like to recognize the work of the working group. They put in many long hours, lots of discussion and very thoughtful discussion to address the comments that were made from the public and also to go through the proposed rule and make sure it was the best rule we can create.

With that, I'll turn the presentation back to Bob to discuss moving forward.

MR. BEALL: Okay. Thank you, Al. So where are we with the final rule? Currently, the draft final rule is in formal concurrence. At the, towards the end of February, the staff will get comments from the division level and NRC management.

We also plan on having another public meeting towards the end of February. And this public meeting is to get last minute feedback on the proposed implementation schedule of the draft final rule from the public.

And we can, we will then consider those if they want any changes to that and the package as it

goes towards the Commission. And speaking of the Commission, the package is due by June of this year to them. And right now we're on schedule to meet that date.

With that, the three of us will be happy to take any further questions from the Committee.

MEMBER SUNSERI: Members, any additional questions for the group? None? All right.

So let's open the phone lines. And while we're doing that, we'll call for any comments from the audience. Members of the public in the audience, please come to the podium and state your name. Nobody? Oh, here comes one.

MR. NEWTON: I'm Tom Newton from the Center for Neutron Research. I just kind of wanted to reiterate my comments that I did with the subcommittee a couple weeks ago, is if this rule is properly implemented, the TRTR community, both the research reactor community and others, feel like this is a win/win. It will reduce burden for both of us without having any really safety consequence.

MEMBER SUNSERI: Thank you. Any other comments from the audience?

Okay. We'll turn to the phone line now. Is there anybody on the phone line that would like to

make public comments? Please state your name and make your comment.

Is anybody on the phone line that can hear this, please just speak up because it was my understanding that there was somebody that wanted to make a public comment.

Thank you. All right. One last chance. Any member of the public on the phone line that would like to make a comment, please do so at this time. All right. Well, that's it. We'll close the phone line.

With no further questions, we'll turn it back to you, Mr. Chairman.

CHAIRMAN RICCARDELLA: Okay. Thank you, Matt. We have about a half an hour. And I understand that we have a letter ready to meet on this topic.

MEMBER SUNSERI: That's correct. We have a draft letter. We can --

CHAIRMAN RICCARDELLA: Okay. We're no longer on the record.

(Whereupon, the above-entitled matter went off the record at 11:28 a.m. and resumed at 1:02 p.m.)

CHAIRMAN RICCARDELLA: Okay, the meeting will convene. The topic is --

MEMBER CORRADINI: Okay, shall we get

started?

CHAIRMAN RICCARDELLA: Yes, Mike.

MEMBER CORRADINI: Okay, we're in a session that is going to be talking about NuScale Chapter 2 and 17. This is our containing Phase 3 review of NuScale With Open Items.

And, what I'll do is I'll turn it over to NRO, Dr. Chowdhury will lead us through at least the first part of it.

And then, we have staff to support him if we have detailed questions.

Dr. Chowdhury?

DR. CHOWDHURY: Yes, good afternoon. My name is Prosanta Chowdhury. I'm the Project Manager for Chapter 2 of the NuScale Design Certification Application review.

I have been with the NRC about 14 years and my background is, I'm in -- I have a nuclear engineering degree, Master's degree, and also on -- in electrical engineering.

Prior to joining the NRC, I worked for the State of Louisiana in the radiation protection area for 18 and a half years.

At the NRC, I joined the Project Management Group in 2008, so I have been there for ten

years now.

What I plan to do today is to go over the high level of findings that the staff presented at the ACRS Subcommittee meeting on Chapter 2 on December 18, 2018.

And so, and then, if there are any specific questions the members may have, then we have the staff present in the audience to answer those questions.

Okay, this is slide number two. On December 18, 2018, the staff presented to the ACRS Subcommittee Chapter 2, the following topics.

The topics are geography and demography, which is Section 2.1 of the Standard Review Plan; Nearby Industrial, Transportation and Military Facilities, Section 2.2; Meteorology Section 2.3; Hydrology Engineering is Section 2.4; and Geology, Seismology and Geotechnical Engineering is Section 2.5 of the SRP.

I want to make a note here that the staff review that was presented on December 18, 2018 was based on Design Certification Application Revision 1 submitted by NuScale on March 15, 2018.

We also received later Revision 2 of the Design Certification Application, but the staff,

because of the scheduling and timing, the staff did not review that part to influence the SE. So, that will come later. At this point, our focus is on Revision 1.

Topics and conclusions for SRP Section 2.1 at Geography and Demography and also SRP Section 2.2, Nearby Industrial, Transportation and Military Facilities, COL items provided in the Design Certification Application have been found to be acceptable.

The COL Applicant referencing the NuScale power plant design clarification should describe and address site specific geographic and demographic statistics as part of COL item 2.1-1.

Nearby Industrial, Transportation and Military Facilities to demonstrate that the design is acceptable for each potential accident or provide site specific design alternatives as part of COL item 2.2-1.

Site specific information in a COL application should be bounded by the design parameters.

MEMBER REMPE: Excuse me for a minute, I missed the Subcommittee meeting. But I was curious from the transcript which I read after the

Subcommittee meeting where the staff said they evaluated six sites and only one of the six sites were bounded by the site parameters that are based on the EPRI users or utility requirements document.

Correct, that's what --

DR. CHOWDHURY: That's in Section 2.3 I believe. And Mike Mazaika is present in the audience.

MEMBER CORRADINI: I think that was strictly for the LPZ and EAB calculations. The staff did an audit on six.

DR. CHOWDHURY: Yes, that's in Section 2.3.

MEMBER REMPE: Right. Okay, so I'd note that in --

MEMBER CORRADINI: But not on these.

MEMBER REMPE: Okay. So, I should wait until -- okay. Heads up, go ahead.

DR. CHOWDHURY: Okay.

So, now we are talking about 2.3, Meteorology. And, for -- there are five subsections there, 2.3.1, 2.3.2., 2.3.3, 2.3.4 and 2.3.5.

So, each of them climatology, 2.3.1; precipitation, winds, rain, snow and ambient dry and wet-bulb temperatures are generally representative of a reasonable number of potential plant site locations.

However, because design may be deployed in remote locations or at sites subject to harsh weather conditions, some postulative parameter values may be challenged.

And, these were discussed in detail at the Subcommittee meetings.

Local meteorology and onsite meteorological measurements are the COL Applicant's responsibility and they'll be responded or provided by the COL Applicant.

So, would you like to bring up your question at this point?

MEMBER REMPE: Okay, so, again, the staff did an audit and only one out of six sites were found to be bounded by what was in the EPRI utility requirements document.

DR. CHOWDHURY: The staff did a calculation by themselves. So, I would request Mike Mazaika to come forward please to the microphone or Jason White, one of them.

MEMBER REMPE: So, just to give the whole extent of my question, Chapter 19 did their analysis for the risk assessment using Surry parameters.

So, I'm just curious in the one out of six or the six ones you did with the audit, did you

include Surry?

MR. WHITE: One moment.

MEMBER CORRADINI: If I just want to clarify to get precisely to -- so, what the staff did was on the accident releases. They chose the specified NuScale short distance and then chose six sites and one of the six passed at that short distance.

MEMBER REMPE: Right. But didn't they assume -- did they look -- I'm not sure what they did in the audit. But did they look at the X/Qs for all six sites and said, hey, only one out of six sites are bounded by what's in the EPRI document?

MR. WHITE: Yes, that's correct.

MEMBER REMPE: Okay, of the six sites, did you include Surry?

MR. WHITE: That's what I'm checking, one moment, please.

MEMBER REMPE: And then, at some point, I'd like to hear from NuScale, are there any -- we've only looked at a few of the chapters and we're going to see a third set of site parameters in the DCD or was it just limited to Surry and the EPRI recommended values?

MR. SHAVER: This is Mark Shaver from

NuScale Power.

MEMBER CORRADINI: You're going to have speak up, please, Mark.

MR. SHAVER: Sorry, is this better?

MEMBER CORRADINI: Yes.

MR. SHAVER: All right. So, what NuScale did was took meteorological data from airports all over the U.S. and picked the value between the 80th and 90th percentile, the meteorological data was the 80th to 90th percentile and did --

MEMBER REMPE: I'm having trouble hearing you.

MEMBER CORRADINI: You're going to have to speak a little more clearly and a little slower or else, we can't understand you.

MR. SHAVER: All right. So, what NuScale did to develop the X/Qs for accident doses is looked at meteorological data all over the United States from airports.

And, we took the 80th to 90th percentile site which ended up being Sacramento.

And then, we took that meteorological data to develop X/Qs for the accident scenarios.

MEMBER REMPE: So, is this for Chapter 2 what you did? Because in Chapter 2, I thought you

attributed it to the EPRI URD.

But now, you're telling me you independently looked at all of these sites?

MR. SHAVER: Yes, we independently looked at sites. And this was at Chapter 2 X/Qs that were used in Chapter 15 analysis.

And we did that because of our shorter site boundary distance. We used the ARCON96 code modified to do the X/Qs.

MEMBER REMPE: So, I'm having a little trouble still hearing you, so you're tell me on Chapter 2 and Chapter 15, you did your own assessment and picked the 85th or something percentile values of the existing sites in the U.S. today, is that what you said?

MR. SHAVER: The meteorological data, that is correct. And then, we used that meteorological data in the ARCON code to develop X/Qs for our shorter site boundary.

MEMBER REMPE: Okay. So, then, again, I'm just repeating what I read in Chapter 19 in the open version, it says you used Surry.

So, how does this 85th percentile compare with Surry?

MR. SHAVER: I'm not sure, I haven't done

that comparison.

MEMBER DIMITRIJEVIC: Joy, as I pointed in the email, the Surry data was for some of the population by 2060 and also economical effects.

I didn't find reference to Surry data in anything else in Chapter 19.

MEMBER REMPE: I thought they did it when they actually evaluated the does to get the consequences.

MEMBER CORRADINI: I don't -- so, two things. One, NuScale, if we start getting into areas that are in proprietary, you have to stop us and we'll save for closed session. That's point one.

Point two is, I think what Vesna says is correct to the extent that it's open information.

MEMBER REMPE: Okay, so, one --

MEMBER CORRADINI: What they did by the number of sites, the number of sites as Matt said, 80th to 90th percentile and then staff came back with an audit at six reactor sites and found at a short distance only one out of six passed using that tool and that meteorological data from those six sites.

So, two different totally different analyses approaches.

MEMBER REMPE: So, I guess I'd like --

MEMBER DIMITRIJEVIC: But also Chapter 19 has the meteorological data for the tornados, you know, for external events. And they're not for meters, you know, they're not -- the ones I tracked are not are equivalent to Chapter 2.

So, I'm not -- and plus, I don't remember, did you look in the separate document to see does EPRI document gives the all the data that they provide in Chapter 2 table?

MEMBER REMPE: Okay, so again, I'm really getting confused because they did their own assessment. I did see attributes in the staff documents to what NuScale did saying that it was the EPRI.

I thought it was actually in the NuScale document, too, they'd used the EPRI UFRDX. But, they did not, is -- I was confused on that totally. They did not ever use the EPRI document?

MR. WHITE: So, from the staff's perspective, I'm not sure what NuScale used for their calculations.

We did not do a direct comparison to the Surry data set. We used six data sets that we had in house and we did an independent calculation using the ARCON96 methodology with those six meteorological data

sets and we compared our numbers to the numbers that they provided as their site parameters.

MEMBER REMPE: So, I guess where I'm coming from and I'm not quite sure I fully understand what you're saying, Vesna. But, to me, at some point, the COL Applicant has to come in and compare their particular site with all the assumptions that were made by NuScale.

And, where I'm trying to go with this is, are there two sets of assumptions for -- or two different type of site evaluations for parameters?

Or, is that list going to be very convoluted to compare with for different analyses they need to compare different things?

MR. WHITE: Well, I'm not quite sure for the Chapter 19 analysis that you mentioned. But, for Chapter 2, we're only comparing their results to the site parameters that they provided for Chapter 2.

MEMBER REMPE: Okay. So, I'm not quite -- I had trouble hearing what you're saying. Yes, could you --

MEMBER CORRADINI: You have to speak closer to the mic.

MEMBER REMPE: Yes, it's --

MEMBER CORRADINI: It's mushy in here.

MR. WHITE: Okay. Sorry about that.

We're only looking at the site parameters that they provided for Chapter 2. So, when we did our independent verification, we were looking at our results versus the values that they provided for Chapter 2.

I'm not quite sure what they provided for Chapter 19.

MEMBER REMPE: Okay. So, that's the point I'm going to is that I want to know what exactly was used in Chapter 19 so it's clear to everybody that the -- what needs to be considered for the different analyses.

And I guess I -- maybe this has happened in other GCs where they used two different site parameters type things?

MEMBER CORRADINI: So, if I might try, I mean, I don't want to read from the SER because it is a proprietary SER, but I think as the staff member noted, it was essentially, and as NuScale noted, they essentially used the 80th, 90th percentile from a number of sites.

They did not consider Surry. They did not consider anything in Chapter 19.

And staff independently had six

calculations at a short distance. The distance matters because you change the methodology relative close to buildings versus far away as the diffusion and the spread of the thing.

So, I think that's the open item that's left out there to be considered.

MEMBER REMPE: It is, but then, what's considered for Chapter 2 may be different than Chapter 19 is the point I'm trying to emphasize.

CHAIRMAN RICCARDELLA: But in Chapter 19, wouldn't the COL Applicant have to do his own PRA and consider the specific --

MEMBER CORRADINI: Yes.

MEMBER REMPE: Right.

CHAIRMAN RICCARDELLA: -- parameters -- site parameters that are applicable to their site?

MEMBER DIMITRIJEVIC: Right, because --

MEMBER REMPE: But they won't ever --

CHAIRMAN RICCARDELLA: They just used Surry as an example.

MEMBER REMPE: They won't ever say, well, it's bounded because -- and they'll -- by what's in Surry here versus what's in the 80th percentile?

MEMBER CORRADINI: I guess my -- again, I don't want to speak for the staff, but my sense is, in

a sense, this is a red herring.

They have a calculation. The calculation is an open item because, at these close distances, it does not meet the EAB and the LPZ proposed.

So, they either have to go back and -- NuScale's got to go back and redo the analysis and to staff's approval or change the distance and show that at some distance you then meet the site parameters.

But, I think that's it. I don't think looking at Chapter 19 at this point is going to benefit us at all.

MEMBER REMPE: I just, again, I'll probably bring it up again in Chapter 19 space, but it seems like there's different assumptions used for different places. And I just am wondering about that. Okay?

CHAIRMAN RICCARDELLA: But we reviewed the PRA a few months ago.

MEMBER REMPE: Preliminary review, yes.

CHAIRMAN RICCARDELLA: Preliminary review. It was the preliminary PRA but it was just an example of -- it wasn't in the PRA.

MEMBER DIMITRIJEVIC: Well, the PRA, like everything else, has to be conforming the qualified, you know, phase and all the assumptions on the

locations and the thing will have to be confirmed.

I don't see any contradiction actually, at least what I checked with what you're saying. Because the only problem will be if you have a contradictory assumption which are important from my point.

But since they all were used in -- and I didn't see this other Surry application. So, the Surry data, it was used in some but is not used in Chapter 2.

Well, my point is, I don't think we need to be concerned because all of those assumptions still have to be confirmed in the qualified.

MEMBER REMPE: I agree with you that they'll have to be confirmed, but I don't -- I'm trying to emphasize the point, there's two different sets of assumptions is all I'm trying to emphasize.

MEMBER DIMITRIJEVIC: But they --

MEMBER REMPE: And I was curious, are there going to be a third set? I mean, how many different site parameters -- or do they pick for different chapters is where I'm kind of going.

MEMBER CORRADINI: Again, I'll just repeat, I think, to focus just on Chapter 2, staff has left it an open item in terms of the source term itself and the methodology used for short distances.

And, until NuScale comes back and confirms that they've sorted out the methodology or show that they meet the method -- they use the methodology as stated at a longer distance, it remains an open item.

MEMBER REMPE: Okay.

MEMBER CORRADINI: I think -- I'm looking at you -- I think I've said it --

MR. WHITE: Yes, that's accurate.

MEMBER REMPE: Okay.

MEMBER CORRADINI: Okay.

MEMBER REMPE: Thank you.

DR. CHOWDHURY: So, the open item, I'm on slide number five.

On slide five, we mention just talked about the open item, it's Open Item 02.03.04-1. And, again, we are currently evaluating X/Qs in meteorology to determine if the methodology is acceptable for calculating design assess and offsite X/Q values in parameters at EAB and LPZ in relation to NuScale design or a COL Applicant reference in the NuScale design.

The staff found that the Applicant provided onsite X/Qs site parameters values at the main control room and technical support center doors and heating, ventilation, air conditioning intake that

were representative of a reasonable number of sites that may be considered for a COL Application.

As for the long-term accident dispersion estimates for routine releases that found that the long-term routine release site parameter values selected by that Applicant are representative of a number of -- a reasonable number of sites that have been already considered for a COL Application.

MEMBER KIRCHNER: So, I was asking my colleagues, maybe it was before my time on the Committee, are you going to then come before us with this accident source term methodology review?

DR. CHOWDHURY: Will that be presented?

MEMBER KIRCHNER: Yes.

DR. CHOWDHURY: Yes, it will be.

MEMBER KIRCHNER: Okay, thank you.

MEMBER CORRADINI: So, and again, just so I have it clear, there's two things that sit in the open item. One is the methodology for EAB and LPZ and the source term that is yet to be --

DR. CHOWDHURY: Right.

MEMBER CORRADINI: -- the final? Okay.

DR. CHOWDHURY: That's correct.

MEMBER CORRADINI: All right.

DR. CHOWDHURY: And that's the topical

report.

MEMBER CORRADINI: Thank you.

DR. CHOWDHURY: Hydrology Section 2.4 in all areas of hydrology, the Applicant provided adequate site parameters as well as COL items 2.0-1 and 2.4-1.

So, essentially, a COL Applicant referencing the NuScale Power Plant Design Certification should provide information sufficient to demonstrate that the actual site characteristics described in this application falls within the range of site parameter values consistent with the stipulation in COL items 2.0-1 and 2.4-1.

And the staff finds this, including the stipulations in COL items acceptable for 2.4.

Section 2.5, Geology, Seismology, Geotechnical Engineering, again, in all areas of this topic, the Applicant provided adequate information including COL item 2.5-1 that specifically belongs to that section.

And also referenced COL items for Section 3.7 and 3.8. So, those COL items, 3.7-3, 3.7-5 and 3.8-6, 3.7-8 that -- and specified that a COL Applicant referencing the NuScale Design Certification should provide the information sufficient to

demonstrate that the actual site characteristics falls within the range of site parameter values.

The staff finds the Applicant's information, including stipulations in all those COL items acceptable.

And, I think staff made some -- Weijun, you are here, right, in the audience?

Okay. So, the -- since we presented at the Subcommittee meeting some change -- some corrections are made in this -- on those drafts or some consistency, right?

Okay, would you please come forward and explain what the changes were?

MEMBER CORRADINI: Your comments only get on the record if you come forward.

MR. WANG: Okay, Weijun Wang.

MEMBER CORRADINI: And you have to speak right in to that mic, otherwise, we can't hear you, I'm sorry.

MR. WANG: Okay. I'm Weijun Wang, Geotechnical Engineer in the NRO. I am the reviewer of the NuScale Section 2.5 with other of my colleagues.

Okay, this chart here, it's a little bit different from what we presented at the Subcommittee

because the figure on the left, that one, because here we said we present the chart for the -- so far the design seismic response spectrum for the horizontal plot.

And in Subcommittee presentation, actually, we presented on the left one, it was vertical components.

So, now the -- on the left one, it's correct. It's horizontal components certified the design seismic response spectrum. That's the only difference.

CHAIRMAN RICCARDELLA: It's horizontal in both the right -- in the left and the right now?

MR. WANG: Right. The -- in the design, it had provided both horizontal and vertical, the components.

And, as an example, we only provide horizontal. The only different is the anchor, the acceleration, it's like in the horizontal one, it was .4g and the vertical was .5g. That's the major difference here.

