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(202) 234-4433

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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REGULATORY RULEMAKING, POLICIES AND PRACTICES

SUBCOMMITTEE

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THURSDAY, NOVEMBER 16, 2023

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The Subcommittee met via Teleconference, at 8:30 a.m. EST, David A. Petti, Chair, presiding.

COMMITTEE MEMBERS:

DAVID A. PETTI, Chair

RONALD G. BALLINGER, Member

CHARLES H. BROWN, JR., Member

VICKI M. BIER, Member

GREGORY H. HALNON, Member

JOSE A. MARCH-LEUBA, Member

ROBERT MARTIN, Member

WALTER L. KIRCHNER, Member

JOY L. REMPE, Member

THOMAS ROBERTS, Member

MATTHEW W. SUNSERI, Member

ACRS CONSULTANT:

STEPHEN SCHULTZ

DESIGNATED FEDERAL OFFICIAL:

DEREK WIDMAYER

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

8:30 a.m.

CHAIR PETTI: Good morning, everyone. The meeting will now come to order. This is a meeting of the Advisory Committee on Reactor Safeguards Radiological Rulemaking, Policies and Procedures Subcommittee. I'm Dave Petti, chairman of the subcommittee.

ACRS members in attendance are Ron Ballinger, Tom Roberts, Joy Rempe, Vicki Bier, Bob Martin, Greg Halnon, virtually I see Matt Sunseri. We right now do not have Charlie Brown or Vesna, but they may show up.

MEMBER DIMITRIJEVIC: I'm here, I'm here.

CHAIR PETTI: Oh good, thank you.

MEMBER DIMITRIJEVIC: Hi, good morning.

MEMBER SUNSERI: And I'm connected, Dave, so.

CHAIR PETTI: I saw Matt Sunseri is here.

MEMBER MARCH-LEUBA: Yeah, and Jose's here too.

CHAIR PETTI: Oh, sorry, Jose, yeah. Jose March-Leuba is here. And our consultant Steve Schultz is with us. Derek Widmayer is the ACRS staff designated federal official for the meeting.

The purpose of the subcommittee is to hear from the staff concerning comment resolution and status of draft final versions of the Advanced Reactor Content of Application Project, ARCAP, interim staff guidance document; Technology Inclusive Content of Application Project, TICAP, guidance documents.

The subcommittee will gather information, analyze relevant issues and facts, and formulate proposed positions and actions as appropriate. There is a session scheduled for the December 2023 full committee meeting, and the committee plans on preparing a letter report on this matter at the meeting.

The ACRS was established by statutes governed by the Federal Advisory Committee Act, FACA. The NRC implements FACA in accordance with its regulations found in Title 10 of the Code of Federal Regulations, Part 7. The committee can only speak through its published letter reports.

We hold meetings to gather information and perform preparatory work that will support our deliberations at a full committee meeting. The rules for participation in all ACRS meetings, including today's, were announced to the Federal Register on June 13, 2019.

The ACRS section of the U.S. NRC public website provides our charter, bylaws, agendas, letter reports, and full transcripts of all full and subcommittee meetings, including slides presented at the meetings. The meeting notice and agenda for this meeting were posted there.

As stated in the Federal Register notice and in the public meeting notice posted to the website, members of the public who desire to provide written or oral input to the subcommittee may do so, and should contact the designated federal official five days prior to the meeting, as practical.

Today's meeting is open to public attendance, and we have received no request to make an oral statement at the meeting. Time, though, is provided in the agenda after presentations are completed for spontaneous comments from members of the public attending or listening to our meeting.

Today's meeting is being held over Microsoft Teams, which includes a telephone bridge line allowing participation of the public over their computer using Teams or by phone. A transcript of today's meeting is being kept, therefore we request that meeting participants on Teams and the bridge line identify themselves when they speak, and to speak with

sufficient clarity and volume so they can be readily heard.

Likewise, we request that meeting participants keep their computer and/or telephone lines on mute when not speaking to minimize disruptions.

At this time, I ask the team attendees to make sure they are muted so we can commence the meeting.

We will now proceed. I note that Vice Chair Kirchner has joined us as well. And I call on Steve Lynch, Branch Chief of the Advanced Reactor Policy Branch in the Office of Nuclear Reactor Regulation, for opening remarks.

Steve.

MR. LYNCH: Good morning, members. Myself and my team that are in front of you are very excited today to talk to you about the work that has been ongoing for a number of years on both the NRC's development of the regulatory guide endorsing the Technology Inclusive Content of Application Project and the accompanying Advanced Reactor Content of Application Project.

We recognize that with an increasing interest in advanced reactors being licensed by the

NRC, that it is important for the staff to develop guidance to support these early movers. In particular, while we are still working on developing a new framework in Part 53, we recognize that it is important to meet developers where they are today using the existing regulatory frameworks in 10 CFR Parts 50 and 52.

These guidance documents that are developed are intended to help improve the predictability and efficiency of both the development of advanced reactor applications, as well as the NRC staff's review of these applications.

The NRC staff has been diligent in preparing these documents for the both the preparation and review of advanced reactor applications and has worked extensively with stakeholders and members of the public to receive feedback.

Today we are going to provide overviews of the work that we have done to update these documents to reflect our best technical, licensing, and policy positions, as well as help the members understand how we have carefully considered the feedback received during the public comment period on these documents.

We look forward to good engagement today as we work to finalize these documents for use

hopefully in the next few months. So thank you very much.

MS. OBER: Good morning, my name is Rebecca Ober, and I'm Project Manager in the Advanced Reactor Policy Branch at DANU and Office of Nuclear Reactor Regulation. I'm going to give the initial overview, and then I'll turn it over to Anders for the detailed TICAP discussion.

So the purpose of this briefing is to provide a high-level overview of the TICAP reg guide and the nine ARCAP ISGs, as well as the public comments received and the NRC's disposition of these comments. During this briefing, the staff will provide a summary of the ARCAP and TICAP structure before discussing the ten documents in more detail. Then staff will wrap up with the path forward.

Staff has previously briefed the ACRS Future Plant Design Subcommittee on this topic multiple times. On March 17, 2021, staff provided a high-level overview of the ARCAP and TICAP structure, which was then updated on July 21 of 2021.

Then in December 17, 2021, staff provided the draft White Paper versions of the nine ARCAP ISGs and the TICAP draft reg guide.

In the short term, staff plan to use the

ARCAP and TICAP guidance to support both Part 50 and 52 non-light water reactor applications. In the long term, staff will update the guidance as appropriate to support the Part 53 rulemaking.

Revision 0 of all ten draft documents was issued in May 2023 for public comment. And Revision 1 of the TICAP guidance was reissued in September 2023 for public comment. The current list of documents and how to access them can be seen on this table. In addition, it also shows the number of comments received on the various documents.

The documents with the most comments were the TICAP draft guide Revision 0 and Revision 1, followed by the ARCAP roadmap ISG, with 68 comments. The number of comments received is consistent with the importance of the documents because both the TICAP reg guide and the ARCAP road map ISG are foundational guidance documents.

During an advanced reactor stakeholder public meeting on June 7, NRC staff discussed the ARCAP and TICAP documents, specifically the changes from the White Paper versions to the current draft versions. This meeting includes presentations by both NEI and NRC.

Since it occurred during the open comment

period, staff also included information on how to provide comments during that discussion. This was followed by another public meeting on August 22 for stakeholders to discuss their comments.