CHAIRMAN RICCARDELLA: Okay, thank you.

DR. CHOWDHURY: Okay, that's all the --

MEMBER CORRADINI: Do you want to move on now to NuScale?

So, for the Committee, there were questions in the Subcommittee about ODI, so I think NuScale's presentation is going to try to specifically address some of our questions.

MR. INFANGER: Good afternoon, I'm Paul Infanger. I'm Regulatory Affairs at NuScale.

My background is a Master's degree in nuclear engineering and I've been in licensing for 35 years, 25 years at the operating fleet, about 10 years in new reactors and the last 4 years, I've been at NuScale.

Next to me is the lead presenter is Neil Olivier, he'll give a little background.

MR. OLIVIER: Yes, my name is Neil Olivier. I'm the Corporate Services Director at NuScale.

My background is mainly in operations previous to NuScale. I've got licenses on Limerick Generating Station in Columbia and I worked at San Onofre before that. And I was in the Navy before that.

And, if you want me to go ahead, I can start presenting.

So, I was asked to come today to give a background and an overview of NuScale's ODI program.

So, our ODI program is mandated from the quality assurance -- NuScale's quality assurance program is based on NQA-1.

Specifically, Requirement 3, Section 500, it allows for the deferral of design verification activities provided that we identify and control those items.

Those ODIs are a form of engineering assumptions that are controlled --

MEMBER RAY: Wait, let's stop here --

MR. OLIVIER: Okay.

MEMBER RAY: -- for a bit.

What it's based on, of course, this is the boiler and pressure vessel code and there are a lot of things not covered by the boiler and pressure vessel code. But that's a minor point.

The inspection report which is a public document, so I won't refer to the SER, is, as you know, uses Appendix B as its criterion. It acknowledges the source of requirements.

But criterion 3 and 16 are basically the same as in boiler and pressure vessel code as it is in Appendix B. And Appendix B is, I think, the thing we should use as our reference here, particularly when we're talking about design certification.

Now, the inspection report says that there's a NuScale -- they refer to a memo, but let's just call it a procedure and policy that identified ODI's necessary for closure prior to support the DCA submittal.

And there were ODIs not necessary to be closed prior to the DCA submittal.

So, there's a distinction that I believe NuScale has between the things that are required to support DCA submittal and those that can be deferred.

And, the issue that we want to, I think, get clarity around is the NRC inspection report also refers to sufficient closure of ODIs to allow a 52.50 -- a reasonableness finding to be made.

And it's in that domain that we want to get clarity.

So, the issue of deferral isn't a question, the question is, what do we do -- what do we need in order to support the design certification and what do we do to identify those things which we don't need for design certification but which are needed to support operability perhaps well down the road. How is that distinction made from NuScale's point of view?

MR. OLIVIER: So, the memo you speak of, the ODIs that we classified as not -- we had to close

them for DCA which are all closed. Those address content analysis or results of conclusions or an engineering deliverable is needed for DCA.

So, the ones that are open are categorized in the latter category that don't need to be closed for DCA.

So, I don't know how to word it any other way than that.

MEMBER RAY: Well, at the time of the inspection, there were 173 closed that were considered necessary to close and 1,500 that were open.

MR. OLIVIER: There were 1,500 open, they looked at 173 in detail and did not find any conclusion or nonconformances in the inspection.

MEMBER RAY: I think we're mixing up two things here. Let me just read from the inspection report.

NuScale identified 173 ODIs that required closure, blah, blah, blah. The NRC inspection team reviewed 170 from the list of 1,563.

But, at the time, they recorded, they can be wrong, of course, but that there were 173 that were identified as needing to be closed and they were closed, as you said.

MR. OLIVIER: That's correct. That

happened before the --

MEMBER RAY: So, how's the distinction made because we have to make a similar distinction. We have to come to some conclusion.

MR. OLIVIER: Right, and I was going to go into that as far as the interactions between the NRC and NuScale and they've done various chapter audits. They did the QA inspection. I believe there's another Q&A inspection scheduled.

They've reviewed them in RAIs. They've reviewed thousands of documents and yet to tell us that there's an ODI that needed to be closed prior for DCA. It's just we have closed the ones necessary for the DCA.

The ones open, and I can provide examples and give you some statistics on what's open now. I don't think anybody's --

MEMBER RAY: Well, I think we're trying to get what the criteria are both you guys and, of course, we'll talk to the staff as well, for what it is that needs to be closed.

Now, to an extent, what needs to be closed is a function of how visible the ODIs are. So, for example, if you have ITAAC that covers, and I'm not suggesting that's the right solution, but if you have

ITAAC that cover ODIs then that's a very visible mechanism for handling those things that are not closed, but what you relied upon in the design certification.

MR. OLIVIER: I agree.

MEMBER RAY: That's the way we look at it anyway.

And we're trying to understand that. There isn't any explanation that we can find. ITAAC, of course, are a perfectly logical and ordinary way to cover things that are not capable of being resolved at the time of certification.

And, how many of these 1,500 ODIs, if any, would be subject to having ITAAC established?

Well, that depends, in my personal individual judgment, on how visible the tracking of the ODIs is.

There's references here to the ODIs existing at different levels in the design documentation.

Now, I think you're going to be able to tell us that you have very solid tracking system for the ODIs that exist and it's that that is going to be important in what you say here, so please, emphasize it.

MEMBER BLEY: I'd like to add something to Harold's question. One thing to know what the ODIs are and track them as they close, it's another if they affect other aspects of the design or anything in the DCD such as the PRA. And how are you tracking that as well?

You know, if you change one of these assumptions you haven't yet settled on, it could affect many other things.

MR. OLIVIER: Agreed. The configuration management system is what we're relying to make sure that the impact analysis is accurate when we change something. There's no -- I couldn't tell you that a specific item does or does not affect something without doing an impact analysis which is part of the design verification and design control.

The design control system is set up as required by NQA-1 to do that impact analysis to ensure that all changes are -- all impacts are assessed.

MEMBER CORRADINI: So, can I take an example? So, let's say, for example, I'll pick this as an example, that you want to have a CVCS pump of some output and you assume so many GPM under normal operation and under accident for injection purposes.

And instead of what you assumed you'd find

by the manufacturer that you eventually have it procured from that it's 10 percent less.

Explain to me how that then is promulgated through the whatever you call the checking program to make sure that doesn't have an impact either in a Chapter 15 analysis or in a PRA analysis? Can you help me there?

MR. OLIVIER: Yes, so the --

MEMBER CORRADINI: Is that a good example?

MR. OLIVIER: It is. It is and I have a few examples with me, but we can use your example.

MEMBER CORRADINI: Okay, that's fine. If you've got an example --

MR. OLIVIER: Well, it's the same -- those are -- it's very similar to what I have --

MEMBER CORRADINI: Oh, okay.

MR. OLIVIER: -- in that it's weight versus a flow.

It's that our design control program is managed in a way, whether it's in ODI or it's a change, say we wanted to change the flow, we would then do an impact analysis against all documents that are related to that function.

So, if it's the design description, it's the engineering calc that did the flow and through our

-- I will call it a reference, but a link inside CMIA, our system, configuration management information system, it will tell me what other impacts there are.

The engineer then does the impact analysis and it should inform upon every other document that needs to be changed and every impact from there, it would chain tell us whether the DCA is affected in any fashion.

And then, that would drive a change, if needed, we would inform the NRC.

MEMBER CORRADINI: Okay. So now, I'm going to pick up to be another member who doesn't trust computers.

Have you done a check so that you actually invent an ODI that had a significant change and wanted to look for and you expect to an effect over there and you double check that you do see those effects?

That the configuration control management system actually says when I change the pump flow or the weight or something, I expect to see a big effect over here and, ergo, I do see the effect? Do you know what I'm asking?

MR. OLIVIER: Yes, and I don't think we've done --

MEMBER CORRADINI: I want to make sure the

software program actually captures --

MR. OLIVIER: So, the software program only lists the impacted documents, the engineer --

MEMBER CORRADINI: And the engineer will check it?

MR. OLIVIER: -- is required to check every single line item.

MEMBER CORRADINI: Okay, okay.

MEMBER RAY: Yes, they say very clearly that the design control process, and it's a design change --

MEMBER CORRADINI: Okay.

MEMBER RAY: -- would be or choose --

MR. OLIVIER: Yes, we can -- we use the same exact process for an ODI. If an ODI changes, it's entered and the change control process is treated like any other change.

MEMBER CORRADINI: Okay, thank you, I got it.

MEMBER RAY: But, again, what's -- what we're struggling with is the idea that certain things are needed to get the design certification and other things are not and how is that distinction made, particularly given that the -- everything you read here is very explicit. I'd give you citations, but

some of them are not where I want to go in terms of documentation.

But, in any event, this only applies to the certification process, this, by that I mean, the QA program or the -- it's emphasized that we're only looking at a program and you're, I know, describing program controls of open design items.

The program only applies through design certification. How, unless we are sure, and this is the bottom line for me, that we've listed and identified the ODIs that need to be controlled, how do we know that, yes, they're going to get handled after design certification?

MR. OLIVIER: So, in our database and I reviewed it and I've reread it multiple times, there's a 1,098 that are explicitly listed. Every one of them's been reviewed and the justification has been reviewed by engineering and another engineer to verify that the justification is sound. That's for the open design item.

They've also been reviewed to make sure that we didn't need to have them closed before we submitted the DCA.

The -- every one that I've reviewed is confirmatory in nature. And I've got listed and I can

give you some statistics if you'd like them.

MEMBER RAY: But, would you accept the idea that the design certification itself needs to say that these items need to be closed in accordance with a program that complies with Appendix B or that your topical report, whatever you want?

I mean, does that make sense? I think that's your intent, isn't it?

MR. OLIVIER: It's in our -- I can't speak to that what's in -- Tom, maybe you can speak to it, but --

MEMBER RAY: Yes, we're just looking for some way to make sure that four years down the road, in a situation in which the program you're talking about now may not apply. There's no obligation to use it, these things are going to get closed.

MR. BERGMAN: So, Tom Bergman, Vice President, Regulatory Affairs, NuScale.

It isn't necessary to put things that will be required later in the DCA. So, the -- what we're seeking approval of is the design that's in the DCA, not a perspective design down the road.

So, it's strange, but by rule, we can terminate our QA program the day we're certified. And then, when COL comes in that uses our information,

everything has to be back under Appendix B the day the application is submitted.

And then, once that COL is issued, it stops again for us, not for the licensee at that point.

As a practical matter, you don't do that, right? Because, especially in our case where you've got a COL coming in right on our heels.

But, by rule, we're not seeking approval of what the COL will submit, it's have we made the case that we've, with reasonable assurance, met the NRC's regulations with the application as it's submitted.

I get the interest in control --

MEMBER RAY: Well, let me stop you right there, because respond to this. The Agency certifies a design and information has been relied upon which includes, I won't say a lot, but includes a fair number of unverified design assumptions.

Shouldn't those be part of the certification? I mean, you, yourself, don't want at least some of the ODIs to remain open at the time of certification. There's a bunch that you've said, these need to be closed. What about the others?

And, if they are left open, what is

exactly our assurance that, although we relied on them, we relied on those assumptions and you can't say, well, no, no, you didn't because of whatever reason. I don't know what it would be.

But, let's just say we rely on all of those assumptions and unverified design inputs, how do we then gain the confidence necessary that, in fact, they're going to be resolved and if there are any changes, I don't have any doubt that it'll be -- the changes will be processed under your change procedure.

But, it's the idea and I could cite to you here comments about how the ODIs exist at various levels in documents and so on. You can't go look at the documents. You've got to work off of some set of identified ODIs to ever find them later when operability of the system's required.

Help us understand which ones you think need to be closed? Which ones can remain open? And how we can be certain that they will be closed?

Because we rely on all of them, not just the ones you think need to be closed.

MR. BERGMAN: And I'll need Neil to correct me if I misstate, but most of the ones are left open because the information simply doesn't exist. Right?

So --

MEMBER RAY: That's what ITAAC do very explicitly.

MR. BERGMAN: No, ITAAC -- well, most of these ODIs are not touched by ITAAC.

MEMBER RAY: I know that, I'm not proposing ITAAC, I'm just telling you that that's what ITAAC were established to do in a design certification was to make sure, and I can read the definition to you here if you'd like me to, to make sure that the things that could not be verified at the time of certification would be verified before operability.

That's what it is. The inspection test, analysis and, you know --

MR. BERGMAN: I have a different view of ITAAC.

MEMBER RAY: Acceptance criteria.

MR. BERGMAN: Which are to confirm that the design that is built conforms to the design that was proposed, both in the DC and as modified in the COL and is ultimately modified during construction.

So, I think the CVCS example is very clear, but that, as you said, would be visible in the DCA.

But, to use an example, and again, I'll

look to Neil for the details, but a component weight is going to be an assumption today because we don't have procured component.

That component weight is going to still be an open item at the COL because they still haven't procured a component.

During construction, they'll procure the component. If the weight, depending on how you characterize the open item, sometimes it can be above than or less than or you just said, you know, 6,000 pounds.

If it comes in, whether it's 5,500 pounds or it's 6,500 pounds, that's a change that goes through the change control process.

If that change doesn't affect the FSAR, the NRC would only verify it through inspection. They rely on the design control process to make sure the design changes, if we've changed an assumption, the design changes have been properly controlled.

If it does affect the FSAR, of course, you know, it goes 50.59 and then you have to evaluate, is it a departure and during licensing or after licensing? Is it a 50.59 licensing change?

MEMBER RAY: Truly, we do know. We --

MR. BERGMAN: Right.

MEMBER RAY: -- we've done all of this ourselves. The problem -- some of us, many times -- but the issue that's still unanswered here is, we've got this large number of items, some of them may be --

MR. BERGMAN: I disagree it's large.

MEMBER RAY: -- the table of the weight of a pump that's assumed to be something and it turns out to be something greater, for example. Yes, I totally understand that.

But it could be something much different from that as well. There are, I mean, again, I can go through and give examples here, but I don't want to take the time to do it, you know them better than I do, of things that are assumptions relative to system performance.

They're identified -- we just want to be sure that they are tracked to closure whenever that happens.

One way to do it, and the way that's established and accepted so far and one of the certifications that we've done and plants that are under construction today, are ITAAC.

But I'm not suggesting that here, I just want to get to the point where we say we're confident that the ODI are identified, they will be attached in

some way to the design certification and they will be tracked to closure whenever that happens.

MR. BERGMAN: I do not believe that's ever been done for any certified design by the Agency.

MEMBER CORRADINI: So, what's been done?

MEMBER RAY: No, I agree with you because people would go back and look at the weight of a pump and say, this is more than was assumed in the design and they would go through 50.59. Absolutely right.

The point is, you identify that as an open design item. There are others as well that may be much more significant and subtle than the weight of a pump.

MEMBER CORRADINI: But that's --

MR. BERGMAN: But that's what --

MEMBER CORRADINI: Can I -- hold -- because we're running out of -- I hate to be the time watcher, but I'm watching the time. I want to make sure I get the staff up here on Chapter 17.

What I think the back and forth is, is that we're trying to find a way that we get confidence in what appears to be a much more sophisticated way of tracking things than we've seen before in other certified designs. That's my impression.

I won't pick other certified designs, but

I don't suspect that these things were watched as these are being watched.

MR. BERGMAN: I actually agree. I think the only reason this became an issue was because we were the first Applicant to actually compile the list.

MEMBER CORRADINI: I didn't say that, but that's the sense that I get, too.

MR. BERGMAN: Yes, but the rest of them simply relied on their NQA-1 compliant program to bring it to closure.

MEMBER RAY: I don't want to be -- suggest any criticism here of the process.

MR. BERGMAN: Sure.

MEMBER RAY: We're just trying to marry it up with design certification. So, understand that.

But let me tell you, as somebody who's been through this, like I said, for a long, long time, if you come in with a component that differs from what was in the design that was presented and approved, whether it's the CP or OL or whatever, by the NRC, you identified that.

You don't need an ODI to say check the weight versus what was assumed in the design. What was assumed in the design is in the design and you can compare it and check it yourself. You don't go and

have to, I think, but your system is great.

But we're trying to identify, like I said, where ODIs get -- have the potential to get buried and make sure that they aren't.

First of all, that all the ones that should be dealt with in order to certify the design have been closed. That's number one.

And, number two, that given that there are many assumptions and they aren't just the weight of a pump out there, that years down the road, they get picked up and closed. They may be esoteric assumptions that were made.

And that's the whole point.

MEMBER CORRADINI: You get the last word because I think we've got to get back to the presentation.

MR. BERGMAN: I will. And so, that's what Neil tried to explain is for items that, quote, are significant enough to be in the DCA that's been part of the NRC's review. It was part of the inspection. The licensing audits which have been at least several thousand documents now, all of those contain assumptions, not all, many of those contain assumptions.

The staff considers those at the time. If

they believed an assumption needed to be in the FSAR, they would raise it at that time either through an RAI or just a question in the assumption, not every question in the audit, excuse me, gets an RAI.

So, that process is very thorough. And so, that screening's been done. There are, and again, I've let Neil give you the stats, most of these are minor in the nonsafety related areas or they're things you simply can't validate like component weights.

MEMBER CORRADINI: So, at this point, I'm going to say, Neil, you're back up.

MR. OLIVIER: All right, thank you.

I will move expeditiously. Most of this stuff, we've already covered.

So, ODIs are resolved and verified via the design verification process. We've already gone over this. They're ideally per NQA-1, they're to be closed out prior to procurement manufacture, construction or by use for another design organization with a different QA program.

But, in all cases, that design verification is required to be done prior to relying on the component to perform its function.

Moving on to slide four, the interactions that we've had with the NRC regarding ODIs, we've

already talked about the 2017 inspection. We've had numerous communications with the staff, numerous chapter audits where thousands of documents were reviewed and ODI questions were asked and subsequently answered along with RAIs. And I couldn't give you a solid number, but it's -- there's thousands of documents that were reviewed.

The highlights from the inspection, they reviewed 170 specific ODIs. So, we gave them the list and at the time, it was 1,500. It's currently 1,098 -- correction, 93, excuse me, 1,093 that are open.

They had no concerns about no nonconformances or violations. They did note we had a conservatively low threshold for opening ODIs. And I bring that up as part of what Tom said.

Some examples, we talked about weight, but 300 I classify and have binned them, my staff did, 317 of those 1,093 that are open are specific to mass to a cabinet.

MEMBER CORRADINI: Can you repeat that again?

MR. OLIVIER: So, 317 of those ODIs that are currently open are due to mass of a component. That's a third of them, basically.

We have another 114 that are due to the

secondary plant. One of them that I've used an empale before is tower selection, what type of tower are you going to use.

And different -- I've worked at three plants, one didn't have a tower, San Onofre was a single passthrough.

Depending on the site location, depending on the environment, you have a different tower, things like that.

The size of the containment or the -- not the containment, the tower intake, depending on what type of tower you pick, what have different sites, those are the many assumptions, 115 of those that are around the secondary plant. They are open items that need to be confirmed later on down when we have that information.

And then, there's 45 that are specific to the layout and they're basically open items to ensure that we get proper isometric drawings done in the detailed design, nothing more than that.

MEMBER RAY: Okay, let me add to your highlights some highlights that I'll provide from the same report.

MR. OLIVIER: Okay.

MEMBER RAY: The NRC inspection team also

reviewed a small section -- a small sample of design supporting documentation for the DCA.

The inspection team identified an example where inaccurate information was present in a topical report at the time of submittal, specifically, the cover page to the calculation made a statement that a value was obtained by analysis when it was an assumed value identified as an ODI.

Now that's not a problem in that it was identified as an ODI, just not in the report that was being submitted. Which, again, we're looking at this from the standpoint of what our role is here.

NuScale documented the issue in correction action report.

The NRC inspection team identified an example where an assumption was not identified as an ODI by NuScale, specifically, the fuel pool heat load.

Specifically, NuScale made the assumption to neglect the main reactor coolant pump pool heat input, excuse me, into the spent fuel pool heat load.

The DCA supporting documentation, NuScale identified that this is an assumption that should be verified which is an ODI by NuScale definition.

Now, this was two years ago. Nobody expects perfection, that's not the point. But these

are two specific examples of where the system went awry.

Elsewhere, there was a reference, and I guess this gets to the bottom line for me again is, are these things being captured in a way that's visible at a high level? All of them, regardless of where they may be buried on the back page of some report or otherwise.

Or do you have to go looking for them with an audit?

MR. OLIVIER: No, sir. And, I can answer that.

MEMBER RAY: And you're going to, I know, but --

MR. OLIVIER: Well, there's not much. And to your specific question, they are in a specific ODI database. I can search for them, I can look at them and I can tabulate them and you can search for data by ODI number, by their type, by their parameter, whether system.

MEMBER RAY: As you and I both know, having done it, the verification of the fact that ODIs are getting associated with other things, again, never going to be perfect but it is a key part of it as well as the visibility which, as they say in this topical

report, the visibility didn't exist in the front of a report -- a topical report that's being issued.

So, having an inventory that enables and facilitates going back and saying, wait a minute, here's one that we didn't capture because it wasn't obvious or whatever to the verifying responsible engineer is a part of what we're looking at.

Again, the main thing for us is the certification process, what's in, what's out and the things that don't get closed at certification. Are we sure they're going to be? That's the issue.

MR. OLIVIER: Yes, and they're visible and tied to the source document that they came from.

MEMBER CORRADINI: Please go ahead.

MR. OLIVIER: And, there's not much more.

The conclusion is that, in the concluding slide that NuScale's ODI process properly controls unverified engineering assumptions in accordance with NQA-1 and that the NRC has reviewed the ODI process in various ways including the inspection, detailed inspection, chapter audits and RAIs.

That's the end of the presentation.

MEMBER CORRADINI: So, let me ask a question as an observer of the conversation.

So, once the DCA is, assuming, becomes the

DCD and we're all squared away, these pass on to the owner/operator and will have this list to check as construction is going on?

MR. OLIVIER: Absolutely, it's part of the design.

MEMBER CORRADINI: And they have to develop their own program of -- or do they follow this NQA procedure in the COL phase?

MR. OLIVIER: Hypothetically, that group, whoever does the COL --

MEMBER CORRADINI: They have to decide?

MR. OLIVIER: -- they have to, using NQA-1, their engineering assumptions by different whatever name, they need to be verified so they will be transferred with the design to that group.

MEMBER CORRADINI: And there's no other instrument from your perspective that's necessary other than that?

MR. OLIVIER: Absolutely.

MEMBER CORRADINI: Okay.

And, let me ask another way, let me try a different approach.

I can't -- for want of a better term, I can't come up with a -- is -- are there levels of importance of these ODIs so that you actually have 10

or 20 that you watch because they're such large sections that have such a large impact?

How do you know which are more or less important than others? We used weight and pump capacity, but I could come up with some past certifications that didn't turn out to be so mundane.

MR. OLIVIER: The ODIs are owned by the document and the engineer who authored the document. They keep track of what they -- as an overall process, they're responsible for closing out those ODIs. They know which ones are important, which ones need to be closed out.

Other than that, I don't keep a top 10 list, if that's what you're asking.

MEMBER CORRADINI: That's kind of what I was asking.

MR. OLIVIER: I don't personally because I run the program, but they do, the engineers know which ones -- they own them, that's the program puts the ownership on the engineer.

MEMBER CORRADINI: Okay, so any more questions for NuScale before we drag the staff up here and get after them?

Okay, thank you.

Omid, are you the lead here?

MR. TABATABAI: Yes, I am.

MEMBER CORRADINI: You have so many, I'm not sure.

MR. TABATABAI: Good to see you, too.

MEMBER CORRADINI: You're on.

MR. TABATABAI: All right, good afternoon, everyone. Thank you very much for giving us this opportunity to present to you the staff's review of Chapter 17 of NuScale Design Certification Application.

My name is Omid Tabatabai, I'm the Senior Project Manager in the Office of New Reactors and I have the responsibility for Chapter 17.

With me today, we have Alissa Neuhausen and Andrea Keim. They will be presenting reliability assurance portion and also QA portion.

And also, Ian Jung is here and he will be supporting us with reliability assurance portion of the meeting.

Just on the agenda for the staff today, I just wanted to go over the staff's review. Under quality assurance, Member Ray, you had some questions for the staff during the Subcommittee. And, although NuScale went through the ODI process extensively, but we wanted to be responsive to those questions. And we

will touch on the questions that you asked during the Subcommittee presentation.

MEMBER RAY: Thank you.

MR. TABATABAI: Just to mention the names of the staff who reviewed this Chapter 17, these are our key reviewers for Chapter 17.

Quickly, I will give you a high level overview of Chapter 17 SER that the staff has prepared. Our SER is based on Revision 1 to the DCA.

The latest revision that we have in house is Revision 2. But, by the time that we were going through the process of concurring or and approving the SER, we had Revision 1.

The SER has two open items and no confirmatory item. One open item is related to quality assurance and one open is related to reliability assurance section.

During the review, the staff performed two audits and one inspection that we have already touched on.

Again, during the December 18 Subcommittee, we provided some information on the SER. It has not changed, we don't have any update except to touch on ODI process from the staff's perspective again.

This concludes my introduction and, with that, I will turn the presentation to Andrea.

MS. KEIM: Hi, I'm Andrea Keim, I work in the Vendor Inspection Quality Assurance Branch of NRO, which is New Reactors.

I have a Bachelor's degree in material science and engineering and I also have a Master's degree.

The Quality Assurance Branch, we currently have two branches and these branches perform routine and reactive vendor inspections.

We also conduct QA implementation inspections for the new operating reactors -- for the new reactors, sorry.

We also perform QA licensing reviews for Part 50 and 52, where we review the QA programs and we also do the initial test program.

So, with that, I'm going to discuss Section 17.5 of the NuScale Design Certification Application.

So, the first thing we're going to talk about is the regulatory basis which the first one is Appendix A, GDC 1 which requires quality standards be applied to the structure systems and components important to safety, that these shall be designed,

fabricated, directed and tested to quality standards commensurate with the importance of the safety function to be performed.

The next requirement is that they -- is Appendix B which is 10 CFR Part 50 which is our quality assurance requirements and it addresses the 18 criteria.

52.47 address the contents of an application which includes that they -- that the application must include the quality assurance program.

And, the description of the quality assurance program for the nuclear power plant shall include a discussion of how they meet the requirements of Appendix B.

MEMBER RAY: Okay, let's stop there then. What we're talking about is issuing a certification for a design that has what we're now calling open design items.

How do you reconcile that with what's on the screen here? And, also that the quality assurance program that is approved, excuse me, the quality assurance programs that's applicable ends as NuScale just reaffirmed at the time of design certification?

The bottom line is, what provision should

be made for things that are not yet done but are assumed in the certification? Because that's what we're talking about.

MS. KEIM: But that's going to be like a hold point until you get your COL Applicant in.

MEMBER RAY: No, I'm asking about the -- just read the words. It doesn't talk about a hold point. A certification is issued and the provisions for certification require, as you have pointed out, that you have a QA program that applies to everything that's in the certification.

You've got assumptions here. The assumptions are unverified. How should they be identified at the time of certification consistent with this requirement up here?

The way that we've done before, I won't name names, but plants that include those being built are you have design acceptance criteria. You have ITAAC that are associated with things that can't yet be done to use the heavy pump example, you don't identify those because that's a deviation from the approved design that you then have to process when it occurs.

You don't identify everything that might someday have a deviation. But those things that you

have assumed that aren't verified, how are they supposed to be identified?

You've taken credit for something that's an only a design assumption that doesn't comply with Criterion 3 of Appendix B or the equivalent in NQA-1 or the topical report or where ever.

But the point is, you've taken credit for it, it isn't yet verified and nobody's trying to say it has to be. Although, strangely, there are some that have to be, as pointed out in the inspection report in order to reach a reasonable assurance determination.

We're trying to figure out how these things are identified that remain at the time of certification. And I don't think we should call certification a hold point.

MS. KEIM: Technical reviewers have gone through their process of reviewing their chapters and they do audits and do RAIs and they come to a conclusion of reasonable assurance.

MEMBER RAY: Well, NuScale has a system in which they've at least identified which ODIs need to be closed. Do we concur in that determination or is it only a result of the inspections that are -- the reviewers work that's -- that you referred to?

Have we looked at the ODIs to say, gee, this one should be closed? NuScale fell short here or made a mistake or something. This is a verification that should occur.

I'm going to ask you -- we'll get to her in a minute.

MS. KEIM: That's my boss.

MEMBER RAY: Okay, go ahead.

MS. KAVANAGH: Hi, my name's Kerri --

MEMBER RAY: Sorry.

MS. KAVANAGH: That's okay. I'm Kerri Kavanagh, I'm the Chief of the Quality Assurance Vendor Inspection Branch.

Quality assurance does not require a 100 percent inspection and verification. The goal of a design cert is reasonable assurance.

We assure that they're implementing their QA program at specific times when the tech staff goes out and they do audits, if there are already concerns, they report back and we will continue evaluating whether or not we need to perform more quality assurance inspections to verify that the QA program is implemented while the design is under certification review.

MS. KEIM: So, let me --

MEMBER RAY: You know, but wait a minute. I'm sorry, Joy, we're not -- I'm trying not to talk about what you do. I'm trying -- which is very fun -- good job, I like the inspection report. It was very helpful.

What I'm trying to do is understand the certification process which you provide input to, I know.

MS. KAVANAGH: Yes.

MEMBER RAY: But we are trying to look at this from the standpoint of the things that have been taken credit for that are important to certification but which have not been verified.

How is that done? You make an important contribution to that. But another way of saying it is, well, we've looked at the open design items and we're good with those that remain to be closed later.

MS. KARAS: This is Becky Karas. I'm the Branch Chief for the Reactor Systems Branch. I was also supporting the 2017 inspection that's been referred to.

And my staff does look at some of the ODIs when there are calculations that they're looking at for the audits.

So, we have had circumstances where we've

been looking at a calculation through an audit process that is something that's supporting the conclusions and the results that are in the DCD.

And, in those cases, my staff engages in a discussion with NuScale. They also sort of independently look at that. And these are usually things that are like engineering assumptions and that's how we've seen it for other designers that there'll be things that are listed as, you know, assumptions or conservative assumptions in the calculations.

If we look at that and it makes sense to us that that's a conservative assumption that's very clear, then that may end it. Also, if it's something that doesn't matter, there's no sensitivity and we know that, that may end it.

But in some cases, we have gone back to the Applicant and we've said, you know, you've got an open design issue, you've got an assumption for this certain parameter. And it's not apparent to us that that would be obviously conservative. We need the calculations supporting that that shows that that's, you know, the right value.

And then, you know, either they have it because, in some cases, they have that later

calculation that's already been done but the paperwork for closing the ODI or the updated Rev to that first calculation might not be completed.

But we engage in those discussions with them. We may submit an RAI if we need to to make sure that that value is calculated.

I've got some specific examples where we've done that.

MEMBER RAY: Well, let me interrupt you before you get too far. And I think you should please continue.

But the -- in the very beginning of what you said, you said in our audit process. And, I've done a lot of audits and I do understand auditing. It is not review, it's not what we do.

If -- what's different between an audit where you do what you've just described, and please continue when I'm done with my spiel.

What's different between an audit which surfaces something and you send an RAI and you ask for more information and you're not satisfied with it or whatever, and what we're talking about or what we're trying to talk about is, you should have or the certification should contain an identification of all the ODIs so you don't pick it up in an audit.

MS. KARAS: So, let me explain how we're conducting the review then maybe from a basic perspective.

So, let's say there's a calculation in Chapter 15, right, the key assumptions will be listed. The output results will be listed. It won't necessarily -- it won't indicate there that there's an ODI or anything. Right?

MEMBER RAY: Exactly.

MS. KARAS: But we don't, you know, look solely at what's written in the DCD, right? There's always a calculation supporting that, so we open audits for the chapters.

And, you know, those key calculations we then audit in that supporting documentation, it will indicate if there's an ODI or not.

And sometimes that could be with a value or an assumption that isn't important enough to rise to the list that's listed in the DCD. We can then either, you know, request that they place that in the DCD, we can -- we will ask for the basis behind that.

So, there have been instances where we've done that.

MEMBER RAY: Okay, but again, we're talking about an audit process and I'm trying to -- if

I could, because of time, I just want to ask staff to please stick with the idea that we're trying to distinguish between discovering something in an audit that isn't satisfying and getting it corrected as opposed to having an identified list of assumptions that we rely upon implicitly whether we happen to pick it up in an audit or don't in the design certification.

That's what we're trying to talk about. So, terrific auditing job, you know, I don't have any criticism or question about it. I know that that goes very well.

But still, when you've got over a 1,000 currently of open ODIs, the changes of picking up something and take the difference between the weight of a pump and the heat input to the spent fuel pool from the -- those are two quite different issues.

And one can be identified when the plant is being built that the plant -- the pump weight is different than what was in the design. The absence of consideration of the heat input to the overall performance in an accident is not going to be picked up during construction. It's not a 50.59 item.

And so, help us get to the point where we can understand, you know, we're just relying upon the

down stream post certification QA programs, whoever's implementing them, to pick these things up and deal with them because there's a list kept somewhere that isn't part of the certification.

It sounds to me like that's the case.

MEMBER BLEY: Harold, let me try something.

MEMBER RAY: Okay, I'm sorry to go on and on.

MEMBER BLEY: I know and I think I understand where you're coming from.

We have, in other cases, other plants, other design certs, but actually in operating plants, too, found situations where the design assumptions were wrong and it was never checked.

Now, I kind of think, listening to all I've heard today, that what NuScale has done is the first step in what we're looking for.

These ODIs, everybody has them, but they don't make a list of them. They've tried to make a list, we haven't seen -- at least I haven't seen the list, I don't know how thorough it is.

MEMBER RAY: It's a big list.

MEMBER BLEY: But, it's a big list, but it's not big compared to the -- everything that's in

the plant.

But what they haven't done, they told us, is set priorities on that. Some of these design assumptions have a very minor effect on overall safety. Some go right to the heart of being able to remove heat, being able to contain fission products, whatever.

If there were some structure to look for which of these have the greatest impact, could have the greatest impact on safety, you'd want to have a top ten list. You want to look at these more thoroughly and try to make sure you met all of those estimations.

MEMBER RAY: Well, NuScale --

MEMBER BLEY: Now, NuScale --

MEMBER RAY: NuScale did do that for the -- in their judgment for the design --

MEMBER BLEY: Well, no, they've got a big list and they said they haven't put any priorities on them.

MEMBER RAY: But they did close 173.

MEMBER BLEY: They did, for design cert.

MEMBER RAY: That's right.

MEMBER BLEY: But there's a whole bunch more that we don't know exactly how they decided which

ones to close for design cert and we don't know how you -- yes, what all the others are on the list.

But there are, certainly, are ways to put them in priority that would help us avoid the problem we've seen in the past. And I think that's what -- we're started on the road that way with just having this, which is --

MEMBER RAY: And I don't want to diminish the auditing process or the inspection process.

MEMBER BLEY: Oh no.

MEMBER RAY: I mean, they're very good, very good processes, but that's not what we deal with in certification. We need to know what the assumptions are.

Okay, enough. Thank you.

MEMBER CORRADINI: Please continue.

MR. TABATABAI: We're on slide seven now.

MS. KEIM: So, slide seven talks about our topical report review. The NuScale Quality Assurance Topical Report Review was completed separate from the design application process. It followed a topical report process.

The topical report was reviewed to ensure that the preliminary work on the application was done in accordance with Appendix B to 10 CFR Part 50

requirements.

The staff used the standard review plan, NUREG-0800, Section 17.5 which is for safety analysis reports as the guidance.

And the Applicant QA topical report submittal was in accordance with our Reg Guides and with the standard review plan and it met the requirements of NQA-1 2008 and 2009 addenda.

So, we found the topical report acceptable and it met the requirements of Appendix B.

Slide eight?

MEMBER RAY: The only thing I'd say there is, Appendix B doesn't say anything about, and I don't think the topical report does, either, about things that are covered by ITAAC, for example.

So, there's no issue over unresolved or unresolvable items. We've to a system to deal with that.

What we're talking about here is a system that isn't included within those things that are covered by ITAAC. There's a really nice explanation of why they -- why ITAAC exists, what it's supposed to do and so on and so forth.

It's really not part of QA because it's something that's built in to the certification and, if

you take credit for the ITAAC, the QA program is satisfied.

The issue is, we're taking credit for ODI that we don't know what they are. And does that satisfy the QA Appendix B requirements for design certification?

It's, you know, I'm trying to use something that illustrates what it is we're talking about. It's well-establish that you can satisfy Appendix B and have unresolved design items that are reflected in ITAAC.

The question is, can you satisfy Appendix B and have unresolved items that are in the hands of the responsible design engineers.

MEMBER BLEY: Mike had to step away for a minute.

MEMBER RAY: Yes, I --

MEMBER BLEY: But we're within just a few minutes of our ending time and you aren't quite there yet. So, I think if you can go ahead, it would be a good thing.

MS. KEIM: Yes.

MEMBER RAY: I've created too much turmoil, I'm sorry.

MS. KEIM: So, the staff's review of the

design certification application Section 17.5 was done to -- it references the appropriate quality assurance topical report and the staff has assigned an open item to address the quality assurance implementation inspection.

We've done a preliminary one or an initial one and we plan to go out and do a second inspection. The next slide talks about our completed inspection.

We went out in June 5th through the 9th of 2017. We were in the Corvallis, Oregon location. The staff used Inspection Procedure 35017 which is the quality assurance implementation inspection procedure.

There were no findings of significance were identified, yet, there were some issues to look into.

The QA inspection report is available on our public site. And, as noted in the SER for the Design Certification Application, we will have an open item to perform a follow up inspection which has been scheduled for the end of February.

The announcement letter went out and it was dated January 27th, so we are planning to be there on February 25th through March 1st.

So then, we did try and address these questions that were brought up at the Subcommittee

meeting.

So, how does the NEC staff ensure all open design items are sufficiently closed by the time of the Design Certification Application as approved?

So, I don't know if you're still going to -- how these answers are going to meet your needs, but the technical reviewers use audits and the RAIs during the review process to obtain sufficient information to make a reasonable assurance determination for the assigned review areas.

Any ODI that prevents the reviewer from making a reasonable assurance determination will need to be closed prior to the approval of the Design Certification Application. So, they would have been assigned an open item.

The NRC performed an initial quality assurance inspection that reviewed the ODI tracking and closure process and there were no findings of significance identified.

So, the second question, what does sufficiently closed mean?

The response that we came up with it, sufficiently closed means the technical staff are able to make a reasonable assurance determination.

So, for the third question, what --

MEMBER RAY: And, in doing that, are they aware of the open ODIs that they may be relying upon?

MS. KEIM: Yes.

MEMBER RAY: They are?

MS. KEIM: Yes.

MEMBER CORRADINI: So, can I say it another way, just so we're on the same page?

MS. KEIM: Okay.

MEMBER CORRADINI: There's an engineering calc. In the engineering calc, you guys are reviewing or auditing. It's listed that I have assumed A, B, C, D, and E in this. And then, staff is deciding, well, A, C, C, D, and E don't matter or it's conservative or something.

It's listed in the engineering calc?

MR. TABATABAI: That was actually the specific example --

MEMBER CORRADINI: That's why -- I just wanted to make sure I'm on the same page.

MR. TABATABAI: Yes.

MEMBER CORRADINI: Okay.

MS. KEIM: So now, we're on question three.

What if unverified assumptions changed after the DCA is approved? For instance, unverified

assumptions that are used in the PRA model?

So, the response here, I didn't address the specific PRA model question, but for the main question, NRC's Regulatory Information Summary 2010-05 discusses the applicability of 10 CFR Part 21.

And these requirements are applicable for standard design certifications. And the RIS clarifies that the regulatory requirements of Section 206 of the Energy Reorganization Act are applicable through the entire regulatory life of a standard design certification.