Similarly, a public meeting was held on September 26 to discuss Revision 1 of the TICAP draft guide, which included additional guidance related to the construction permit PRA developments. And again, this meeting was held during the public comment period, and guidance was provided on how to provide comments.

All 20 of the documents we'll discuss today are publicly available in ADAMS. And in addition, there's a public webpage with all key guidance documents and of meetings.

This guidance is being developed to support non-light water reactors. Because there are many different technologies under construction, the current light water reactor focus prescriptive guidance was not sufficient.

The NRC aims to have guidance that is technology inclusive, meaning it will work for any reactor technology. And we're also aiming to have guidance that helps applicants identify the most risk-significant aspects of the design.

Finally, this guidance aims to have the end safety goals in mind instead of prescriptive paths to meeting those safety goals, hence the term performance-based.

In the near term, this guidance will support licensing of non-light water reactors that follows the licensing modernization project process under 10 CFR Part 50 and Part 52. All ten of these documents may be updated to account for final rule language of Part 53.

MEMBER ROBERTS: Rebecca, it's Tom Roberts. Can you speak briefly to advanced applicants not using the LMP? Are they still on Reg Guide 1.206 or the 1.70, or are there parts they would pick and choose from the new reg guide?

MR. SEBROSKY: Yeah, so this, my name's Joe Sebrosky and I'm the Senior Project Manager in the Advanced Reactor Policy Branch. The near term needs that we have right now that have been identified are for the X-Energy construction permit application that's going to use the LMP process. That's coming in in the spring.

And then the other one of the near term need is the Natrium TerraPower Natrium's project. That's also coming in in the spring.

Light water reactor applicants can choose to use the LMP process, but it's based on non-light water reactor applications. We don't know of any current light water reactor applicant that's going to pursue the LMP, so they would be following Reg Guide 1.206 for their applications.

In addition, there are some non-light water reactor applications that we know of that may not use the LMP, like Oklo. That they may end up using pieces of parts. There's for example the ARCAP road map ISG has Appendix B, bravo, that talks about applicability regulations to non-light water reactors. They may end up using that and then use a different approach.

But their approach would be discussed or the expectation would be discussed with the staff on their preapplication phase.

MEMBER ROBERTS: Okay, thank you. So the focus really is LMP. If you don't follow the LMP process, there may be parts you can pick and choose from, but by and large it's a case basis. Is that right?

MR. SEBROSKY: Right.

MEMBER ROBERTS: Okay, thank you.

MS. OBER: As you can see from the list on

the screen, ARCAP is broad in nature and intended to cover guidance for a wide variety of non-light water reactor applicants. While TICAP guidance for off-normal reactor states only, ARCAP encompasses everything needed for a license application.

The TICAP's scope is governed by the LMP-based process, which is written in NEI 18-04, Revision 1. NRC reviewed this document and endorsed it in Reg Guide 1.233 in June of 2020. To provide guidance on how to use the LMP, industry developed NEI 21-07, and Reg Guide 1.253 proposes to endorse this document with clarifications and additions.

So here's a chart that has been shown at many public meetings on ARCAP and TICAP, but it still provides a great holistic view of what is needed to license a non-light water reactor.

Please note that the Fitness for Duty Program, financial qualifications and insurance, aircraft impact assessment, performance demonstration requirements, Nuclear Waste Policy Act, and operational programs were added since this was last shown at an ACRS meeting, and that's in the orange box on the right-hand side.

MEMBER REMPE: I have a question. Where do you find combustible gas monitoring and control

guidance?

MR. SEBROSKY: So the combustible gas monitoring and control, and I'll look to folks that are on the bridge line to help me out, the LMP process would identify whether combustible gas and control is an important safety function.

So when you look at this slide, you see the licensing basis event analysis is in Chapter 3. That analysis would identify whether combustible gas and control warrants a safety-related function or is a safety -- a non-safety related special treatment function.

So depending on the outcome of the LMP process, it could show up in Chapter 6 or Chapter 7 if it's safety-related, or if it's non-safety related special treatment.

MEMBER REMPE: Okay, so if someone comes in and they don't identify controlled combustible gas generation as a critical safety function or whatever, I know we keep calling them something else. But one of the higher level safety functions. It probably won't show up at the licensing-basis event, and the staff may not identify that.

And then I'm just kind of wondering, because we saw one application where it just kind of

slipped through. And I'm just wondering how do we make sure the staff always is looking for that? I mean, if they don't have a zircaloy-based cladding, there are still ways you can have combustible gas generation. It may not be hydrogen, but you can have it.

I'm kind of wondering how one makes sure that the staff looks for that carefully in the guidance and the applicant knows to look for it a little more carefully than what we're seeing.

MR. SEBROSKY: Yeah, I understand the question, and it gets back to the fundamental belief in the process, the licensing modernization project process that it'll identify important safety-significant functions, both safety-related and non-safety related.

MEMBER REMPE: Well, maybe there ought to be a checklist of even though the applicant doesn't identify it as a critical safety function at the high level, that the staff goes through maybe four or five things, heat removal, heat generation, criticality, etc.

And maybe that ought to just be a checklist somewhere in the guidance. I mean, there may be some other ones I'm not thinking about that the

applicant may come up with. But it just seems like there ought to be a checklist that everyone things carefully about some known concerns, is where I'm coming from. Just a comment.

MR. SEBROSKY: Understand.

MEMBER MARTIN: Well, and then I will -- break out here. My pet peeve of hazards analysis. So certainly in the documentation that you all have created surrounding, you know, this reg guide and really the whole move towards risk-informed framework mentions hazards a million times. It's great. And risk a lot too.

But then when you look at the content of an application, it's kind of buried. And certainly in my experience, and I've done this for money before, hazards analysis is what creates these lists, right. And there are methods that are recognized in you know, really all industries.

But there's commonality to those methods that you'll find a lot of consensus among safety experts on that it -- while at an early stage these are qualitative type methods. That over, of course, the evolution of a design they can become more quantitative.

And they provide the evidence necessary to

support the downstream activities of safety analysis and the basis for design change and such. And rather than seeing something that pops up and, say, combustible gas, you know, if it showed up on, you know, implicitly on a downstream list, and then you think more to the example, you would say it's almost becoming prescriptive.

But rather, elevating the role of hazards analysis is -- would probably be more technology-inclusive with the expectation that these lists would be otherwise created by the applicant.

So my read of the draft reg guide, I see the statements. Of course I've already mentioned these 18 statements of hazards analysis. But in Chapter 1, there's a statement about you present the, you know, the design basically or rear design.

And the clause in the sentence there was "and its connection to safety analysis." To me that is the hazards analysis. That is the connection. And to not have a chapter like number 2 that is explicitly the hazards analysis, that there are rules to how to come up with that list, seems to miss the boat.

Because I think in any kind of deliberation on the integrity and safety of design, you had to pull the thread. It's that connection.

And everyone will say yes, the connection's there. But right now, it's bring your rock.

And understanding that maybe outside is relatively new to us, but in other industries there are pathways that are accepted and have commonality. And for us not to have some specificity as to what that looks like seems to lead to the high potential of inadequate applications.

And in the spirit of being inclusive, I think the most important thing is for the staff to receive quality applications that they can trace back to decisions that go back to a qualitative assessment section. And while it appears under the surface, it really needs to be elevated, because we're all about safety.

So it's a little bit of preaching. It's a lot of preaching. But how do you defend not elevating hazards analysis to a top-level chapter on this? It really should follow that Chapter 1 in this case.

MR. SEBROSKY: So I'll look to Marty, so Marty Stutzke, Bill Reckley, or Boyce Travis to add anything to what I'm about to say. So when you look at the importance --

PARTICIPANT: Check testing one, two, one,

two. Check, check, one, two, one two, one two. One two. Mic check.

MEMBER REMPE: Could someone --

PARTICIPANT: Mic check, mic check.

MEMBER REMPE: That's Thomas. Tom, is someone on the internet virtually like Matt or Vesna or Jose, can you confirm you can still hear us?

PARTICIPANT: We can hear you.

MEMBER REMPE: You can hear us?

MEMBER DIMITRIJEVIC: We can hear you, but we hear that track too.

MEMBER REMPE: Okay. That was Thomas. And I just wanted to make sure that you guys can still hear us.

Go ahead and continue with the meeting. I'm not sure what's going on, but I think we're okay. Go ahead.

MR. SEBROSKY: So what's being shown is the first eight chapters of the SAR, which is the LMP-based process, which relies on a robust analysis of the hazards.

And that's driven by the expectations for the development of the PRA and the defense-in-depth. And Reg Guide 1.247, which endorses the level 3 PRA methodology, is the process by which we rely on those

hazards being identified as part of the level 3 PRA.

There is a discussion, and Anders is going to be talking about in more detail about how the PRA results are placed in various chapters. But I understand the concern about ensuring that there is a robust hazard analysis and that it be captured either in the SAR or in the supporting documents for the SAR.

Marty, is there anything you wanted to add to that?

MR. STUTZKE: Hi, this Marty Stutke, I'm the Senior Technical Advisor for PRA in NRR DANU.

I would point that we had previously developed and presented to the committee our draft guidance DG-1413, which is the technology-inclusive identification of licensing events, which lists a whole number of techniques such as haz ops, FMEAs, etc., for identifying hazards and was developed specifically to address ACRS comments about the need to start with a blank sheet of paper like that.

However, DG-1413 is linked to the Part 53 rulemaking, so we're going to decide, we'll need to consider whether we want to issue it in advance of the rulemaking or whatever.

MEMBER MARTIN: I appreciate what you said there. The activity of determining licensing basis

events is different certainly from a hazards analysis. It does heavily rely on a hazards analysis. But the hazard analysis, well, just to leverage why Joy says, provides this list.

It's, you know, analogous to like in Reg Guide 1.203, right, where you have the accident safety analysis. You have a PIRT to have a step prior to actually doing the exercise of in that case deterministic safety analysis.

Or you have the experts come in and assess in analogous sense risk in a qualitative sense. And basically score the characteristics of the problem using heuristic methods.

And it applies here as well. It's just a higher level, and it's appropriate, not just because it drives requirements. But it's appropriate because of the precedent and past success. And of course not only I mentioned how it's being applied to other industries. But the Department of Energy, and they rely on it heavily.

And so for folks in our industry that have familiarity with the Department of Energy's process, I think you'll find a general appreciation for that step, not just as a step along the way, but as really the focal point of any kind of safety deliberation.

It is something that's easy to understand and you can get from there to anywhere in the safety case.

And I didn't criticize the fact that it's not mentioned. It's just not at -- it's just not given the attention. And really the attention means more specificity about what that looks like. I'm concerned that you'll get a light touch.

And of course a light touch would invariably have weaknesses. You'll spend a lot of time churning on the approval process. Applicant one will give you something, and applicant two will look completely different. Maybe in their minds, since they're, you know, they think everything is there.

Unless you prescribe something, leveraging, you know, not necessarily, not methods from industry. But to some extent from academia and you know. And when I say academia, something with some meat on it, not the really 50,000 foot kind of language you oftentimes get from industry documents. Which some of the ones that we were talking about here I would say fall into that category. Maybe 10,000 to give us credit.

But nonetheless, and I'm showing my bias of course, some deterministic thinking, but some compromise in that direction is a better path for

certainty in the licensing process. And that certainty comes down to a consistent example.

Anyway, my second preach. But I'm sorry.

(Laughter.)

MEMBER ROBERTS: Yes, Tom Roberts again. I have two questions, and probably this is the right slide to ask them. But for that, I was wondering, Marty made a great comment I think about Draft Guide 1413 and its applicability to 10 CFR Part 53.

Was there explicit consideration of that, since now this ARCAP and TICAP is being decoupled from Part 53 to revisiting the decision to -- when to hash 1413?

MR. SEBROSKY: So I guess the short answer is that's under consideration. If you look at the ARCAP road map ISG, you see that we have that draft guide listed as something that's under development that could potentially influence an update to the document down the road.

But we haven't made a determination on whether to put that in as part of the 50 and 52 update, or how we would take the ARCAP/TICAP guidance and adjust it for the Part 53 language once we get a Commission decision.

So if it's -- it's on the list and the

appendix, but at this point, we identified it as a potential update for a future revision. That's about it.

CHAIR PETTI: So we did, in our Part 53 letter, recommend that that draft guide be issued independently because we felt it was so important. It's this exact issue coming back again.

MR. SEBROSKY: Understand.

MEMBER KIRCHNER: Yeah, I think this is a good point. To the extent that a critic or a skeptic would look at this and say, well, you just reordered the deck from a conventional 50/52 application.

And yes, it's tailored to some of the aspects of LMP and the referenced NEI guide. But did that kind meat that Bob's talking about doesn't find its way in here, then you -- then the next step is then oh, okay, you -- then you put everything on that PRA and that somehow is inclusive enough that it identified all the hazards.

And if it's not, then -- completeness with the PRA and so on and the quality becomes an issue for some of the advanced designs that don't have the maturity and such.

So the hazards analysis is kind of a, I wouldn't call them deterministic, but it's a logical,

systematic way of making sure you've covered the waterfront, catch that combustible gas if that's a potential, and incorporate the good work that was done by you in that draft reg guide.

So I'll stop there.

MEMBER MARTIN: I'll try to answer. So in previous conversations, you know, with staff members and such and others, there is a feeling that maybe it's all there. Again, I don't like the fact that it's under the surface, but there's several reg guides on performing different sorts of PRA, right. Maybe it was eight, nine, I don't know, ten. There's quite a few.

And one way to look at it is that well, you're just going to do it all, you know. But there is no screening of that, which would otherwise come from your hazards analysis.

And in some ways, you know, an applicant comes in and they're just going, applicant still likes a prescription, despite what some people say. But people that do the work kind of do things by procedure.

And if they look at the list of reg guides for doing PRAs, they're just going well, I got to do reg guide this, this, this, this, you know, at

different levels. And certainly, I guess if you do everything, somewhere along the line you will have done the right thing.

But the hazards analysis, you know, it will prioritize. Which again, the same purpose of like a PIRT. It will screen things that are unnecessary. Maybe for whatever reason we don't need combustion again.

So you could get -- you could clear the air earlier on. And in an age where there's a lot of pressure to getting, you know, expedite reviews, but obviously with the integrity, you want a framework to support that.

And so, but if you're strict, you're probably okay. But I worry people won't be strict. And they don't, shouldn't have to be. And I think the solid hazard analysis, maybe myself, will go a long way towards making everyone's life easy. Not a preach, I don't think that's a preach. I'm not counting that one.

MEMBER HALNON: Just to be clear, though, what your position is now is that NEI 18-04, when you're going through the licensing basis event selection process, which is comprehensive, you're saying that that is going to look at all these

hazards.

If they're significant enough to the plant, that they'll be part of the licensing basis event selection, which will then play out later on in the process.