So, the NRC considers the regulatory life as the period of time which the standard design certification needs to meet the regulations in effect. And this period is when an application is docketed, and ends when the termination or expiration date of the standard design certification or the termination or expiration of the last license directly or indirectly referencing the standard.

Therefore, the vendor in this case, NuScale, would evaluate the defect or failure to comply in accordance with their procedures.

The NuScale procedure addresses discovery of the issue, the evaluation, and notification.

The NuScale Part 21 program is also

reviewed during the NRC staff inspections as in the one in June and it will -- the one in February of 2018.

And, for the final question, it wasn't really a question, it was making a statement that we need to clarify with NuScale that they've run a RIS with these open items.

MEMBER BALLINGER: So, let me try to simplify what I'm hearing. Item number one, an engineer or somebody goes and looks at an ODI and lists the assumptions. And, if they're satisfied with the assumptions or they're conservative or something, they say, okay, we're fine.

If they don't, then it becomes an open item.

MS. KEIM: Yes.

MEMBER BALLINGER: Right? Right? It becomes and open item.

MEMBER RAY: No, actually, you have to be more than satisfied.

MEMBER BALLINGER: Okay, well, let --

MEMBER RAY: You have to meet Criterion 3 of Appendix B, period.

MEMBER BALLINGER: Right, okay. So, let's -- you're more exact than I am, right?

So, what if unverified assumptions change after the DCA is approved? If the DCA is approved, there's no open items. Or can there be open items?

MEMBER RAY: That's what we're talking about is, how do we know what the open items are that we relied upon in the design certification and which continue to exist?

MEMBER CORRADINI: Don't get confused with the open items and ODIs. Are you -- I assume you're not confused.

MEMBER BALLINGER: An open item is generated if they can't verify the assumptions or the staff is not satisfied.

MEMBER CORRADINI: Or they'll ask an RAI or require --

MEMBER BALLINGER: Or yes, something like that.

MEMBER RAY: An open design item, just as a --

MEMBER BALLINGER: Right, but all the open items have to be cleared.

MEMBER RAY: Open design items.

MEMBER CORRADINI: There is a difference, there's a difference.

MEMBER BALLINGER: I know there's a

difference, but I'm saying open items.

MEMBER RAY: Well, open items are a different subject.

MEMBER BLEY: Open items in the SER supporting the design cert.

MEMBER BALLINGER: yes.

MEMBER BLEY: All those open items must be closed.

MEMBER BALLINGER: Right.

MEMBER BLEY: The open ODIs don't all have to be closed, that's what --

MEMBER BALLINGER: Okay, that's what you're saying, because I'm reading that, if there's an ODI that generates an open item --

MEMBER BLEY: It has to be closed.

MEMBER BALLINGER: -- it has to be closed.

MEMBER BLEY: Yes. That's -- sure.

MEMBER BALLINGER: So, that's what I'm understanding.

MEMBER RAY: But that's --

MEMBER BALLINGER: No, where I'm going is, when you get through this, you're finished. If the DCA is issued, all open items, open items, have been closed. And, those open items may have been generated by ODIs --

MEMBER BLEY: Or other --

MEMBER BALLINGER: -- or other.

MEMBER RAY: Mostly other things.

MEMBER CORRADINI: But, I think staff's point is, as I understand it, to summarize because, a, have run out of time; and, b, they still have another part of the presentation to talk about, is that they, by accommodation of their review, inspections, and audits, have satisfied themselves that they have captured the important ones that they require to be closed ODIs.

They require to be closed so the design certification can go forward. That's my impression of their statement.

MR. TABATABAI: That's correct. I mean, they have 15 -- I mean, last -- two years ago, when the staff did an inspection, there were about 1,500 ODIs, but that doesn't mean the staff's SER would include 1,500 open items.

No, open items are a very, very, very small subset of ODIs. Not all ODIs are required to be -- there's no regulation -- the NRC staff has no regulatory requirements to demand all of the ODIs be closed by the time of DCA approval. There's no regulations in place.

The staff reviews what comes in the application, which is defined by the Code of Federal -- what the Applicant needs to provide and that's what the staff reviews based on all of the guidance documents, DRP or DSRs and things like that.

And so, for -- and if they are not happy with the level of information or clarity of the information in the application, the staff uses RAIs, audits, and confirmatory analysis to make sure that those open items or ODIs that have an impact of the finding, reasonable assurance finding, those are closed. So, that item is closed.

MEMBER RAY: Wait a minute, I got to jump in here and say, they don't -- the staff doesn't review all ODIs.

MR. TABATABAI: That's what I was --

MEMBER RAY: As you just --

MR. TABATABAI: -- about to say.

MEMBER RAY: -- heard explained.

MR. TABATABAI: Okay.

MEMBER RAY: They review what they're reviewing when they have issues that come up that are associated with ODIs, it's conceivable it'll generate and open item. But, it'd be very rare.

The issue is, the two things are just --

the words sound similar, but they're very, very different. And you shouldn't assume that all ODIs get reviewed as part of the design certification.

MEMBER BALLINGER: That was the point I was missing.

MEMBER CORRADINI: Sam?

MR. LEE: Yes, this is Sam Lee from NRO Licensing Branch 1.

I think the last exchanges there, I think those reflect a clearer understanding. If I could just step back a little bit to provide a perspective.

And, I'm going to say something that might actually raise your eyebrows, but I'm going to qualify it, so allow me to expand on what I'm about to say.

Open design item is not within the scope of the staff's review of the DCA application package.

Again, I'll say, it's not within the scope of the design review of the staff's review of the design application package.

The way we came across ODI, as you know, we -- as part of the design application package, we have the FSAR, the topical reports that's a report that come to you for review, as well as supporting technical reports.

So, we have a plethora of associated

reports to review as part of the DCA.

And, one of those is a topical report on quality assurance program development, QAPD. And, as Kerri was saying earlier, in the midst of performing a review of QAPD, and as part of a follow up action to do a QA inspection, we came across NuScale's program called open design item program.

And when we came across it, the name itself is kind of altering enough, right, the open design items. And it is associated with our notion of open items.

So, obviously, we were very curious and we made a separate inspection effort to look into that.

And what we found was that the level of detail of what's covered in the ODI really is below the scope of the staff's review. Right? It's not even in our radar.

As I said, I'm going to qualify what I'm about to say or what I just did say.

And so, the more we looked into that, the more we realized that these don't rise to the level of the open items that you and I -- that we've been talking about.

And, but however, as part of the review process, through the RAI exchange and getting the RAI

responses, at times, the staff has had to conduct audits, regulatory audits.

And we look at the information in more detail, information that's, in the cases, it's not docketed. And sometimes, we would come across questions that would be directly at the related -- particular related ODI.

And if that ODI needs to be addressed and closed in order to satisfy, as the staff's need to make a disposition, a regulatory disposition, we would pursue that and make sure that that is closed.

Whether that's pursued as an RAI or an open item, it remains to be seen. And I'm not sure if there's any open item that we have in any of our chapters today that was born out of an ODI, per se. But, it could be, it could be.

And so, I just wanted to state up front that we don't approach ODI as a program to reviewed. We encounter them on a case by case basis as our review directed to ODI, if needed.

MEMBER RAY: Well, let me say that, from just reading the introduction to Part 50, every Applicant for a design certification under Part 52 is required to include the description of the quality assurance program applied to the design and blah,

blah, blah.

The point is, this is something, here in this case, you said these are trivial items. An assumption was made according to the inspection report to neglect main reactor coolant pool heat input to the spent fuel pool heat load.

That's the kind of thing that we do look at and it's not necessarily trivial. It wasn't even identified with an ODI until the inspection occurred. So, good things come out of inspections, don't get me wrong.

And, NuScale does track these ODIs. The issue before us is, should they be identified as existing at the time of design certification? Whether it's itsy-bitsy things, and we're only talking about stuff that's covered by Chapter 15, by the way, not things that are in the balance of plant or whatever, that's not anything that we're concerned about in the certification.

It's only those things that pertain to the certification.

If you were able to tell us that ODIs that are identified and not resolved and that are important, any of them would be identified as open item, like Ron had assumed, great. That basically

would answer our question.

But we're looking for something less than that, which is just that, in the process, we are assured the ODIs that exist at the time of certification are identified, that's all we're looking for.

And, you know, I would Chair the AP1000 Subcommittee, we went through and identified things that couldn't or hadn't been resolved and we made up ITAAC.

And, sometimes, they'd fail the damn thing and we had to go through a pretty difficult process after the Amendment 6 was issued.

So, it isn't something that is just a lot of trivia, necessarily.

MR. LEE: This is Sam Lee, again.

For the record, I didn't refer to ODI as being trivial. So, but, I understand what you're saying.

I think, as I hear you, I'm thinking about the process that we have in place. And I have to trust the process. And the process allows for the staff to be able to conduct its review in the manner that the Part 52 requires.

It talks about, essentially, complete

design, not complete design. It talks about reasonable assurance finding, not complete assurance finding.

And, I think the, again, if we are trusting the process and conducting the review per our process, I don't know that we are doing this review in any less rigorous way than what we did for AP1000, per se.

And so, we have to trust the process to be able to arrive at a regulatory finding that we must make. And, in the course of doing so, if we run into an ODI that speaks to a particular question that the staff has, we would pursue that. And I think we have.

MEMBER RAY: Is there any reason why --

MR. LEE: And, I think we have several examples that we have and I'll turn the mic over to Becky.

MS. KARAS: I can -- this is Becky Karas, again. I can give you a couple of examples of -- or if you ask a lot of questions about them, I'll have to get Tim to come up here.

And these are only a few examples of places where we have pursued issues.

There was one case in the return to power recriticality calculation where they had an assumed

power peaking factor. And it was stated that it was, you know, that was an assumed value based on engineering judgment.

When we audited that, we couldn't immediately come to the conclusion that that was clearly conservative. So, we raised that with NuScale.

They performed the calculation that would determine that peaking factor and it did confirm that it was conservative.

We audited that calculation as well and they closed the ODI.

We also had a case where the subchannel analysis, they had a value listed for the input P-rise engineering uncertainty factor that was incorporated into that analysis in the topical report.

And, later, they did verify that analysis to be conservative and closed the ODI.

So, those are a couple of examples. You know, there are certainly, I think, some, you know, isolated circumstances like by the inspection that we noted like with the pool heat load, I think, you know, any inspection can uncover those things.

I was there for that inspection, that was one that had been failed to be identified as an ODI

when the ODI process was more in its infancy within NuScale. And, they have since that time, put in more controls to capture things like that. So --

MEMBER CORRADINI: I'm sorry, Becky.

MS. KARAS: Yes.

MEMBER CORRADINI: Were you finished?

MS. KARAS: Yes, sorry.

MEMBER CORRADINI: Okay, so, I'm going to do a time check. We're about 15 minutes over. I think we've had enough interchange for the moment.

I think you have more to talk about relative to the second part, which is the RAP or the D-RAP.

MR. TABATABAI: That's correct.

MEMBER CORRADINI: So, can we get to that?

MR. TABATABAI: Sure.

CHAIRMAN RICCARDELLA: Are we still going to have a closed portion of the meeting?

MEMBER CORRADINI: I don't think we're going to have a closed portion unless we need to in the D-RAP.

CHAIRMAN RICCARDELLA: In the what?

MEMBER CORRADINI: Unless we need to in the D-RAP portion, we're not going to have a closed portion.

CHAIRMAN RICCARDELLA: All right.

MEMBER CORRADINI: So, why don't you keep on going?

MS. NEUHAUSEN: Okay, good afternoon. My name is Alissa Neuhausen. I'm covering Section 17.4 on the reliability assurance program.

MEMBER CORRADINI: Closer to your mic.

MS. NEUHAUSEN: Closer -- move it closer to me.

So, for the reliability assurance program, staff's review was performed in accordance with SRP Section 17.4, Revision 1.

The Applicant's -- sorry, the staff reviewed the program description and implementation programmatic controls SEC selection methodology expert panel member requirements and the determination of risk significant SSEs.

The first stage of the RAP is the design reliability assurance program which encompasses the reliability assurance activities that occur before initial fuel load which includes the DC and COL phases.

The second stage comprises the reliability assurance activities conducted during the operations phase.

The DC review is the subject of today's presentation.

Specifically, staff found that the D-RAP list was developed in accordance with its RAP methodology.

NuScale adequately implemented the expert panel in developing the D-RAP list and the D-RAP list is comprehensive.

The three COL items, respectively, for integrating RAP into operational programs, QA controls during site specific design, procurement, fabrication, construction, and pre-operational testing activities, and the identification of site specific SSEs provide an appropriate level of assurance that a COL Applicant referencing the NuScale design will implement an adequate reliability assurance program.

And then, the last item, the inclusion of the D-RAP ITAAC is currently the only open item in Section 17.4.

I do want to correct this slide, it should be open item 17.4-1 to be consistent with the SER.

And then, SECY -- there's been no change since the Subcommittee meeting SECY-18-0093 is still with the Commission.

The staff recommended that the Commission

discontinue the use of the D-RAP ITAAC and the staff is waiting -- still waiting for the response.

MEMBER CORRADINI: Question by the Members?

Okay, so, with that, I think we asked you enough questions for the moment.

I'll turn it back to -- oh, I'm sorry, excuse me, we have to get public comments. My apologies.

So, are there people in the audience, if we can open the outside line, please?

Anybody that has a comment may come to the podium. Hearing none, can we go to the outside line?

Can somebody on the phone at least verify that you can -- we can hear you?

Anybody on the outside line?

PARTICIPANT: We can hear you.

MEMBER CORRADINI: Okay. So, anybody that wants to make a comment, please go ahead. Hearing nothing, we will close the outside line and I'll turn it back -- well, before I do that, let me see, do I have any more members that want to make comments?

MEMBER RAY: I interrupted Joy at one point.

MEMBER REMPE: I was -- Dennis made my

comment about prioritization and that's what I was trying to get in.

At some point, I interrupted the gentleman who was trying to ask -- answer my question, was Surry one of the six that he evaluated? And I'd like to know that before we get to Chapter 19, just for my own future perspective.

MEMBER CORRADINI: Okay.

MEMBER REMPE: And I -- it doesn't have to be today.

MEMBER CORRADINI: Can we take it as an action item?

MEMBER REMPE: Yes, please.

MEMBER CORRADINI: Okay, good.

So, I'll turn it back to the Chairman. Mr. Chairman, it's all yours.

CHAIRMAN RICCARDELLA: Okay, so, we're about 15 minutes over, so we're going to delay the start of the next session by 15 minutes. So, we'll be back here at 3:00 p.m.

MEMBER MARCH-LEUBA: Yes, the next session is going to be closed, so we'll need to start doing the set up during the break.

CHAIRMAN RICCARDELLA: Oh.

MEMBER MARCH-LEUBA: And, do the --

CHAIRMAN RICCARDELLA: Okay.

MEMBER MARCH-LEUBA: Only the NuScale people are not invited for the next session.

(Whereupon, the above-entitled matter went off the record at 2:47 p.m.)

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Protecting People and the Environment

ACRS Full Committee

Draft Commission Paper
(and related draft regulatory guide)

"*Technology-Inclusive, Risk-Informed, Performance-Based Approach to Inform the Licensing Basis and Content of Applications for Licenses, Certifications, and Approvals for Non-Light Water Reactors,*"

February 6, 2019

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

Outline

- Background
- NEI 18-04 & Draft Regulatory Guide DG-1353
  - Licensing Basis Events
  - Safety Classification and Performance Measures
  - Assessing Defense in Depth
  - Content of Applications
- Draft Commission Paper

Advanced Reactor Program

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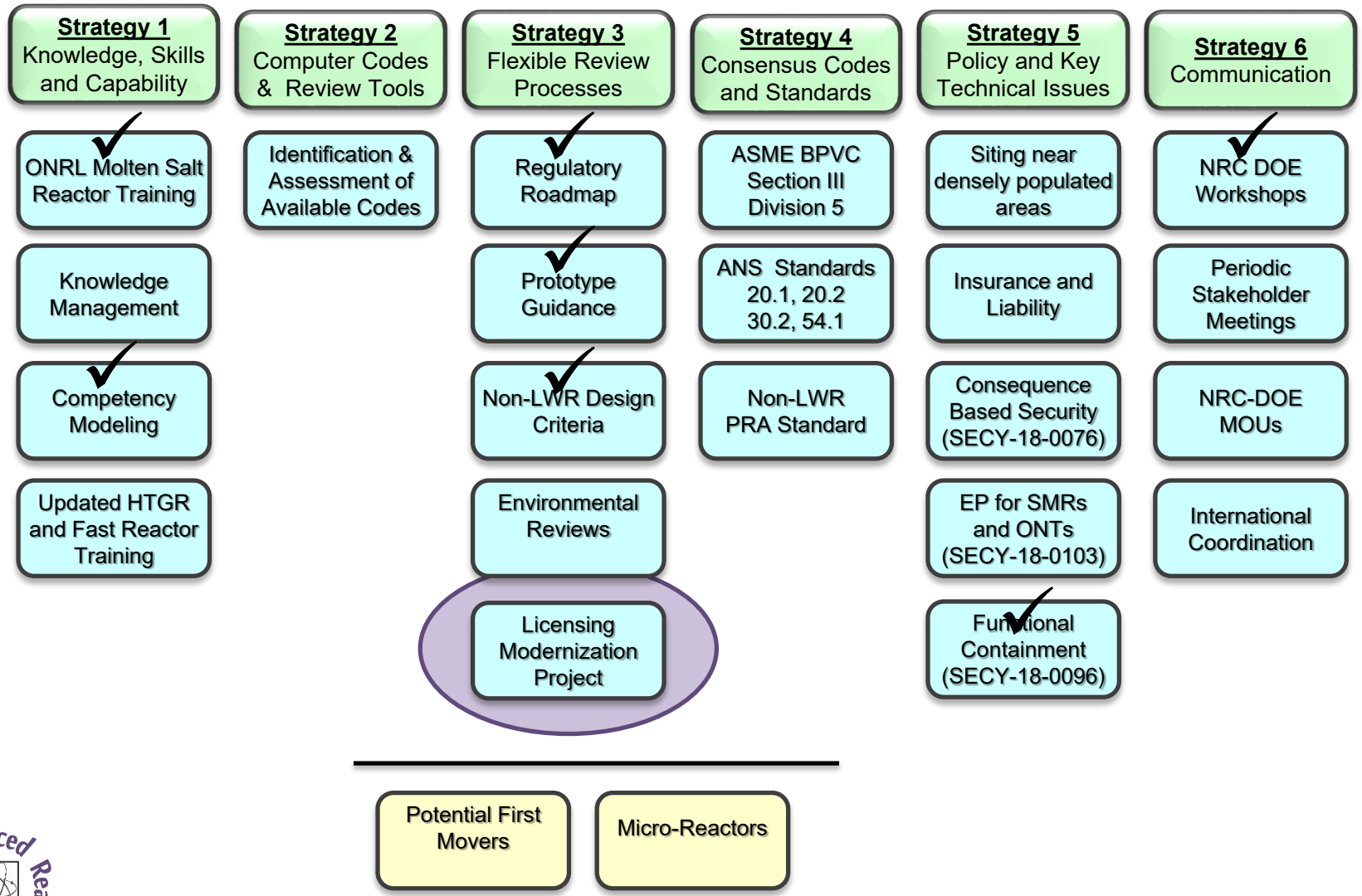
Strategies & Contributing Activities