Is that essentially where we're at right now?

MR. SEBROSKY: That's correct.

MEMBER HALNON: Okay.

MR. SEBROSKY: That summarizes it. Did you want to add anything?

MR. TRAVIS: Yeah, so this is Boyce Travis with the staff. I think it's -- I think we understand ACRS's comment. And I think it's important to contextualize the role of what's being discussed here in the sense that's guidance for what goes in the application that gets submitted to the NRC, versus what's being done at a level below that in the work that's done on the design.

And so the staff's goal was to try and create some performance-based, technology-neutral guidance, and obviously that results in some -- simplifications isn't the right word. But we can't cover the waterfront of all the designs that are out there.

And so a lot of that goes into what's in the guidance in NEI 18-04 for the LMP process and what's in that red box in the middle of the slide that is work that's being done by the applicant and being looked at by the staff but isn't necessarily being reflected in the application.

MEMBER ROBERTS: So I guess I change the subject a little, but I had two questions I thought were probably worth asking on this slide. One is cliff edge effects. It seems like I couldn't I find any discussion of cliff edge effects in the reg guide, in the NEI 21-07 document.

And the real -- the question I found other than the LMP document itself was in one of the FAQ documents that talks a little bit about what that is. And it -- the way it's described is more of a deterministic process even though it's characterized under PRA.

So it just seems like that's a very important aspect of the LMP process. And how that gets rolled up in either the TICAP or the ARCAP wasn't clear to me. I was wondering if you could comment on where you'd expect to find that.

MR. SEBROSKY: So I'll take a crack at it. So one of the things that is a cornerstone of the LMP

process is the event sequences and plotting that on the frequency consequence curve. And there's an expectation that the uncertainties be considered as part of that process.

And I believe embedded in that in certainties are things like looking at the cliff edge effects. So I'll look to any member of the staff that's on the -- in the Teams to correct if I misstated anything.

MR. GILBERTSON: So this is Anders Gilbertson, Senior Project Manager on the NRC staff. I would just add that, you know, there are also as part of following the non-LWR PRA standard, there are attributes and supporting requirements in that standard that specifically address cliff edge effects.

And so, in that way it's very much, probably say this a lot, it's kind of baked into LMP, say invoked in the LMP methodology the use of the PRA standard.

MEMBER HALNON: Yeah, and I just, I've got the 18-04 in front of me. It's very explicit. But there's a question at the end that says, have you assessed cliff edge effects in the PRA. So it's very --

MEMBER ROBERTS: I think it's in 18-04.

I think it's pretty clear there. And there's an FAQ if you go search through all the supporting documents that industry put out. And it gives some clarification what that means.

What I couldn't find is where that would be. Would show up in the safety analysis reports. And how that would be used. For example, the new EPZ determination reg guide specifically requires consideration of cliff edge effects.

So when you look at what facts and scenarios are considered for EPZ determination, you have to go look in the, explicitly address uncertainties and cliff edge effects.

And it seems like the kind of the thing that ought to be bubbled up into a specified subsection of one of these documents so that you know where to find it and it puts out a clear expectation of what you expect to see in an application. That's my comment.

I agree with you, Greg, that it's in there. It's also when you get on the details of exactly how you do it, it's not entirely clear. But that's just that nature of, as Bob would say, hazards analysis. Maybe we have to get to the point of figuring out what is just outside of your expected

frequency of occurrence that really makes a big difference.

And to make sure those are accounted for in some of these, what I would call level 5 defense-in-depth type of assessments where you want to have appropriate consideration for, you know, everything failed, how do you protect the public. And so it just seemed like that's the kind of thing that ought to be more highlighted than, again, I can guess where .

But I would guess in the PRA discussion, because that's where it shows up in 18-04. But it is just a suggestion to bubble that up into something that's a little easier to find.

MR. SEBROSKY: Yeah, like a hazards analysis.

MEMBER ROBERTS: And my second question has to do with the, I guess more the number of chapters and the SSC descriptions. If a look at a traditional SAR, you're probably talking five or six chapters describing the fluid systems, the electrical systems, the I&C systems, the auxiliary systems.

And this condenses it into parts of two chapters, the safety-related, and what was the other one, the non-safety related with special treatment SSCs. And I was wondering if you've looked at what

that might lose in terms of context.

Because it seems like to understand why particular SSCs have been bubbled up to be safety-related, you kind of have to understand the whole plant and the types of SSCs that were not considered to be safety-related or the non-safety with special treatment just to have the perspective on what they do.

And when I look at the LMP, I look at the two definitions of what could be safety-related. One is the obvious things that mitigate accidents. But the other one is the things that prevent accidents from becoming a higher classification than how they're categorized.

So an SSC that keeps a, you know, a DBE from becoming an AOO, that kind of thing is also safety-related. And how the decision is made of what SSCs are in that class and not in that class of things that are there to operate the plant within the bounds of the safety analysis is the way I usually think of it.

It becomes clearer when you have all of the important SSCs described. I was wondering if you'd looked at that, because this seems like it condenses it quite a bit. And you may have missed

something in terms of the, you know, condensing.

So I was looking for perspective whether you've table-topped this or looked at examples of what comes out and what's left in the SAR by the time you get done with this prescription.

MR. SEBROSKY: So to answer your question, during the development of these documents, as part of the TICAP process, we did table-top four different designs.

The designs included the X-Energy design, the VTR, which is the versatile test reactor, which is a liquid sodium chloride design. A preliminary version of X-Energy to look at what a micro reactor portion of the SAR might look like. And then a molten chloride salt fuel reactor.

So we did do table-tops, and those table-tops looked at various parts of the SAR. It wasn't the complete -- each one had its focus on what it was looking at. And the results of those table-tops were reflected both in NEI 21-07 and in our DG-1404.

In addition to that, we've had preapplication discussions, both with Natrium and with X-Energy, on their table of contents, what it would look like. And we've been providing feedback to them during the preapplication phase.

So we have looked at both via -- through the table-tops and with the preapplication discussions with those two applicants what the various SAR content would look like using the NEI 21-07 DG 14-04 process.

MEMBER ROBERTS: And I suppose you would work with the applicants on how they applied the reg guide and the resulting opportunity to clarify or expand the content from the reg guides if what you find is -- is not. I was going to make sure they looked at.

Yeah, one example that occurs to me, getting specific, is like a rod control system, where typically that will be non-safety because you have an independent scram system. But the safety analysis may have assumptions on numbers of rod and rod speeds.

And if your system were, your rod control system were to fail such that the number of rods or the speed were to be greatly above what you assume, and maybe that would promote the accident from one category to another. And so that would push for the rocket hold system to be considered as a either safety related or not safe with special treatment.

So without that discussion in the SAR, it would be hard to see that as a potential issue. So that's the kind of thing I'm thinking when I made the

comment. It's just something that's worth looking at and making sure there's enough information to be able to make those informed decisions.

It sounds like you've looked at that as part of these table-tops? It probably needs to continue to look at that issue, apply this.

MR. SEBROSKY: Yeah, so I would say we've looked at it as part of the table-tops. And then we're actively engaged in pre-application discussions with both Natrium and X-Energy.

Ian Jung is going to add some more background on that.

MR. JUNG: Yeah, my name is Ian Jung, Senior Reliability and Risk Analyst. And I'm the overall technical lead for X-Energy.

So yeah, we agree that overall understanding of all the systems, how they behave and how they contribute to the safe operation of the plant. We understand that -- for X-Energy, we are undergoing readiness -- preapplication readiness assessment right now. And that we are actually looking at their draft preliminary safety analysis board.

Actually on the subject of those systems that may not be safety-related or non-safety related

with special treatment, we are having dialog and giving some feedback how those non-safety related systems are potentially needed to be understood within the context of the safety analysis.

Also with respect to certain regulations of course require describing certain SSCs to be a part of the SAR, safety analysis report, because depending -- regardless of the classification, you know just for example.

One more thing to add is that for PRA, when PRA does not start with a classification, right, it starts with a systems as a whole. So PRA, we expect the PRA to be modeling all these systems to the extent that it is meaningful for the safety of the plant.

In that regard, I'm sure there's going to be some assumptions regarding some of the non-safety related systems that may contribute to the overall risk profile and so on.

So their PRA standards requirements on how they screen those systems for making assumptions and so on. So in our guidance documents, there's, I think of our DG-1404, we expect the certain key essential assumptions on PRA to be described in that assumption.

Even those that are non-essential

assumptions, I think those may not be -- those might be also subject to staff's regulatory audit during the license process.

MEMBER KIRCHNER: Just to add to Tom's point, my sense is if you get an application and you just get information on what's in the box in the upper left corner there, and they've already screened out a number of systems, I suspect, because I've been watching what's going on with recent applications, you're going to in the audit process ask for a lot more information to backfill how you determined, you the applicant, determined that you could do a light touch on this. And I'm seeing it happening with the applications that you're actively considering.

And I'll not go any further on that, but I think that's what's going to happen in practice, Tom. Because you'll pull the string and you'll say well, how did you cut that one out and why isn't it described. Or why is it not important.

And I think what you're doing with it, recent applications with the audit process is much more efficient than just letting a lot of RAIs pile up.

So I am applauding what's going on, but I think -- we'll see when you actually try it with the

real applications, which is a lot more than a desktop exercise. And you start pulling the thread on classification systems in particular. We'll probably beg for a lot more information.

I'm just -- that's my intuition, and it's one member's opinion.

MEMBER ROBERTS: Yes, so I'm guessing there's a tradeoff between what information is pulled and therefore doesn't have to be maintained for the life cycle of the plant, what information is pushed. And then is definitely going to be provided and has to be maintained for the life cycle. Is that really what the tradeoff is?

MR. SEBROSKY: Yes. There's an expectation that the PRA needs to be continuously assessed and updated based on the information that you're getting from a plant.

But reliability and capability, if those key assumptions that you made in the PRA are different than what you see from the actual plant, the expectation is that the PRA would be updated. And if there's a change in the licensing basis events, that that would be something that would be brought forward to the staff.

So there's an effort that we have underway

independent of the application guidance called TIRICE, technology inclusive risk-informed change evaluation process, that after the plant receives an operating license, how do you ensure that you're continuing assessing the plant and reflecting that in PRA updates and potential changes that would need to be brought to the NRC's attention.

I'm looking to see if, Ian, was there anything you wanted to add?

MR. JUNG: Yeah, this is Ian Jung again. I'm looking at some of these new designs.

And I just want to share that overall simplicity of the design and overall expected risk profile of the plant, and the whole risk-informed and performance-based approach we are pursuing is based on our safety-focused framework that some might stay away from traditional prescriptive elements and provide the other performance-based framework with some flexibility.

And but the capability and reliability targets and then applied and those have to be achieved and managed and maintained. That's the framework we are in. Yeah, definitely it's just a balance.

If we wanted to be, we could be as prescriptive as light water reactors. But I think we

have an opportunity to help the industry applicants and execute the principles of risk-informed and performance-based.

And there's a whole set of requirements and expectations regarding maintaining the PRA, use of operating experience, and change management process, and so on. And we have to follow the principles and see how it goes. But I think our safety focus will maintain all the way throughout the process.

MS. OBER: Okay, so back to the slide. The red boxes now shown are what in ARCAP, part of Chapter 2 and Chapter 9 to follow the SAR and all other components necessary to license a non-light water reactor are now included. ARCAP also encompasses the information included in TICAP.

And now the red boxes are what NRC staff and contractors have developed or are developing guidance for. So there is certain guidance for TICAP and ARCAP documents.

The applicability has not been constrained to non-light water reactors because the major document, specifically NEI 18-04, NEI 21-07, and Reg Guide 1.233 are also limited to non-light water reactors.

All ISGs have a new footnote that any

light water reactor applicant should engage the NRC early if they desire to use LMP. There is now a clear delineation between applicant guidance and review guidance.

Finally, references to documents without complete NRC staff review have been removed. For those in-development documents that may result in revisions to the respective ISGs, we have added an appendix at the end to serve notice to that effect.

CHAIR PETTI: Just a question on the LWR footnote. Is it because there's additional requirements that LMP doesn't touch upon?

MR. SEBROSKY: One of the underlying concerns, first and foremost, if you look at 10 CFR Part 53 notes, the Subpart A, it's thought that that's an LMP-based approach, both for non-light water reactors and light water reactors. So we're eventually going to have to address that based on the Commission basis.

The underlying concern right now is we have a level 3 PRA endorsed for non-light water reactors, Reg Guide 1.247. For light water reactors, Reg Guide 1.200 doesn't go to the same extent. It's a level 3 PRA that you need to support the LMP process.

So trying to work that into the process at this stage is a little difficult. So that's one of the main reasons.

The suggestion, or the guidance essentially says if a light water reactor wants to use the LMP process, we encourage preapplication discussions. And one of the first things that we would probably asking is how are you developing your level 3 PRA.

MEMBER HALNON: One other quick question before we move on. The only thing I didn't see is any kind of discussion of decommissioning, and with these new reactors, it could get very complex on the decommissioning side. Is that later down the road, or is there any thought about at least give it some thought on the front end?

MR. SEBROSKY: Yeah, I think we deferred that for developing the guidance for Part 53, the decommissioning guidance, I don't know that we're, like you say, we're explicit in the ARCAP guidance as far as what's expected at the application stage relative to decommissioning.

MEMBER HALNON: Because you do have I think in the financial piece talking about making sure there's funds set aside. But what are you setting

aside funds for if you don't have at least a high-level strategy of how you're going to get this cleaned up?

So I know it's premature and it's probably not relevant to the initial applications coming in, but at some point there's going to be discussion demand on decommissioning, and how are you going to rid of some of this exotic high tech stuff that. Especially the transportable stuff that you want to take away and put some place.

MR. SEBROSKY: Understand.

MS. OBER: Okay, for the principal design criteria, TICAP guidance covers the criteria associated with off-normal conditions while appropriate ARCAP ISGs address the principal design criteria associated with normal conditions. And Reg Guide 1.232 provides additional guidance, and the ARCAP road map recommends discussion PDCs during the preapplication phase.

At this point, we're going to get into the TICAP-specific discussion, and I'll turn it over to Anders.

MR. GILBERTSON: Okay, thank you, Rebecca. Morning, everyone. Again, my name is Anders Gilbertson, I'm a Senior Project Manager in the DANU

Office of Nuclear Reactor Regulation. I have a background in risk and reliability before coming to DANU.

So today I'm going to be providing just a high-level overview first of the TICAP guidance documents. And then with a focus on getting to resolution of public comments on this document. Slide 15, please.

Okay, so as was discussed a little bit earlier, the overall goal of the TICAP guidance is to provide a technology-inclusive approach for developing the contents of applications as a matter of implementing the licensing modernization project methodology for LMP. And TICAP guidance is intended to promote efficient development and review of an LMP-based application.