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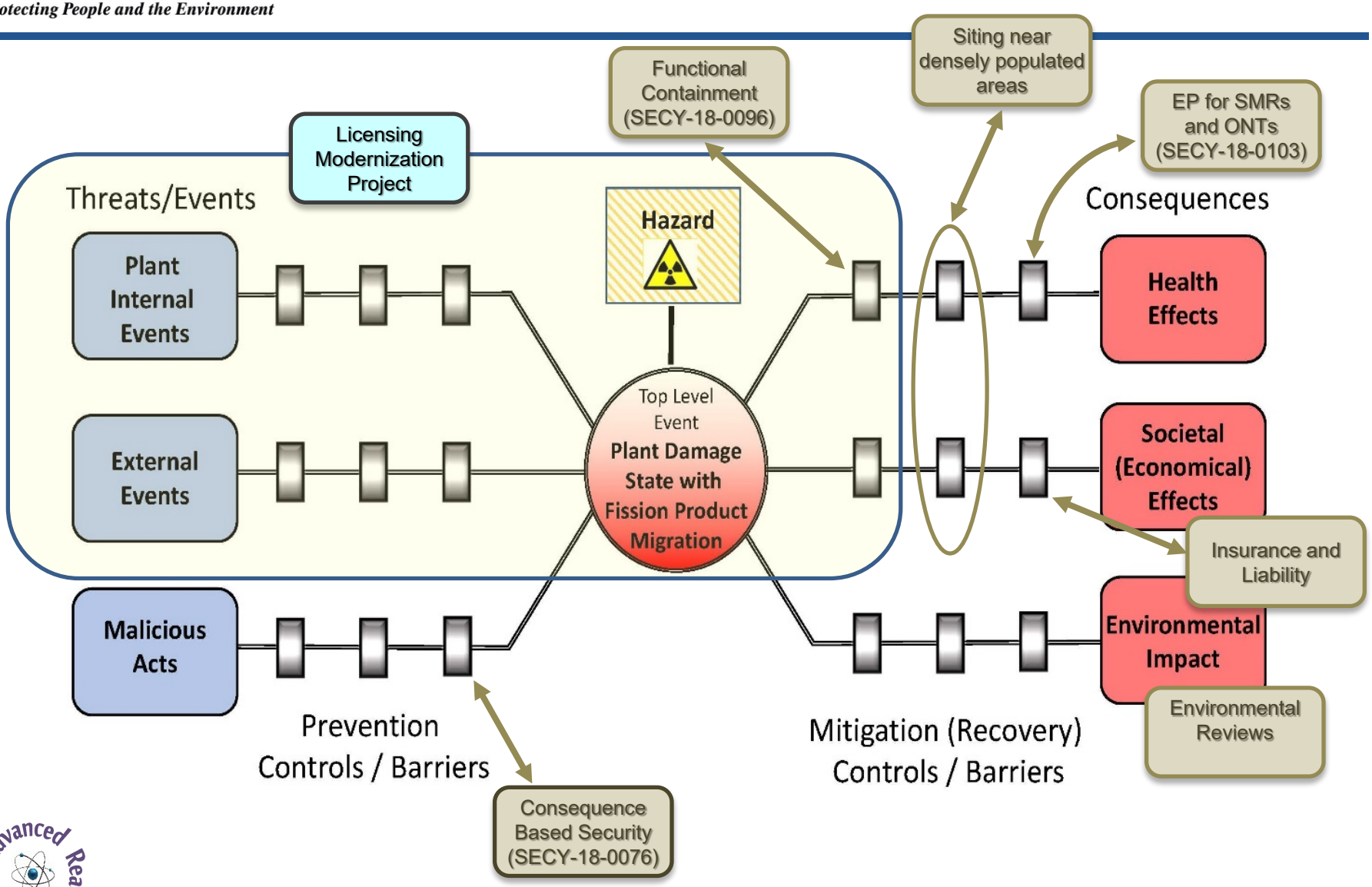
Integrated Design/Review



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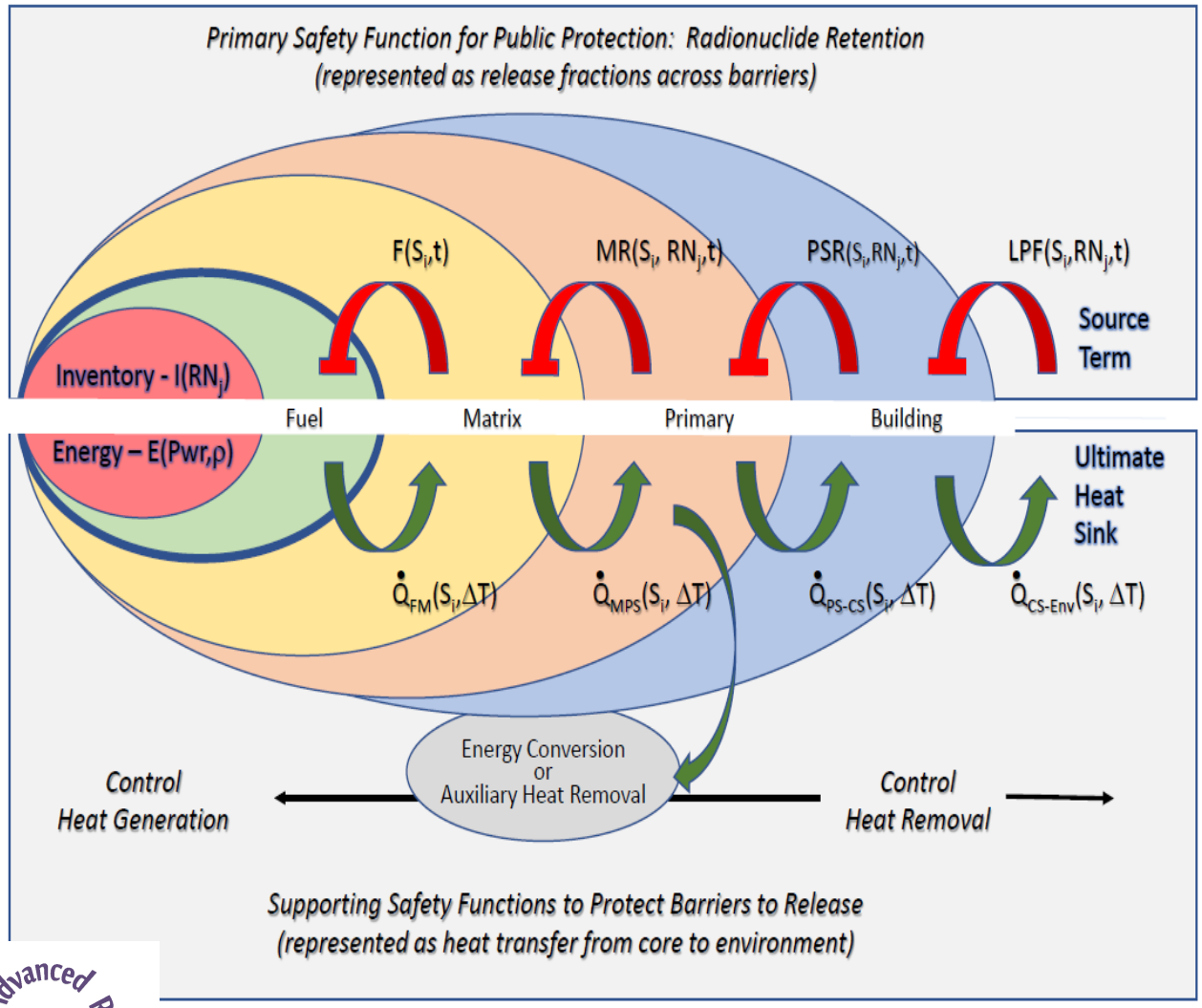
Fundamental Safety Functions and Mechanistic Source Term



$I(RN_j)$	Inventory
RN_j	Radionuclide Groups (j)
E	Heat Energy
Pwr	Power Level
ρ	Reactivity
F	Fuel Release Fraction
MR	Matrix Release Fraction
PSR	Primary System Release Fraction
LPF	Building Leak Path Factor
S_i	Event Sequences (i)
t	Time
$\dot{Q}$	Heat Transfer
FM	Fuel to Matrix
MPS	Matrix to Primary System
PS-CS	Primary System to Cooling System
CS-Env	Cooling System to Environment
ΔT	Temperature difference

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NEI 18-04, General Approach

- Licensing Basis Events
  - Probabilistic Risk Assessment
  - Deterministic
- SSC Classification
  - Function and Risk Considerations
  - Safety Related
  - Non-Safety Related with Special Treatment
- Defense-in-Depth Assessment
  - Structures, Systems and Components
  - Programmatic
  - Integrated Decision-making Process

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Other Requirements

- Associated requirements include:
  - Quality Assurance
  - Maintenance Rule
- Interfaces with requirements for:
  - Siting
  - Emergency Preparedness
  - Environmental Reviews
- Additional requirements for design/operation include:
  - Routine Effluents
  - Worker Protections
  - Security
  - Aircraft Impact Assessments

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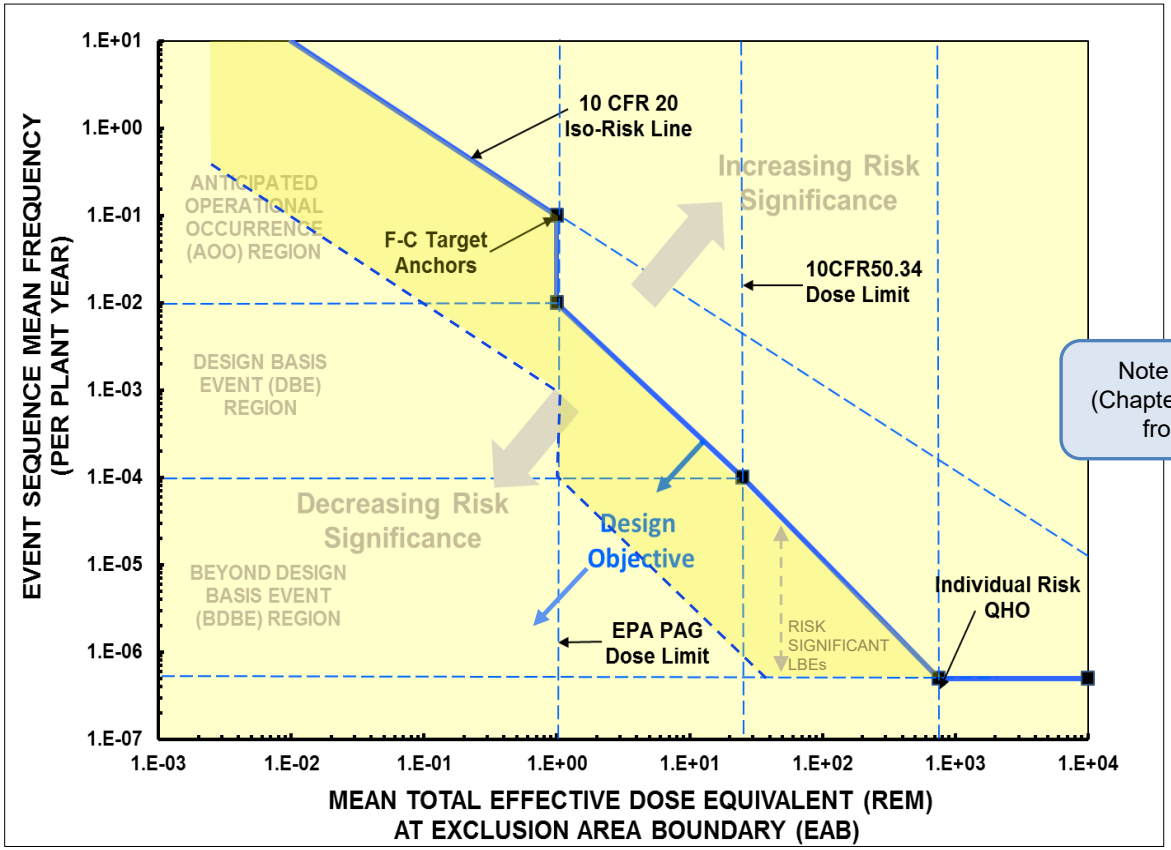
Event Selection & Analysis

The F-C Target values shown in the figure should not be considered as a demarcation of acceptable and unacceptable results. The F-C Target provides a general reference to assess events, SSCs, and programmatic controls in terms of sensitivities and available margins.

AOOs

DBEs

BDBEs



Note that DBAs (Chapter 15) derived from DBEs

* F-C Target considered along with cumulative risk metrics, safety classification, and assessment of defense in depth

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Safety Classification and Performance Criteria

- **Safety-Related (SR):**
  - SSCs selected by the designer from the SSCs that are available to perform the required safety functions to mitigate the consequences of DBEs to within the LBE F-C Target, and to mitigate DBAs that only rely on the SR SSCs to meet the dose limits of 10 CFR 50.34 using conservative assumptions
  - SSCs selected by the designer and relied on to perform required safety functions to prevent the frequency of BDBE with consequences greater than the 10 CFR 50.34 dose limits from increasing into the DBE region and beyond the F-C Target
- **Non-Safety-Related with Special Treatment (NSRST):**
  - Non-safety-related SSCs relied on to perform risk significant functions. Risk significant SSCs are those that perform functions that prevent or mitigate any LBE from exceeding the F-C Target, or make significant contributions to the cumulative risk metrics selected for evaluating the total risk from all analyzed LBEs.
  - Non-safety-related SSCs relied on to perform functions requiring special treatment for DID adequacy
- **Non-Safety-Related with No Special Treatment (NST):**
  - All other SSCs (with no special treatment required)

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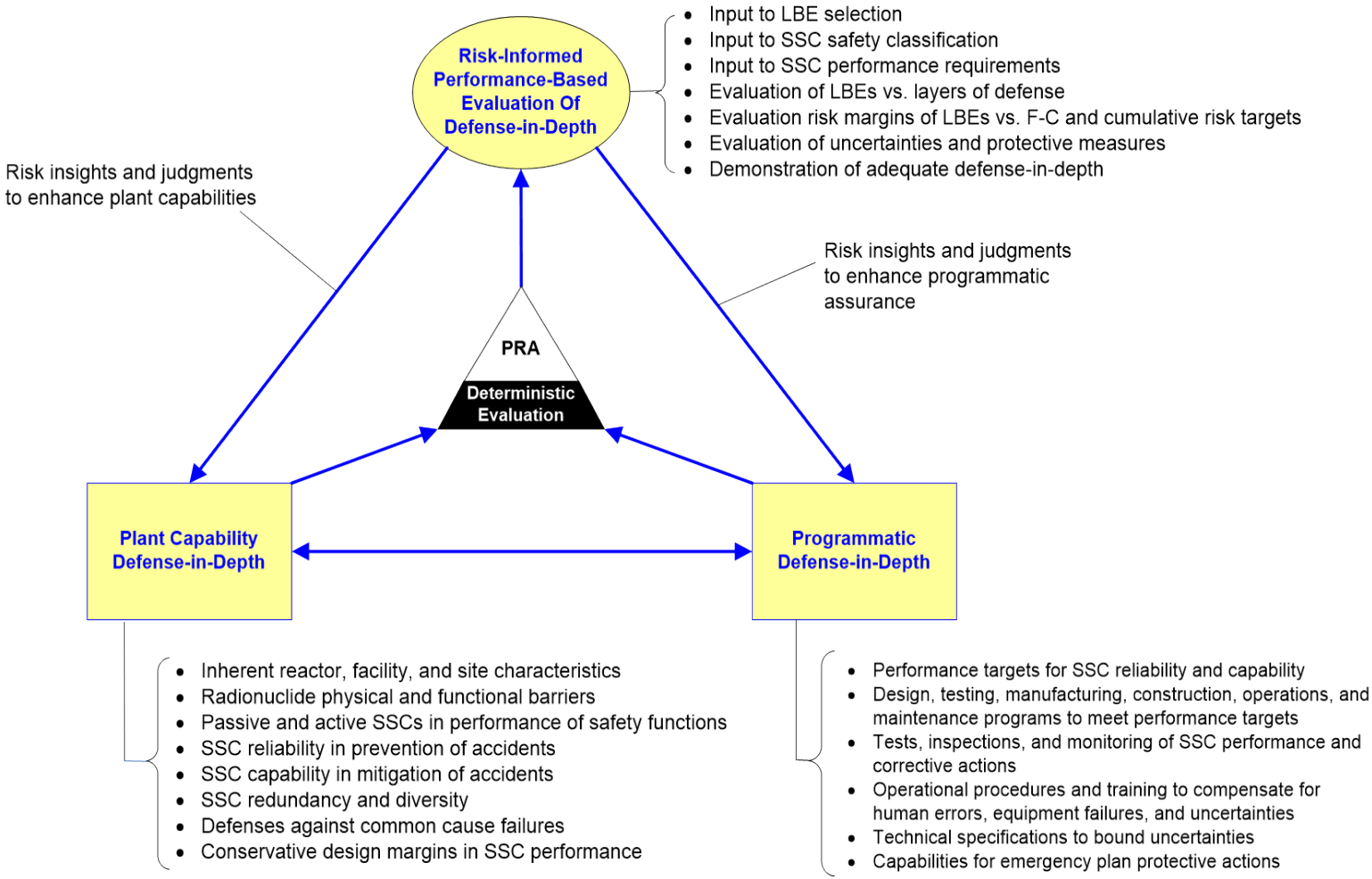
Assessing Defense in Depth



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Additional Discussion Topics

- Integrated Decisionmaking Process
  - Multi-Disciplinary assessments
  - General guidance from RG 1.201 & NEI-00-04 (10 CFR 50.69)
  - No specific NRC documentation on assessment of similar panels
  - Key focus area for implementation by developers
- Reliability of Passive Heat Removal Systems
- Table Top Exercises
  - X-energy (ADAMS Accession No. ML18228A779)
  - PRISM (ADAMS Accession No. ML19036A584)
  - Additional Planned
- Nuclear Energy Innovation and Modernization Act

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Draft SECY Paper

- Paper
  - The purpose of this paper is to seek Commission approval of the U.S. Nuclear Regulatory Commission (NRC) staff's recommendation to adopt a technology-inclusive, risk-informed, and performance-based methodology for informing the licensing basis and content of applications for licenses, certifications, and approvals for non-light-water-reactors (non-LWRs).
- Enclosure 1, "Background"
- Enclosure 2, "Technology-Inclusive, Risk-Informed, Performance-Based Approach"

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Policy Background

- Advanced Reactor Policy Statement
- Pre-application evaluations (e.g., PRISM, MHTGR)
- SECY-93-092, "Issues Pertaining to the Advanced Reactor (PRISM, MHTGR, and PIUS) and CANDU 3 Designs and Their Relationship to Current Regulatory Requirements"
- SECY-03-0047, "Policy Issues Related to Licensing Non-Light Water Reactor Designs"
- Related initiatives to develop and implement risk-informed, performance-based regulation

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Policy Background

SECY-03-0047, "Policy Issues Related to Licensing Non-Light Water Reactor Designs," and the related staff requirements memorandum (SRM) dated June 26, 2003.

- Greater emphasis can be placed on the use of risk information by allowing the use of a probabilistic approach in the identification of events to be considered in the design, provided there is sufficient understanding of plant and fuel performance and deterministic engineering judgment is used to bound uncertainties;
- A probabilistic approach for the safety classification of structures, systems, and components is allowed; and
- The single-failure criterion can be replaced with a probabilistic (reliability) criterion.

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Event Selection

- Consistent with SRM approving the use of a probabilistic approach to identify events provided there is sufficient understanding of plant and fuel performance and engineering judgment is used to address uncertainties
- ❖ Including a lower frequency range for licensing basis events, when combined with other considerations and engineering judgment, is an inherent part of a risk-informed approach and is consistent with the Commission's SRM
- The F-C targets support defining needed SSC capabilities and reliabilities to support the design process and to inform the content of applications, considering uncertainties and multi-module issues
- Consistent with the Commission's SRM approving replacement of the single-failure criterion with a probabilistic (reliability) criterion

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Safety Classification & Performance Criteria

- The safety classification of SSCs and determination of performance criteria are directly related to and performed in an iterative process along with the identification and assessment of LBEs and the assessment of defense in depth
- Consistent with SRM allowing a probabilistic approach for the safety classification of SSCs
- Systematic approach to assessing and determining appropriate relationships between the needed capabilities and reliabilities for SSCs and the role of those SSCs in mitigating and preventing LBEs

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Assessing Defense in Depth

- Framework that includes probabilistic and deterministic assessment techniques to establish defense in depth using a combination of plant capabilities and programmatic controls
- Assessments performed using several approaches to assess a reactor design and determine if additional measures are appropriate to address an over-reliance on specific features or to address uncertainties
- Includes verification that two or more independent plant design or operational features are provided to meet the guidelines for each licensing basis event
- Methodology includes use of an Integrated Decision-Making Process

❖ Staff is not proposing to more universally define or impose DID criteria and seeks Commission acceptance of the NEI 18-04 approach for this specific case (see SECY-15-0168).