As a matter of accommodating outcomes of implementing the LMP methodology, the structure of the SAR resulting from these TICAP differs from the traditional structure, as we've talked about earlier already. And different as it relates to this SARs structure for a light water reactor based on the standard review plan. And I'll go into that a little more detail in the next couple slides.

Just to sort of set the foundation here,

the scope of the TICAP guidance is sort of necessarily governed by the LMP methodology, which is defined by the three major processes for establishing licensing basis events, or the licensing basis. And that includes identification of licensing-basis events, the classification of SSCs, and establishment of special treatments for certain SSCs, and determination of the facility that's in the SSCs.

In addition to being risk-informed and performance-based, I wanted to note the LMP methodology is a PRA-led approach. So the PRA features very heavily.

And the optimal endpoint of the development of the PRA using NEI 18-04 is a PRA logic model that addresses all sources, all hazards, all plant operating states. And that is comprised of the full analysis of all scenarios, starting from initiator and ending with radiological consequences. That's all consistent with the scope of the non-LWR PRA standard.

However, when using the LMP methodology and two-step licensing process, it's understood the PRA will necessarily be something less than the optimal endpoints at the construction permit stage, given the maturity of preliminary design information.

As such, it's important to establish the minimum needed for the acceptable PRA supporting an LMP-based construction permit application in order to help determine how the staff would make findings under 10 CFR 50.35(a) and other related construction permit regulations.

So the subject of this guidance is, this is developed in Appendix B to DG-1404, Revision 1.

CHAIR PETTI: So I had a, just a high-level question, and maybe you'll get to it in later slides. Because it was really hard for me when I read Appendix B to figure out if the PRA that, let's call it the P-PRA, like the PSAR, right. And then there's an FSAR and an FPRA, to keep it simple.

That the information that you're requesting at the CP stage is commensurate with the state of the design. What it looked to me like is that you went into the PRA standard and kind of just binned the requirements. Do I need them at the CP stage, do I need them at the final, the OL stage.

What I didn't see was any sort of discussion about why is that requirement, you know, why can you put that in the CP bucket, as opposed to the F bucket?

I mean, did you guys do something where

you convinced yourself that there would be the right information at the CP stage? So you weren't over-asking.

That's what I was -- I couldn't get a sense of that.

MR. GILBERTSON: Yes, we did perform that process. I will talk about that in a couple of slides, so, yes. If you are happy to -- Yes, I'll wait till we get to there.

CHAIR PETTI: Okay.

MR. GILBERTSON: Okay. So we are on Slide 16. Okay. So this is a good diagram to show. This is relevant to some of the discussions we've already had.

Like I mentioned, given the prominent role of the PRA and the LMP methodology, much of the information in Chapters 1 through 8 of the SAR dictated by TICAP are either directly or indirectly related to or derived from the PRA in one way or another.

So because the TICAP dictates a new structure through the SAR different from the SRP we developed a sort of, we call this affectionately our "Where is Waldo" map, if you will, graphic to help us understand where the risk information and PRA-related

information can be found in the first eight chapters of the SAR.

So we have already been talking about more generally where other information can be found, but this was focused primarily on PRA information and was a graphic that the staff showed at some earlier public interactions on development of this guidance. Member Martin?

MEMBER MARTIN: I wanted to comment on this. I have always had a problem with the shuffle of the deck and you've got to pick your battles, right.

I've already identified one, so -- so I have rationalized that the first four chapters, all right, that's the analysis, right, but once you get into, you know, three, four, you incorporated content and understanding of a safety function, line criteria, safety classification.

Designs go through design cycle. Invariably these things get considered. You really -- well, following DOE's, you know, process and other processes, and I'm sure there are others, your safety classification comes after your hazard though, so it comes very, very early on and through the cycle, of course, you iterate.

If you had not put that arrow between

three and five and just left it at that I probably wouldn't have even spoke up, but I think it communicates the wrong thing here because you cannot get to three and four without already having gone to five, six, seven, and eight, even though we could all say, well, it's done in conceptual preliminary design.

Those things factor because your design has -- There has already been assumptions on how it's going to solve certain safety concerns and incorporating, you know, you might say, you know, you want to get away from deterministic as a word, but deterministic design is a thing.

We do single failure analysis, vulnerability, we design for diversity and redundancy. That is our practice and, of course, you don't want to go that way.

Maybe in the spirit of, you know, risk-informed and PRA in some elegant manner, you know, you want to say it just falls out of, you know, the function of form, exercise, design. The engineering of a design that captures five, six, seven, and eight and gets that into your licensing basis, that matters.

So I wanted to ignore it and just say, all right, one, two, three, four, that's your op-level safety analysis and everything is in the appendix, you

know, or you do it the other way around and you put five, six, seven, eight and all that and then you put your license, you know, all the other stuff in the back, but the top of the deck is less of a, you have less passion for.

I worry that there is this idea that things just fall out of, you know, the design process and I just distinguish design and engineering as two separate things.

You design for form and function and you engineer for a purpose. Five, six, seven, and eight is your purpose that matter. Before that it is a design process.

So it confuses me outside of my one rationalization why it's ordered in this way because you cannot get to three and four without spending a lot of time in all the other chapters.

CHAIR PETTI: But, Bob, this is how the application goes. You're reflecting it off through the designer lens.

MEMBER MARTIN: I know.

CHAIR PETTI: The fact that iterates behind the scenes is really not the NRC's concern, right. I mean what I liked about this is that it allowed a focus.

This is too much information that has to be presented and I would argue that the old content of application, the traditional way, it can be very opaque depending on how it's written and who writes it and that this would allow a greater safety focus to get you to what NRC really cares about.

We understand that it doesn't flow lineally in terms of how it's done. Behind the scenes, you're right, there's huge iterations, but how do you best present it so that the reviewer can get the information they need in the most efficient manner.

MEMBER MARTIN: Right.

CHAIR PETTI: And, okay, I am pontificating because it's in my draft letter, but I think this does this better than perhaps the historical approach.

MEMBER MARTIN: Sure.

CHAIR PETTI: So I understand, you know, your --

MEMBER MARTIN: Invariably though aren't you in say drafting the application in these chapters saying, all right, this decision was made because of something that you'll see discussed in Chapter 5, 6, or 7.

When we talked about it the other day at the A&S conference and, you know, I was picking on the use of defense in depth and uncertainties and its role in addressing uncertainty, and I could go on, yes, but presenting defense in depth aspects of design and its addressing of various uncertainties and safety analysis and your answer was basically, oh, you know, you wanted to see, you know, the content in the discussion of the design that addressed the safety issue and I said, well, you know, oftentimes you begin with the analysis and then you have to then go the other direction, you know, from the analysis into design.

It seems like the design discussion is getting pushed back. Like I said, maybe I could live with it if that line wasn't there and that when you have --

(Simultaneous speaking.)

CHAIR PETTI: Well, again, that line is not there in the application. That's a graphic.

MEMBER MARTIN: That is a graphic, but in the write-up for section, you know, three and four and probably in the other ones it's invariably going to say, you know, look at Chapter 3, or Chapter 5, Section such and such for, you know, more information

or, you know, and on and on and on.

There is going to be a lot of cross reference, or there should be a lot of cross reference.

CHAIR PETTI: I think of it as kind of an unfolding, right, like a fault tree, right, you're coming down and you're into three, okay, and then you've got to, there is going to be a path that's going to take you into five and six or into seven and eight as it unfolds and it has more detail.