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Informing Content of Applications

- NEI 18-04 provides useful guidance for reactor designers and the NRC staff for selecting and evaluating licensing basis events, identifying safety functions and classifying SSCs, selecting special treatment requirements, identifying appropriate programmatic controls, and assessing defense in depth

❖ Taken together, these activities support documenting the safety arguments and determining the appropriate scope and level of detail in applications for licenses, certifications, or approvals for non-LWRs

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Recommendation

The staff recommends that the Commission approve the use of the technology-inclusive, risk-informed, and performance-based approach described in the paper (consistent with NEI 18-04 and DG-1353) for identifying LBEs, classifying SSCs, and assessing the adequacy of defense in depth. These key aspects of the proposed approach will also be used to inform the appropriate scope and level of detail for information to be included in applications to the NRC for licenses, certifications, and approvals for non-LWRs.

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ACRS Full Committee Meeting:

Non-power Production or Utilization Facility (NPUF) License Renewal Rulemaking

February 6, 2019

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NRC Staff Presenters

- Robert Beall, NMSS: Rulemaking PM
- William “Duke” Kennedy, NRR: Acting Branch Chief
- Al Adams, NRR: Senior Project Manager

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Purpose of the NPUF Final Rule

- Implement Commission direction to streamline the license renewal process by establishing a more efficient, effective and focused regulatory framework
- Use innovative and transformative approaches to address existing shortcomings in the current regulations for non-power licensees

⇨ 9 rulemaking objectives

Public Comments on the NPUF Proposed Rule

- Proposed rule was published for comment on March 30, 2017
  - 75-day public comment period
  - Public meeting was held on May 24, 2017
  - Received 16 comment submissions
    - Public comments generally supported the proposed rulemaking and recommended alternative approaches to certain aspects of the rule
- The draft final rule was presented to the ACRS Subcommittee on January 23, 2019
  - The TRTR Chairman stated at the meeting that the draft final NPUF rule was a “win-win” for the NRC and NPR community.

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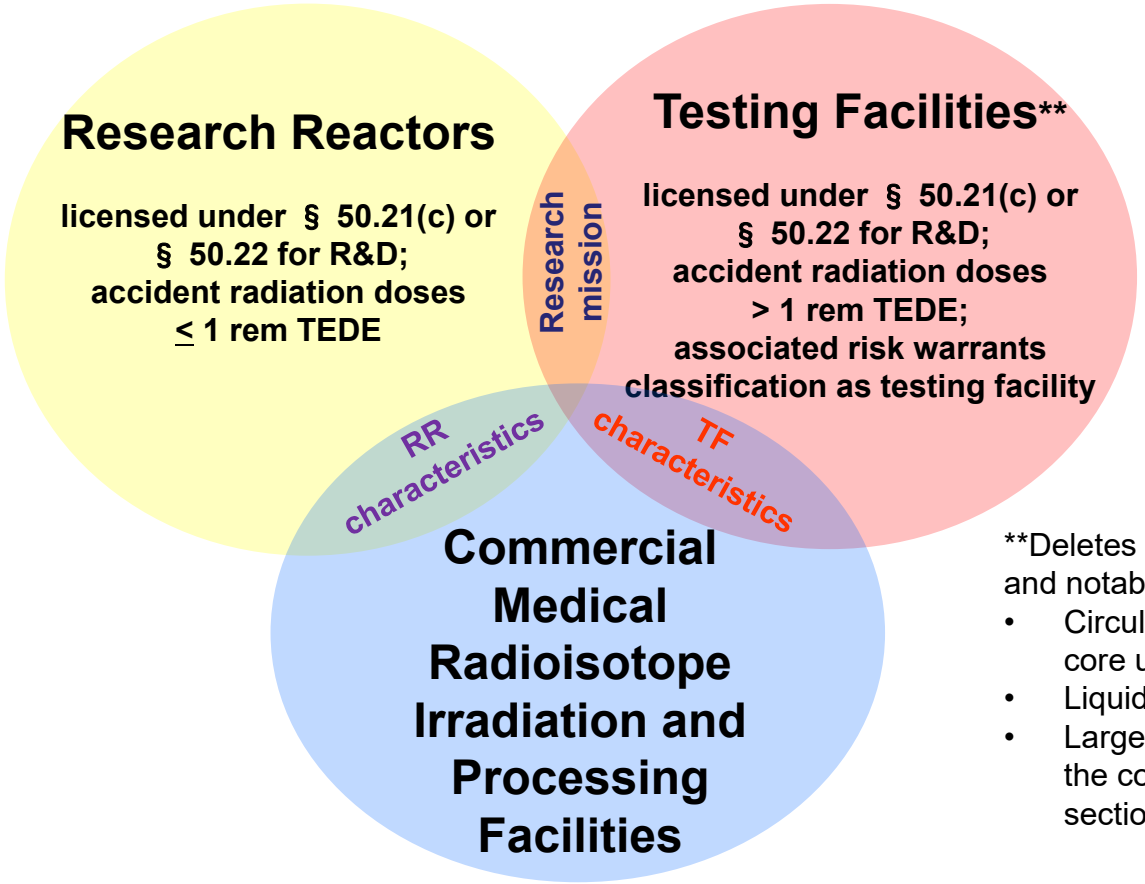
Relationship of NPUF Entities (Post-Final Rule)

Class 104 a or c

Class 103

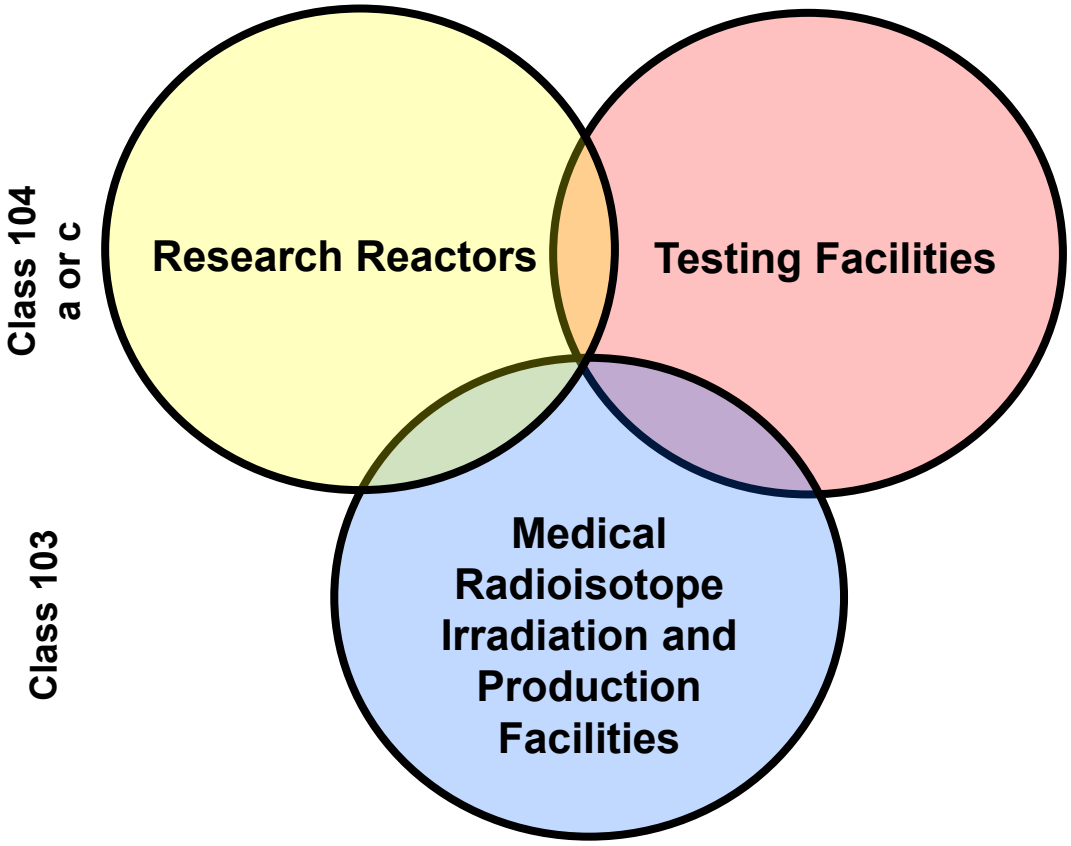


**Deletes previous power levels and notable safety considerations:

- Circulating loop through the core used for fuel experiments
- Liquid fuel loading
- Large experimental facility in the core (> 16 in^2 in cross-section)

1. Update Terms and Definitions

- Establish a single term ("non-power production or utilization facility") to capture all non-power facilities licensed under part 50
- Revise definitions for "non-power reactor," "research reactor," and "testing facility" in response to public comment and make conforming changes*
- Ensure clarity and consistency for the applicability of NPUF regulations



* Text in red are changes from the proposed rule.

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1. Update Terms and Definitions

- National Institute of Standards and Technology public comment
  - Revise definitions of “testing facility” and “research reactor” to “remove the arbitrary 10MW(t) threshold, and apply, instead, a risk-based approach to its regulation of a testing facility.”
  - “… risk is best quantified by accident analyses performed under a licensing safety analysis”
  - Recommended definitions refer to the proposed accident dose criterion of 1 rem (0.01 Sv)

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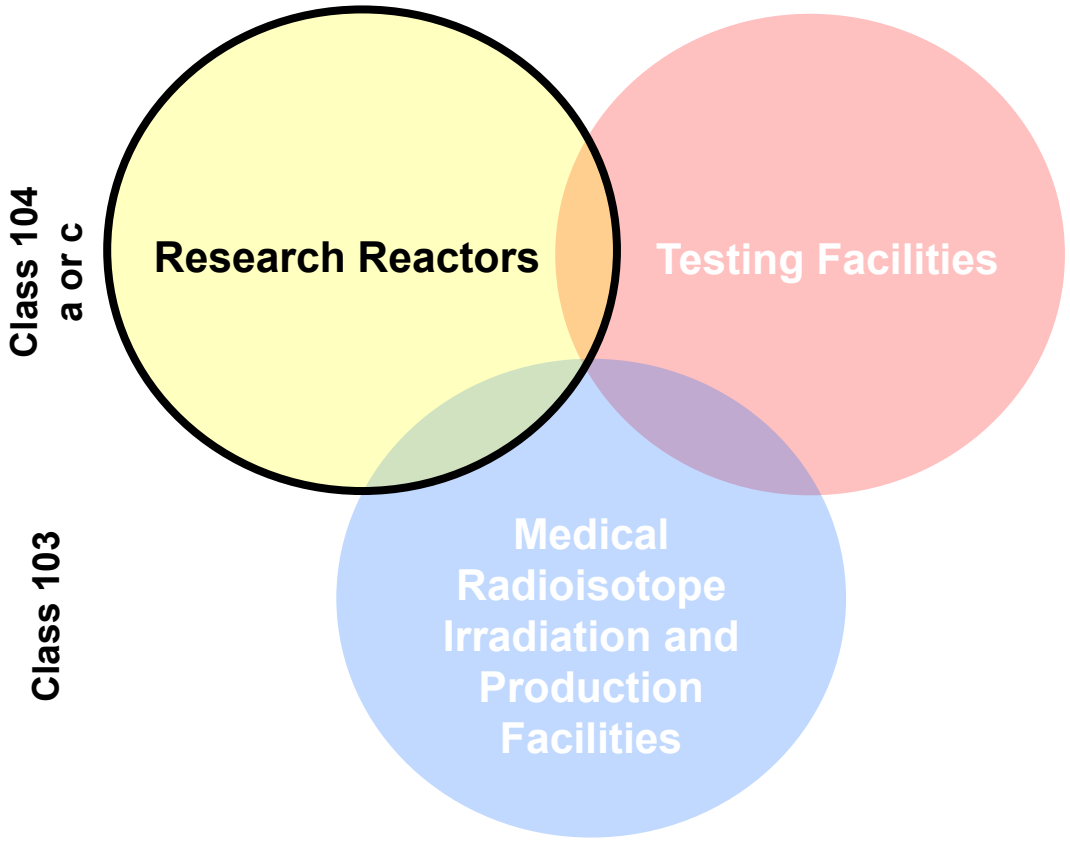
1. Update Terms and Definitions

- NRC staff determination
  - 10 MW(t) threshold, while generally based on safety significance, is not documented.
  - Prescriptive power thresholds do not account for the safety features that are engineered into the facility design and those barriers that must be breached during an accident before a release of radioactive material to the environment can occur.
  - Power thresholds do not accurately represent the risk associated with a particular facility.
  - Use of a postulated accident dose is a more risk-informed, performance-based approach.

2. Eliminate License Terms

- Exempt Class 104a and 104c NPUFs, other than testing facilities, from 40-year fixed term in 10 CFR 50.51
- No license term specified in AEA for Class 104 NPUFs
- Consistent with AEA's minimum regulation standard
- Reduce burden for licensees and NRC, but maintains public health and safety



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No Notable Safety Considerations

- Accident dose criterion of 1 rem (0.01 Sv) TEDE or less
  - small fission product inventory
  - small radiological consequence for maximum hypothetical accident
- Low energy systems
  - low operating power and temperatures
  - minimal decay heat
- No significant aging considerations
  - simple designs
  - proactive aging management / aging-related surveillance requirements
  - loss of coolant is an analyzed condition
- Slowly evolving licensing basis
  - Very low number of design changes each year
  - Few rulemakings apply

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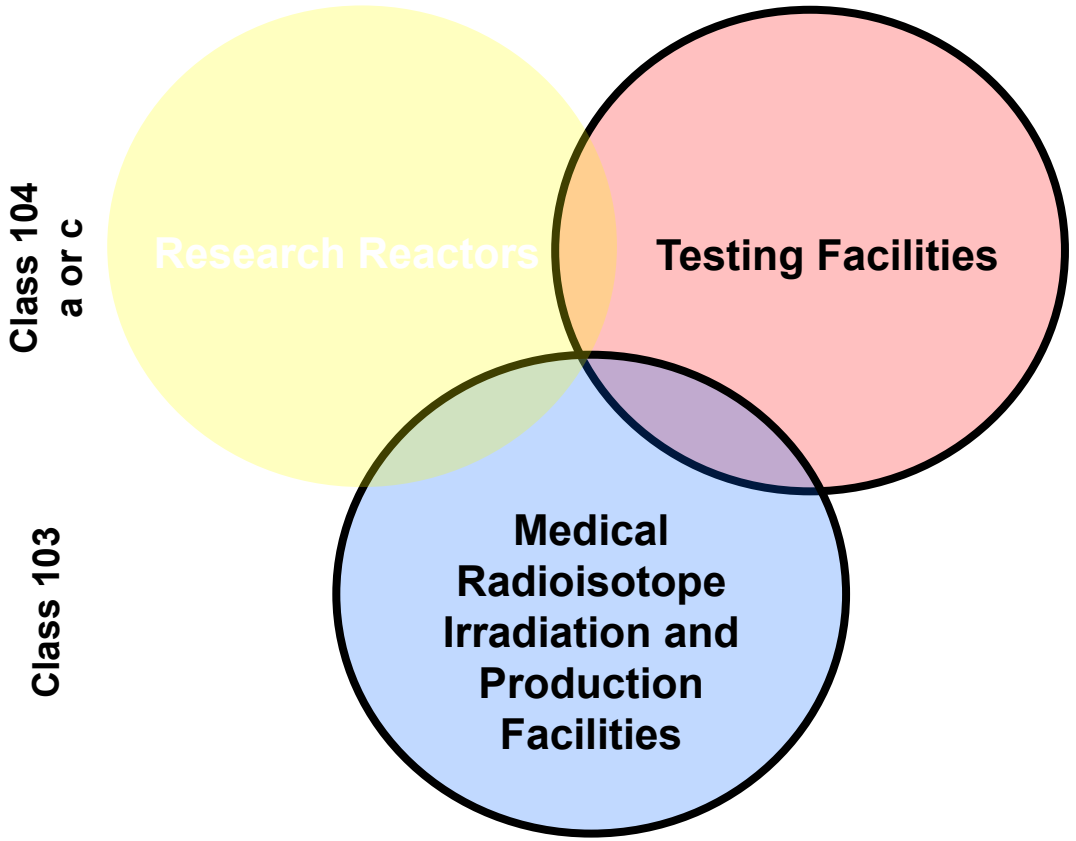
Maintaining Safety without License Renewal

Class 104a or c, except testing facilities

- NUREG-1537
  - License renewal under NUREG-1537
- Inspection program
- Technical specifications
- Existing reporting requirements
  - Safety issues with SSCs
  - Maintenance activities
- FSAR Update rule requirement

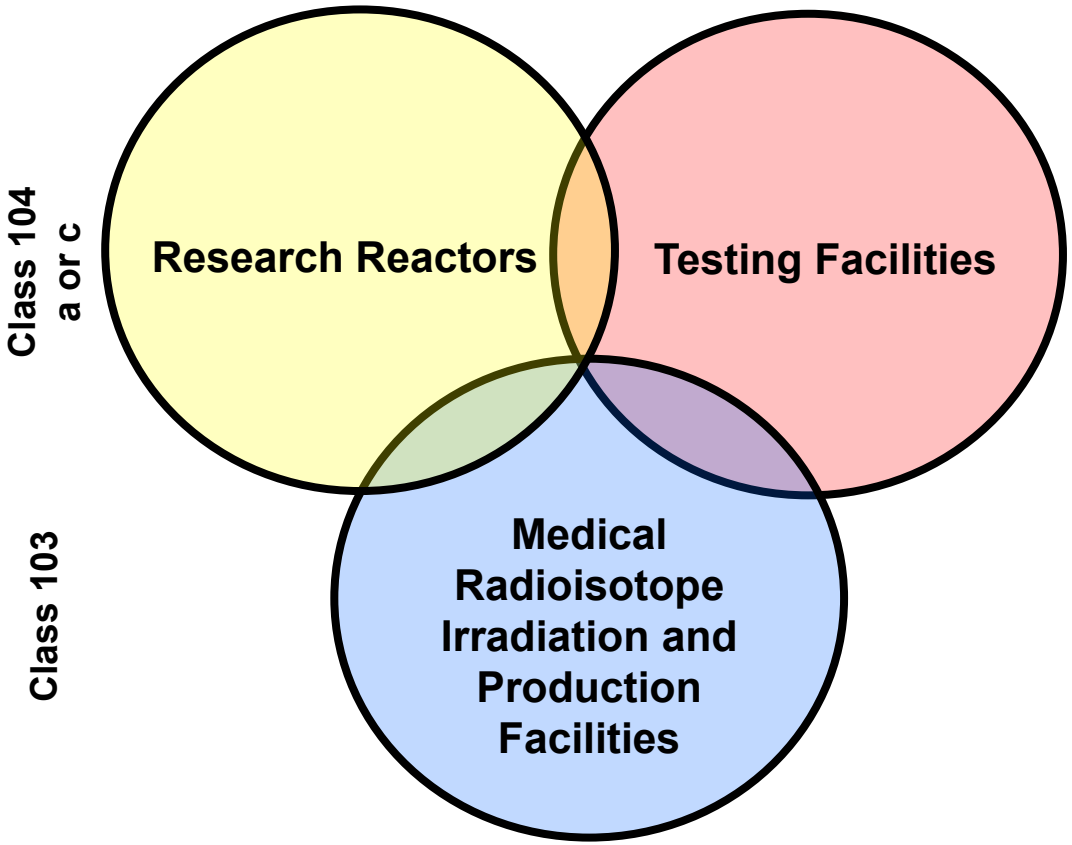
3. Define the License Renewal Process

- Consolidate license renewal requirements under 10 CFR 50.135 for testing facilities and NPUFs licensed under 10 CFR 50.22
- Clarify license renewal process
- Licenses will be effective immediately
- Maintains 40-year term for licenses
- Enhance regulatory efficiency