I mean, yes, to put it all in one chapter would be horrendous, so --

MEMBER HALNON: Dave, your point, this is not the design process. This is the location of information in the SAR.

MEMBER MARTIN: Thanks.

MEMBER HALNON: So I agree with you. I am sitting close to him so he can slap me, but it worked for me because I can see where if I had a licensing basis event and I wanted to see how the systems were going to work it I would go to the right and not iterate back, so --

MEMBER MARTIN: So I come with a deterministic link here. From the standpoint of your PRA it lays out, but once you go to the step of doing

your licensing events, identify your AOOs and DBEs and beyond design basis, et cetera.

You have brought in, you know, more of, you know, more of the deterministic thinking that shapes the safety case or that aspect of the safety case and that is the guardrails that are your safety class SSEs and your design criteria.

You've shaped it, because, of course, it appears, you know, through that interim process. I find it would be confusing. Again, without that line there and thinking five, six, and everything else is an appendix, I would know as a professional, you know, that in an AOO the basis for, you know, whatever, you know, whatever event that you put in there probably has been influenced by the statements that probably appear somewhere else in the SAR related to safety classification, et cetera, et cetera, et cetera.

But if I am a reviewer it would be really hard to pull a thread, you know. So I just see it, you know, again, bias on the deterministic side of, you know, my experience.

I do find a lot of value, a lot of value, in the tool sets that, you know, the risk-informed performance-based approaches offer, but I really see there is more about the synergy of the two that's

going to be effective and ultimately expedite, you know, progress with the new reactor.

Yes, I am getting philosophical, but like I said I think what's going, what you will want to have, you want to have a lot of cross reference here to understand, but I don't see how three and four happen without all the other ones, which is why you have Chapter 15 and Chapter 19 where they sit, you know, they come at the end.

It's safety analysis, you know, and Part 50 and Part 52 has been a design verification activity, right. We present chapters, you know, you address it by the critical safety function, right, or at least the barriers, the fission product barriers, right.

You have your payment, you know, 2.3, you have fuel, four, RCS, five, you know, engineering is Function 6, I&C, you know, I can, I'll say testing, but I don't remember all these sort of things, but you get the whole design story up front with the old model and then, of course, then you lead into 15 with safety and tech specs, you know, 16 which naturally follows from that, and then 19 covers all the -- of course, it was after the fact, you know, in the history of this thing. It lays out in a very deterministic world --

MS. CUBBAGE: Bob, this is Amy Cubbage, NRC staff. I work for Steve Lynch. I would just like to reiterate that, you know, the staff is going to do a holistic team approach to this review.

We are not going to be diving up these little piece parts, so the team is going to be looking holistically at the whole application and not little pieces at one time.

I do think in the interest of time we probably do need to move on because these issues have previously been adjudicated before the ACRS and we need to get to the resolution of comments.

MEMBER MARTIN: Doesn't a statement like that kind of short circuit the independent role of the ACRS? Anyway --

(Simultaneous speaking.)

MS. CUBBAGE: I mean feel free to keep discussing it, I am just looking at the time.

MEMBER MARTIN: I appreciate that comment, but, like I said, it's a secondary issue for me but I do think it does create misconception about where things are in the process. I think it's important to the staff on the review of these things.

So I appreciate what you're saying. If you are all professionals and you all have, you know,

30 years' experience it won't be a problem, but the reality is you don't have that.

CHAIR PETTI: I'm sure they cross, Rob, the old application of contents against this to make sure everything is covered from a completeness perspective.

MEMBER MARTIN: I won't say it's not covered, it's just that it doesn't flow.

CHAIR PETTI: It's in a different way.

MEMBER MARTIN: It just doesn't flow.

CHAIR PETTI: Well it doesn't flow in your sense, but from an LMP sense I look at this and go I understand why it is the way it is --

(Simultaneous speaking.)

MEMBER MARTIN: -- of the reactors that have been produced and gone the old way, so, I don't know.

CHAIR PETTI: And we have two going this way.

MEMBER REMPE: Safety-related SCCs do flow out of the analysis with LBE, the old GA way is where I was coming from. I have a different question, to change the subject, which maybe might be good.

Anyhow, I am confused about the term of "fundamental safety functions" and "required safety

functions," and so I actually went back to the NEI document and to me it looks like the required safety functions are kind of like a subset of the fundamental safety functions. Is that your perception?

MR. GILBERTSON: Yes. I mean I think that's a way of looking at it. It's these are, the required safety functions are what are sort of materially implemented through the PRA to achieve this higher level fundamental safety function.

MEMBER REMPE: So if I am a reviewer is there some sort of guidance that says for every fundamental safety function there better be a required safety function, at least one or two that support that fundamental, because I was confused why you needed the two terms, but, okay, if NEI wants to do that that's fine, but it seems like from the NRC staff's perception you ought to be cross checking to make sure that there is consistency because it's kind of puzzling.

If it's a fundamental safety function it seems like it ought to be required, too, you know, or vice versa. I don't know, it was kind of interesting that it was kind of just skipped over like everybody should know and check to make sure.

MR. GILBERTSON: One way that I would look

at that personally is that I think maybe the fundamental safety functions are more to address the entire spectrum of the design process.

So it's that notion that you are starting from the conceptual aspects of the design and the facility. So the clean sheet respected, I have to do these things, these fundamental safety functions, contain, cool, and control.

MEMBER REMPE: There also ought to be control chemical reactions, not just reactivity control. That's again -- I guess I'm hung up on that topic and all.

There is not a list, so you're kind of telling me, oh, fundamental safety functions are everything we always need to think about but you have limited it to the traditional four --

MR. GILBERTSON: Right.

MEMBER REMPE: -- not things that might come up with non-LWRs. So, again, I just want to make sure that, it seems to me that the designer can say, oh, this doesn't apply to me, but maybe they need to have that list or has an analysis to keep up or something, but you're saying, oh, it's a higher level fundamental list that everybody must do.

I don't see that anywhere. I think that

the applicant gets to propose their critical safety functions or fundamental ones and then they have required safety functions to meet those fundamental ones.

MR. GILBERTSON: Yes.

MEMBER REMPE: So I think there needs to be a cross --

CHAIR PETTI: So what struck me when we have the X-Energy briefing is chemical reactivity, which has been in every HTGR sort of LMP thought process from the beginning, isn't one of their required safety functions.

That is because in their mind it is outside of the licensing basis, at least as they see it down to their cutoff frequency. So the fundamental may be sort of in the abstract and then they go through the process and if it falls below the cutoff frequency then I guess it's not a required a safety function. It surprised me because I didn't anticipate that.

MEMBER REMPE: The connection is not well documented and --

CHAIR PETTI: I didn't anticipate it.

MEMBER REMPE: -- so I think somebody needs to write something down to say, you know, what

is expected here and how to coordinate, and I didn't see that.

Maybe it's there and I missed it. There was a lot of material we were supposed to read for this meeting.

MR. GILBERTSON: Okay. That's -- We appreciate the point, really conductive, and I will take that back.

MEMBER REMPE: Thank you.

MEMBER KIRCHNER: Anders, just a minor point, I find that your color coding is somewhat confusing and I'm not sure it adds a lot of value to this.

I am looking at it, like source term, description of the PRA, well the source term doesn't come out of the PRA. That's a quasi-deterministic derived source of fission products, et cetera, et cetera, or it comes out of, you know, a MELCOR calculation or however you choose to define the source term.