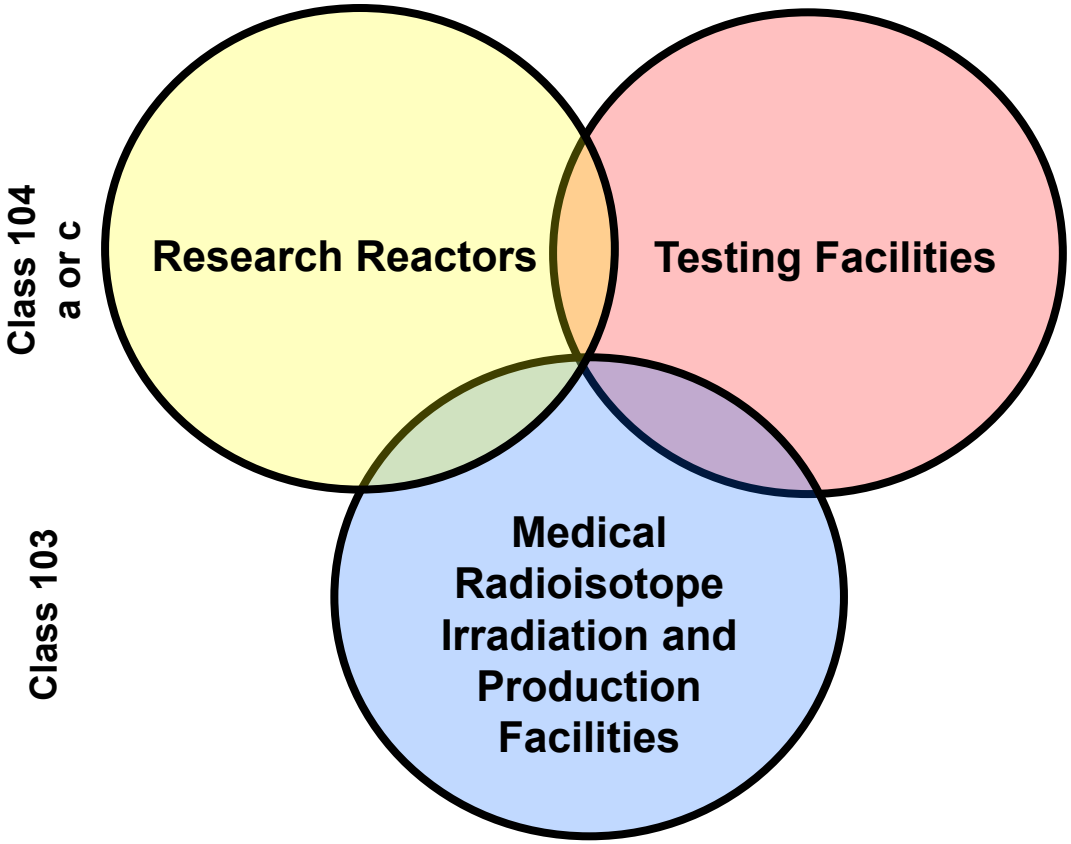
4. Require Updated FSAR Submittals

- Extend applicability of 10 CFR 50.71(e) to NPUFs
- Ensure timely documentation of changes to licensing basis
- Benefit knowledge management, NRC's inspection program, and licensee operator training and exams
- Reg Guide 2.7 provides guidance on the FSAR updates.



5. Amend Timely Renewal Provision

- Create two-year timely renewal for Class 103 and testing facilities and exempt Class 104a and 104c NPUFs, other than testing facilities
- 30 days in 10 CFR 2.109 is not a sufficient period of time for adequate assessment of license renewal application
- Two years provides sufficient time
- Maintain 30-day timely renewal provision for certain facilities



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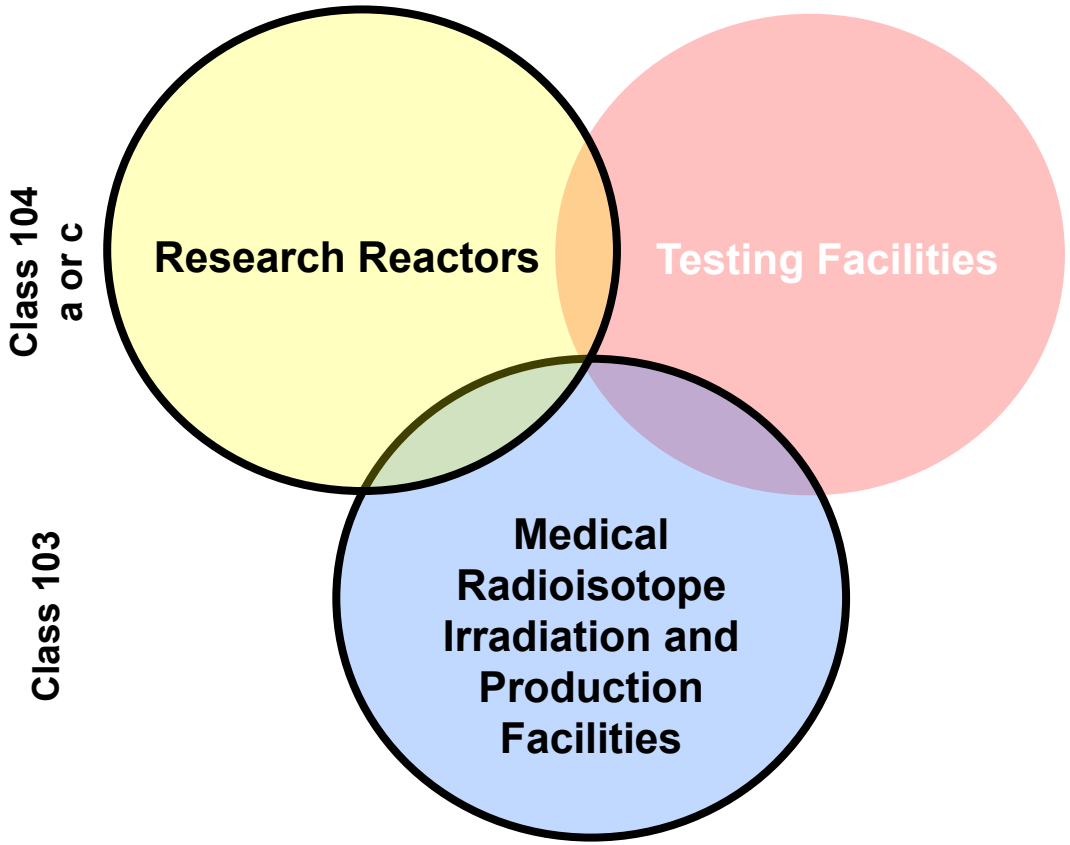
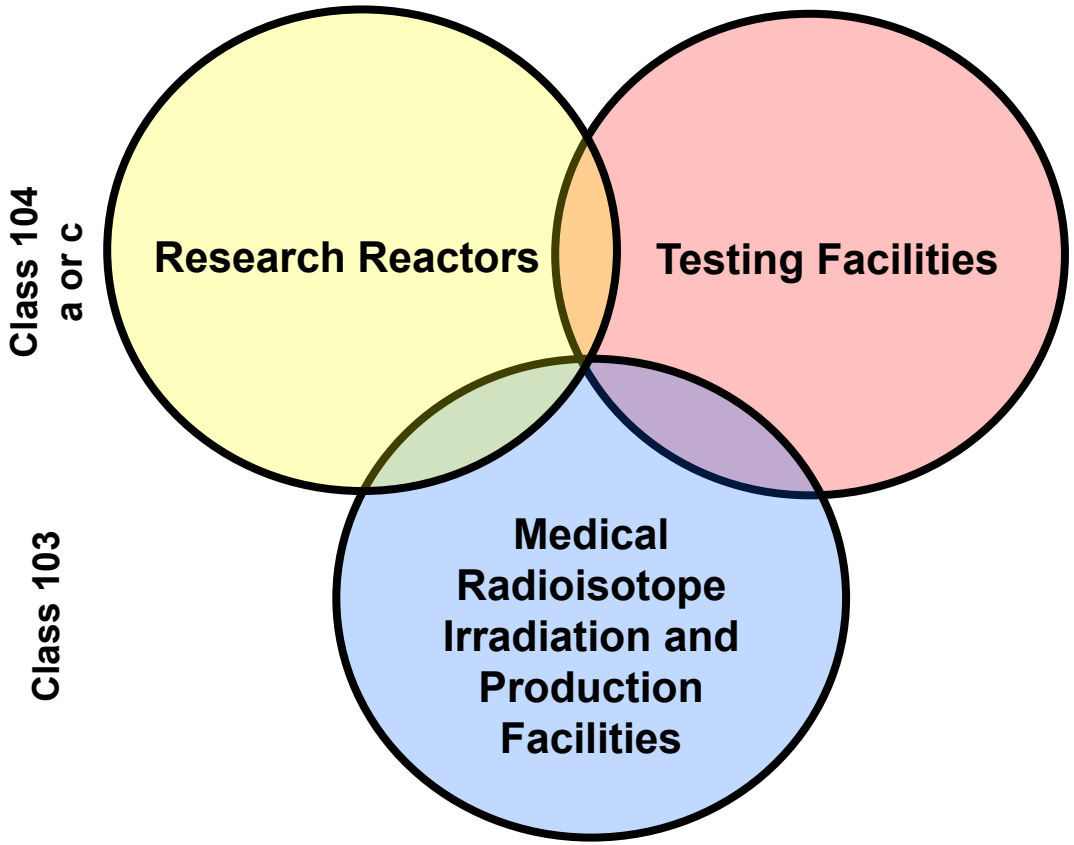
6. Provide an Accident Dose Criterion

- Create new accident dose criterion for NPUFs, other than testing facilities, in 10 CFR 50.34
- Part 20 public dose limits are unnecessarily restrictive as accident dose criteria
- Criterion would align with early phase EPA PAG and provide adequate protection from unnecessary exposure to radiation
- Revised the location within 10 CFR 50.34 of the accident dose criterion



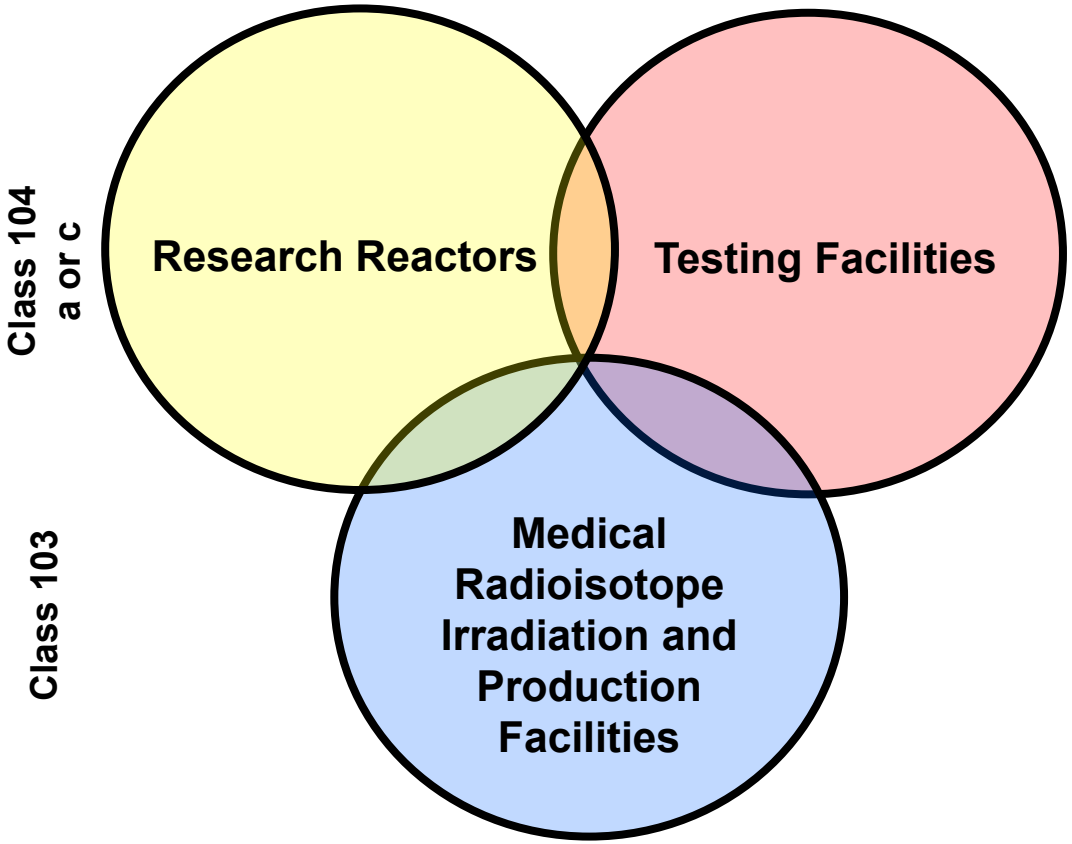
7. Extend Applicability of 10 CFR 50.59

- Extend applicability to NPUFs regardless of decommissioning status
- 10 CFR 50.59 currently is not applicable to NPUFs once fuel is moved offsite
- Avoid burden of issuing license amendments



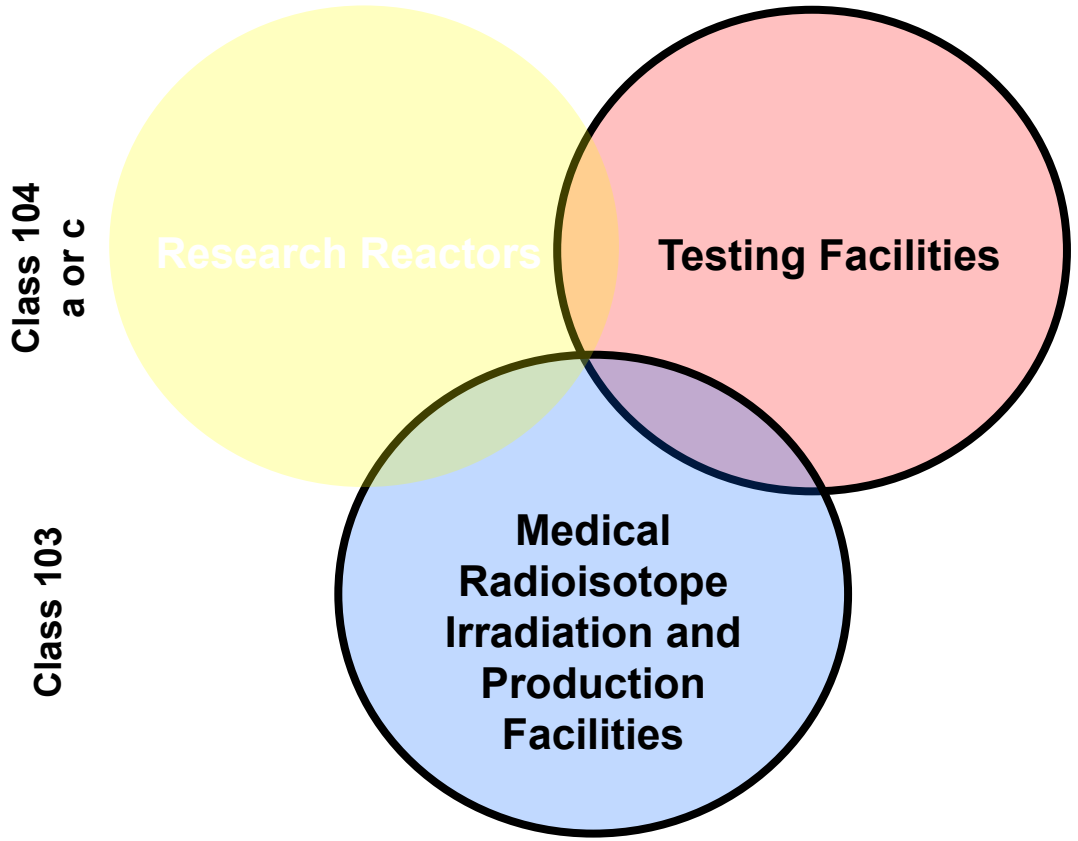
8. Clarify Existing Environmental Reporting Requirements

- Add requirement in 10 CFR 51.56 for NPUFs to provide an environmental report per 10 CFR 51.45
- Historically, NRC has relied on 10 CFR 51.41 to collect "environmental information"
- Improve consistency and clarify Part 51 requirements for licensing actions



9. Eliminate NPUF Financial Qualification Information Requirement

- Eliminate 10 CFR 50.33(f)(2) financial qualification requirement at license renewal
- Primary means to ensure safety is through NRC's oversight and enforcement programs
- Reduce licensee burden without compromise to public health and safety



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Significant Changes from the NPUF Proposed Rule

- Revised the proposed definition of “non-power production or utilization facility”
- Revised the existing definitions of “non-power reactor,” “research reactor,” and “testing facility”
- Made conforming changes to terms and definitions throughout 10 CFR Chapter I
- Revised proposed 10 CFR 50.135 so that renewed licenses will be effective immediately
- Clarified proposed 10 CFR 50.135 to maintain 40-year terms for renewed licenses
- Maintained timely renewal provision for certain facilities
- Revised the location within 10 CFR 50.34 of the accident dose criterion

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NPUF Final Rule Summary

NPUF Final Rule Change	Class 103 Facilities	Class 104a Facilities	Class 104c Facilities	
	Commercial	Medical Therapy	R&D	Testing
1. Update terms and definitions	✓	✓	✓	✓
2. Eliminate license terms	N/A	✓	✓	N/A
3. Define the license renewal process	✓	N/A	N/A	✓
4. Require updated FSAR submittals	✓	✓	✓	✓
5. Amend timely renewal provision	✓	✓	✓	✓
6. Provide an accident dose criterion	✓*	✓	✓	N/A
7. Extend applicability of 10 CFR 50.59	✓	✓	✓	✓
8. Clarify existing environmental reporting requirements	✓	✓	✓	✓
9. Eliminate NPUF financial qualification information for license renewal	✓	N/A	N/A	✓

* Not applicable for Class 103 testing facilities

NPUF Rulemaking Schedule

- Final NPUF rule milestones:
  - Currently in concurrence
  - Public meeting on the draft final rule implementation scheduled for late February
  - Due to Commission in June 2019

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QUESTIONS?

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BACK UP SLIDES

Regulatory Policy – Class 104

The policy for regulation of Class 104 NPUFs is described in the Atomic Energy Act of 1954, as amended, Section 104a. and c.

Sec. 104. Medical Therapy and Research and Development

a. …the Commission is directed to permit the widest amount of effective medical therapy possible with the amount of special nuclear material available for such purposes and to impose the minimum amount of regulation consistent with its obligations under this Act to promote the common defense and security and to protect the health and safety of the public.

c. The Commission is directed to impose only such minimum amount of regulation of the licensee as the Commission finds will permit the Commission to fulfill its obligations under this Act to promote the common defense and security and to protect the health and safety of the public and will permit the conduct of widespread and diverse research and development.

Regulatory Policy – Class 103

The policy for regulation of Class 103 NPUFs is described in the Atomic Energy Act of 1954, as amended, Section 103.

Sec. 103. Commercial Licenses

a. The Commission is authorized to issue licenses to persons applying therefor to transfer or receive in interstate commerce, manufacture, produce, transfer, acquire, possess, use, import, or export under the terms of an agreement for cooperation arranged pursuant to section 123, utilization or production facilities for industrial or commercial purposes. Such licenses shall be issued in accordance with the provisions of chapter 16 and subject to such conditions as the Commission may by rule or regulation establish to effectuate the purpose and provisions of this Act.

c. Each such license shall be issued for a specified period, as determined by the Commission, depending on the type of activity to be licensed, but not exceeding forty years from the authorization to commence operations and may be renewed upon the expiration of such period.

Regulatory Definitions

- Non-power reactor means a research or test reactor licensed under § § 50.21(c) or 50.22 of this part for research and development [*10 CFR 50.2 Definitions*].

- Research reactor means a nuclear reactor licensed by the Commission under the authority of subsection 104c of the Act and pursuant to the provisions of § 50.21(c) of this chapter for operation at a thermal power level of 10 megawatts or less, and which is not a testing facility as defined by paragraph (m) of this section [*§ 170.3 Definitions*].

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Regulatory Definitions (cont.)

- Testing facility means a nuclear reactor which is of a type described in § 50.21(c) of this part and for which an application has been filed for a license authorizing operation at:

  (1) A thermal power level in excess of 10 megawatts; or

  (2) A thermal power level in excess of 1 megawatt, if the reactor is to contain:

  (i) A circulating loop through the core in which the applicant proposes to conduct fuel experiments; or

  (ii) A liquid fuel loading; or

  (iii) An experimental facility in the core in excess of 16 square inches in cross-section. [§ 170.3 Definitions]

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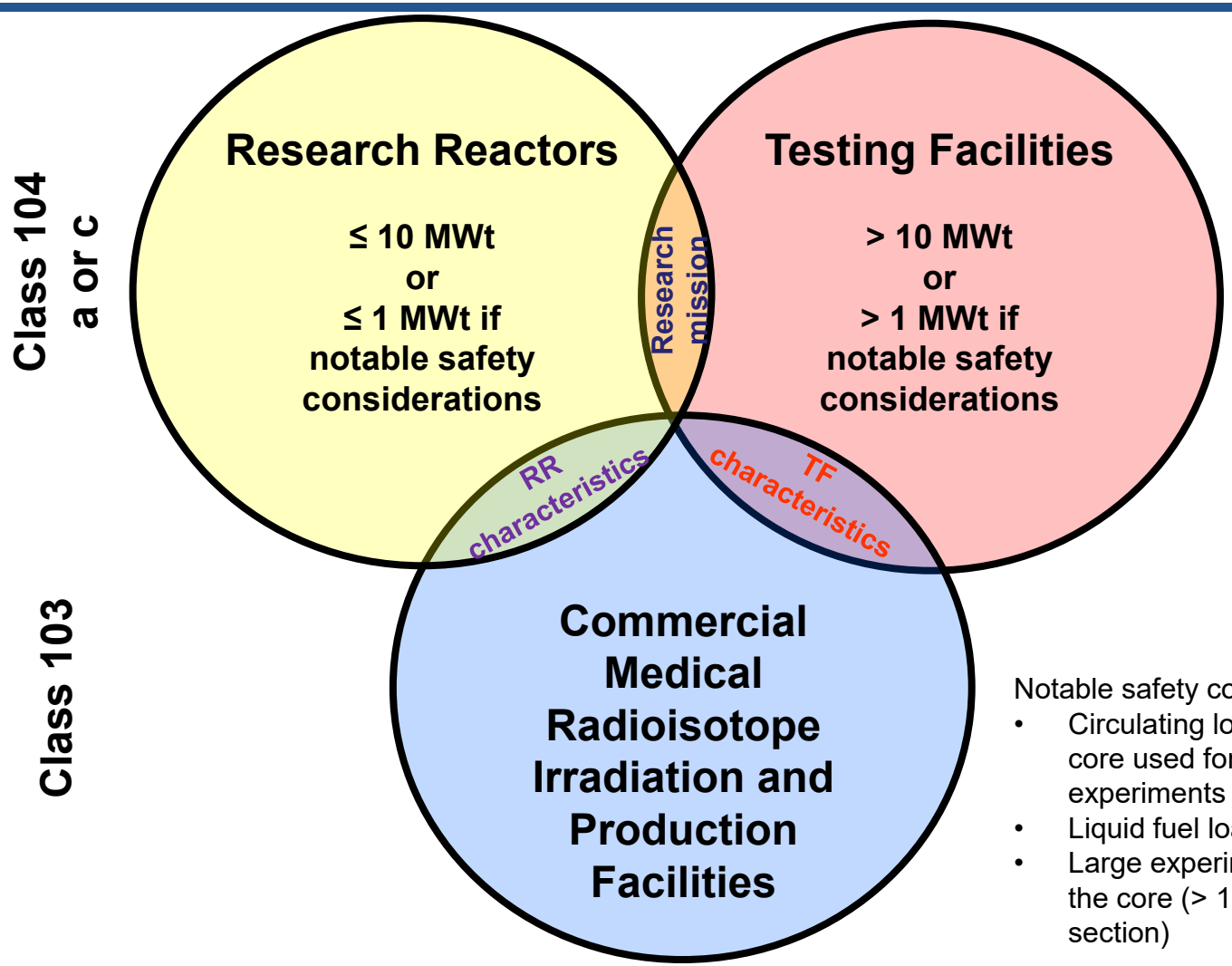
Characteristics of Current NPUF Entities



Notable safety considerations:

- Circulating loop through the core used for fuel experiments
- Liquid fuel loading
- Large experimental facility in the core (> 16 in^2 in cross-section)

Presentation to the ACRS Full Committee

NuScale Design Certification Application Review

Safety Evaluation Report

Chapter 2: SITE CHARACTERISTICS

Project Manager: Prosanta Chowdhury

February 6, 2019

ACRS subcommittee meeting on December 18, 2018

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Topics covered:

- **Geography and Demography (SRP Section 2.1)**
- **Nearby Industrial, Transportation, and Military Facilities (SRP Section 2.2)**
- **Meteorology (SRP Section 2.3)**
- **Hydrologic Engineering (SRP Section 2.4)**
- **Geology, Seismology, Geotechnical Engineering (SRP Section 2.5)**

Note: Staff review is based on DCA, revision 1 (March 15, 2018)

Topics and Conclusions

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Geography and Demography (SRP 2.1), and

Nearby Industrial, Transportation, and Military Facilities (SRP 2.2)

Conclusion

COL Items provided in the DCA are acceptable. The COL applicant referencing the NuScale Power Plant DC should describe and address -

- site specific geographic and demographic characteristics as part of COL Item 2.1-1;
- nearby industrial, transportation, and military facilities to demonstrate that the design is acceptable for each potential accident or provide site-specific design alternatives - as part of COL Item 2.2-1;
- site specific information in a COL application should be bounded by the design parameters.

Topics and Conclusions

Meteorology (SRP 2.3)

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Conclusion

Site parameters related to FSAR Section 2.3 were postulated in accordance with 10 CFR 52.47(a)(1).

- **Regional Climatology (SRP 2.3.1):** Precipitation (rain/snow), winds (i.e., straight-line, tornado, hurricane), ambient dry- and wet-bulb temperatures are generally representative of a reasonable number of potential plant site locations;
  - However, because design may be deployed in remote locations or at sites subject to harsh weather conditions, some postulated site parameter values may be challenged.
- **Local Meteorology and the Onsite Meteorological Measurements (SRP 2.3.2 and 2.3.3):** Local Meteorology and the Onsite Meteorological Measurements Program are site-specific and addressed by the COL applicant.

Topics and Conclusions

Meteorology (SRP 2.3) (contd)

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Conclusion

- **Short-Term Atmospheric Dispersion Estimates for Accident Releases (SRP 2.3.4): Open Item 02.03.04-1** - Staff currently evaluating TR-0915-17565 (Accident Source Term Methodology) to determine if NuScale methodology is acceptable for calculating DBA offsite χ/Q values at EAB and LPZ in relation to NuScale design or a COL applicant referencing NuScale design.

- Staff found that Applicant provided onsite χ/Q site parameter values at the MCR and TSC doors and HVAC intake that are representative of a reasonable number of sites that may be considered for a COL application.

- **Long-term Atmospheric Dispersion Estimates for Routine Releases (SRP 2.3.5):** Staff found that the long-term (routine release) site parameter values selected by the Applicant are representative of a reasonable number of sites that have been or may be considered for a COL application.

Topics and Conclusions

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Hydrology (SRP 2.4)

Conclusion

- In all areas of hydrology, the applicant provided adequate site parameters as well as COL Items 2.0-1 and 2.4-1. A COL applicant referencing the NuScale Power Plant DC should provide information sufficient to demonstrate that the actual site characteristics described in its application falls within the range of site parameter values consistent with COL Items 2.0-1, and 2.4-1. The staff finds the applicant's information, including stipulations in the COL Items, acceptable.

Topics and Conclusions

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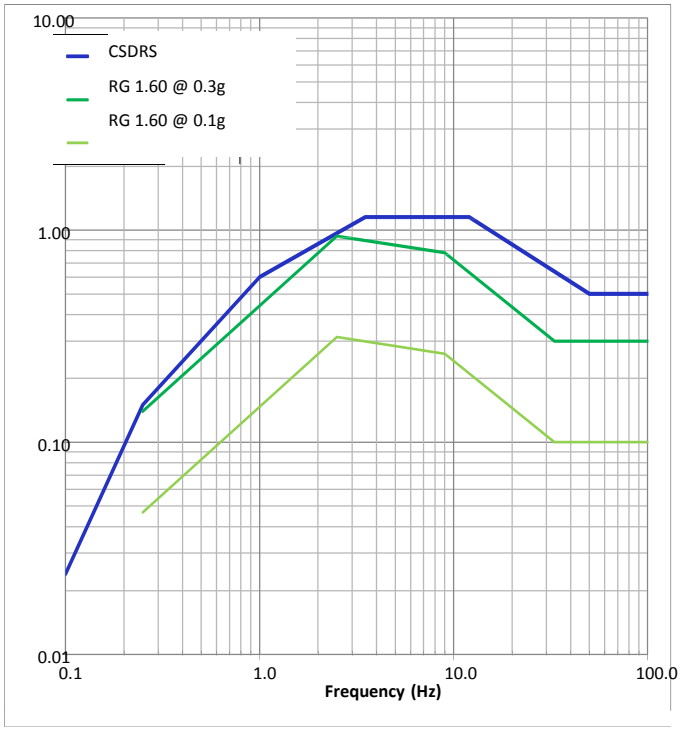
Geology, Seismology, Geotechnical Engineering (SRP 2.5)

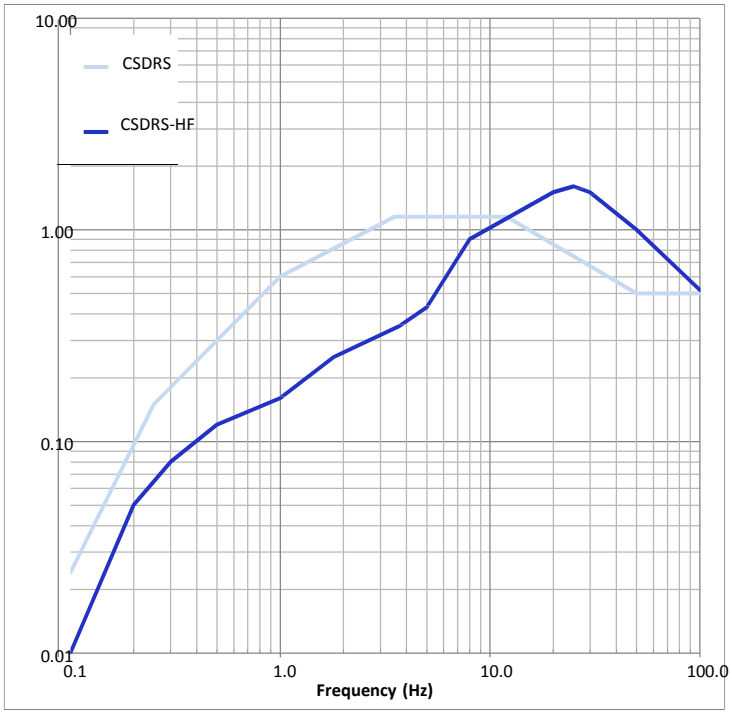
Conclusion

- In all areas of Geology, Seismology, Geotechnical Engineering, the applicant provided adequate information, including COL Item 2.5-1, and referenced COL Items 3.7-3, 3.7-5, 3.8-6, and 3.7-8, and specified that a COL applicant referencing the NuScale Power Plant DC should provide information sufficient to demonstrate that the actual site characteristics fall within the range of site parameter values specified in the NuScale Power Plant DC. The staff finds the applicant's information, including stipulations in the COL Items, acceptable.

NuScale Horizontal Certified Seismic Design Response Spectra at 5% Damping

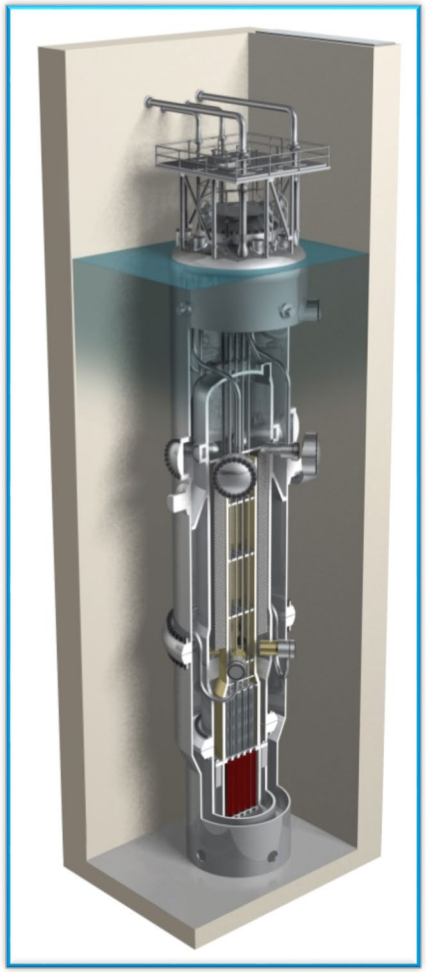


CSDRS vs RG 1.60



CSDRS and CSDRS-HF

Chapters 2 and 17
ACRS Full Committee



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Revision: 0

Template #: 0000-21727-F01 R4

Background: NuScale ODI Program

- NuScale's Quality Assurance program is based on ASME NQA-1-2008.
- ASME NQA-1-2008 Part I, Requirement 3, Section 500, Part (b) allows the deferral of design verification activities provided the unverified portions of the design are identified and controlled.
- Open Design Items (ODIs) are a form of engineering assumption controlled under the NuScale Design Control Process. Assumptions are information or data that is selected for a design activity, other than previously validated design criteria, which are taken to be true for the sake of analysis.
- Assumptions, along with verified design inputs, describe the conditions under which design activity results are considered valid.
  - Assumptions are documented and tracked
  - Basis statements provide engineering justification that the assumption is reasonable
  - Verifier assures assumptions are reasonable

Background: NuScale ODI Program (cont.)

- ODIs are resolved/verified via the design verification process.
- Design Verification is required:
  - Ideally before releasing the design for procurement, manufacture, or construction, or for use by another design organization (with a different QA program)
  - In all cases, the design verification is required prior to relying on that SSC to perform its function

NuScale NRC Interactions on ODIs

- 2017 QA Inspection
- Training/Communication of Staff
- DCA Chapter Audits - Review of NuScale ODIs present in source documentation reviewed.
- RAIs

2017 QA Inspection Highlights

- Included review of NuScale's ODI Process
- The NRC report (ML17201J382) cited:
  - Review of 170 specific ODIs
  - NuScale had a conservatively low threshold for opening ODIs
  - No violations or nonconformances were identified
  - NuScale ODI process adequately manages unverified assumptions

Conclusion

- The NuScale ODI process properly controls unverified engineering assumptions in accordance with NQA-1.
- NRC has reviewed ODI process thru various interactions:
  - RAIs
  - DCA Chapter Audits
  - QA Inspection

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Safety Evaluation with Open Items: Chapter 17, "Quality Assurance and Reliability Assurance"

NuScale Design Certification Application

ACRS Full Committee Meeting
February 6, 2019

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Agenda

- NRC Staff Review Team
- Summary of the NRC Staff's Review
- Quality Assurance
  - ACRS Subcommittee Questions on the Applicant's ODI Process
- Reliability Assurance
- Abbreviations

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NRC Staff Review Team

- NRC Technical Reviewers
  - Odunayo Ayegbusi, NRO
  - Andrea Keim, NRO
  - Mark Caruso, NRO (Retired)
  - Alissa Neuhausen, NRO
- Project Management
  - Omid Tabatabai, Senior Project Manager
  - Greg Cranston, Lead Project Manager

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Overview of the Staff Review

- NRC Staff's safety evaluation report (SER) is based on DCA, Rev. 1,
- SER contains two Open Items and no Confirmatory Items,
- NRC Staff conducted two regulatory audits concerning reliability assurance program and one quality assurance implementation inspection,
- NRC Staff briefed the ACRS subcommittee on 12/18/18,
- The staff will discuss ACRS Subcommittee members' questions regarding the applicant's ODI process.

DCA, Part 2, Tier 2 Section 17.5 Quality Assurance

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Regulatory Basis

- 10 CFR Part 50, Appendix A, GDC 1 requires that QA program be established and implemented
- 10 CFR Part 50, Appendix B specifies 18 quality criteria that the QA program description must address
- 10 CFR 52.47(a)(19) requires that a standard DC applicant include a QAPD that satisfies applicable portions of Appendix B to 10 CFR Part 50

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Topical Report Review

- NuScale submitted Topical Report NP-TR-1010-859-NP, “Quality Assurance Program Description for the NuScale Power Plant,” Revision 3 on March 24, 2016
- NuScale commits to NQA-1-2008 and NQA-1a-2009 addenda as endorsed by RG 1.28, Revision 4
- The NRC staff reviewed the QAPD using NUREG-0800 Section 17.5
- The NRC staff SER dated September 22, 2016

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Staff's Review of DCA, Section 17.5

- References "Quality Assurance Program Description for the NuScale Power Plant," NP-TR-1010-859-NP-A, Revision 3
- COL Item 17.5-1: A COL applicant that references the NuScale Power Plant design certification will describe the quality assurance program applicable to the site-specific design activities and to the construction and operations phases.
- Open Item 17.5-1: Additional QA implementation inspection

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QA Implementation Inspection

- June 5 - 9th, 2017
- NuScale Office Facility in Corvallis, Oregon
- Inspection Procedure 35017, “Quality Assurance Implementation Inspection”
- No findings of significance were identified
- QA Inspection Report is publicly available at (ML17201J382).
- Additional QA inspection is being scheduled and is listed in SER Open Item 17.5-1

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ACRS Subcommittee Comments/Questions

- How does the staff ensure all ODIs are closed by the time DCA is approved?
- What does “sufficiently closed” mean?
- What if unverified assumptions change after the DCA is approved?
- ACRS Subcommittee Comment: The NRC staff should convey to NuScale that they are taking a “risk” by not closing all ODIs before the DCA is approved, particularly, those unverified assumptions that could trigger a Tier 1 change.

DCA Part 2, Tier 2, Section 17.4 Reliability Assurance Program

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Reliability Assurance Program

- Staff evaluated NuScale's reliability assurance program, including the design RAP (D-RAP) list in accordance with SRP Section 17.4, Rev. 1
- Staff found the RAP program sufficient in:
  - Program description and implementation
  - Programmatic controls
  - SSC selection methodology
  - Expert panel member requirements
  - Determination of risk significant SSCs

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Reliability Assurance Program

- Staff found:
  - the D-RAP list was developed in accordance with its RAP methodology and the D-RAP list is comprehensive.
  - NuScale adequately implemented the expert panel in developing the D-RAP list.
  - COL items provide reasonable assurance that the RAP for a COL applicant which references the NuScale design will be adequate.
- Open Item 17.5-2: D-RAP ITAAC (SECY-18-0093)

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Abbreviations

ACRS	*Advisory Committee on Reactor Safeguards*
CFR	*Code of Federal Regulation*
COL	*Combined License*
DC	*Design Certification*
DCA	*Design Certification Application*
D-RAP	*Design Reliability Assurance Program*
GDC	*General Design Criteria*
ITAAC	*Inspections, Tests, Analyses, and Acceptance Criteria*
NRO	*NRC Office of New Reactors*
ODI	*Open Design Item*
QA	*Quality Assurance*
QAPD	*Quality Assurance Program Plan*
RAP	*Reliability Assurance Program*
SER	*Safety Evaluation Report*
SSC	*Structures, Systems, and Components*
SRP	*Standard Review Plan (NUREG-0800)*