So saying that's a part of the description of the PRA seems to me -- It's a minor point, but, you know, the results of the PRA, well, to me the results of the PRA are not just the LBE summary but things like beyond design basis accidents and so on and

events.

I don't know. So if there is some intent to that color coding I've lost the bubble, but that's a minor point.

MR. GILBERTSON: Okay. Yes, as far as the source term is concerned I think, I mean I would relate that more to the mechanistic source term aspects of the PRA.

MEMBER KIRCHNER: Yes.

MR. GILBERTSON: So at which, you know, there is a whole set of analysis and requirements, so I think that's why we designated it in that regard. Okay.

Okay, so moving on. So just to kind of get back to the overall point. This diagram was meant to assist the staff and starting to lay this out. It's a bit of a -- I wouldn't say this is a final sort of set in concrete, you know, characterization of these items, but at least it served to facilitate discussions earlier in that process and really it was also to help us just organize our thinking and how we were developing the guidance.

Okay, Slide 17, please. Okay, so along the same lines, this diagram was sort of very much the same function. This was a diagram that we had

developed where we wanted to really get a high-level view of the overall implementation of the LMP methodology as it relates to the two-stage licensing process under Part 50.

Again, this helps, you know, organize the staff's thinking about what is needed for the minimally acceptable PRA for the construction permit stage and how that is informed by the LMP methodology.

And like it's been discussed before, the LMP methodology is very iterative and so there are feedback loops, aspects of those feedback loops that are not necessarily represented here, but, again, this is a much higher level overview.

One of the main sorts, or takeaways I guess you could say from this diagram was helping the staff to understand the substance of boxes "golf" and "hotel" and those relate to the items that we would expect to see in the construction permit application and generally what might go along with the issuance of the construction permit itself as a matter, again, of understanding what does the PRA need to do, understanding that LMP is a PRA-lead approach, and that the information at the construction permit stage is preliminary in nature. Okay, Slide 18.

MEMBER KIRCHNER: Anders, before you go

on, just quickly, I am trying to implement your guidance here based on the viewgraphs. Maybe that's not the right way to do it, but it's a nice diagram that you've put up.

Why wouldn't you have a description of the PRA in the CP issuance? I am just -- I am not trying to nitpick and do viewgraphs, but if indeed you fundamentally are building this on the PRA, you had a preliminary description of the PRA at the CP stage. I don't understand it.

MEMBER HALNON: That's the first bullet response. The first bullet in the description of the PRA and results.

MEMBER KIRCHNER: Right. I am misreading it. I'll get new glasses. I just need new glasses. Sorry, go on. Oh, I was looking at L versus --

MEMBER HALNON: It said CP application. That's G.

MEMBER KIRCHNER: Okay.

MEMBER HALNON: Raised at CP issuance.

MEMBER KIRCHNER: Yes.

MEMBER REMPE: Yes.

MEMBER KIRCHNER: Okay, go on. Go on, Anders.

(Simultaneous speaking.)

MEMBER KIRCHNER: It's there. Thanks, yes.

MEMBER HALNON: You can read that?

MEMBER KIRCHNER: That I can read. Okay, thanks. Sorry, Anders.

MR. GILBERTSON: Okay. No, not a problem at all. Okay, so the next couple of slides I really just want to kind of hit on some of the key points of the guidance in DG-1404, Revision 1.

This really is going to more specifically relate to the guidance in Appendix Bravo because that's the new material since Revision 0 of DG-1404.

The first point I just wanted to focus on was that, you know, the guidance in DG-1404, Revision 1, is meant to compliment the guidance in NEI-2107, Revision 1, to provide additional information on how to demonstrate the acceptability of this construction permit PRA.

It's not intended to increase the burden on or create any new requirements for the content of application. I will get into a little bit later as well as a matter of some of the comments in making this distinction between guidance on achieving the acceptability of the construction permit PRA and what's needed for the content of applications.

So the first point, major point, that I wanted to make is, again, the guidance in DG-1404, Revision 1, this is Appendix Bravo, it addresses all sources, all hazards, plant operating states, and those should all be addressed in the construction permit application like we showed in the previous diagram and they need to be dispositioned.

Now what we mean by that, dispositioned, is that it's one of the four items essentially shown in this sub-list here, sub-bullet list, it's either modeled directly after the PRA logic model, it's addressed via a screening analysis, so it's excluded from the PRA logic model with some justification, it's accounted for using risk-informed supplemental evaluations, or they are accounted for using design basis hazard levels for those hazards other than the internal events.

So that's what we mean as a matter of addressing what the scope of the construction permit application itself and how one might meet the requirements under 10 CFR 50.34(a), this is what we are thinking about as a matter of implementing the LMP methodology.

As far as the PRA logic model itself, the expectation is that to implement the LMP methodology

at a minimum that model needs to represent the internal events at power reactor PRA logic model because that is really what serves as the foundation of the overall PRA that would be developed for the further implementation of the LMP methodology.

Looking at this and setting this as our threshold, it was understood that this would help demonstrate the applicant's ability to develop an acceptable PRA logic model.

Again, it establishes this foundation upon which all of the other PRA models are expected to be built for all of the other hazards.

The last point here that I wanted to make is that having internal events at power for the reactor in your PRA logic model, that may be acceptable for what we are trying to achieve at the construction permit stage, but we want to note that only achieving that minimum scope for the PRA logic model there may be benefits of the LMP methodology that are not yet fully realized at that point.

So we recognize that, that there is a difference between those two objectives, but as a matter of understanding how the staff arrived at their findings for 50.35(a), this was the guidance and this was our purpose of developing this guidance so we can

provide this to applicants.

Slide 19, please. Okay, and the other points I just wanted to make are that the importance of performing a self-assessment for the PRA logic model, the screening analyses, and the risk-informed supplementary evaluations is quite high.

These, you know, performing the self-assessment helps reduce the need for an in-depth staff review of those items so that they can focus on the assumptions and other sources of uncertainty associated with those analyses.

Now a self-assessment does not need to be a peer review per se at the construction permit stage, we fully acknowledge that, but if a peer review were performed there is guidance in NEI 20-09 and that's been endorsed in Reg Guide 1.247 by the NRC staff.

So the overall point is that some sort of self-assessment would be highly beneficial for us to understand that there was essentially some sort of check on the applicant's work. Now --

DR. SCHULTZ: So how do you anticipate evaluating the peer review which in itself reviews a person's -- an external peer review?

MR. GILBERTSON: Okay. So --

DR. SCHULTZ: Because an organization has

just amazing PRA capability and they're going to be peer reviewed, or has it been done?

MR. GILBERTSON: So I think ultimately that is going to, that's going to be on a case-by-case basis. You know, a self-assessment can essentially be -- the applicant can define for themselves what their self-assessment is.

There is some guidance in NEI 20-09. That is really more set in the context of preparing for a peer review, so there are insights to be gained from that guidance probably, but we would be, you know, interested to know things about, you know, was there some sort independence associated with the self-assessment, for example.

DR. SCHULTZ: Yes. Do you anticipate to establish early on what that peer review is going to entail? In other words, you would not like to see an applicant come in and have you find that more peer review or a different review is going to be required. I think it should be established up front and how it's going to be done.

MR. GILBERTSON: Yes. I don't know that we are, that we were necessarily planning to do that. I think that understanding that at the construction permit stage it's one more aspect to help the staff

understand what they've done.

So if they -- that we would -- the staff would ask for more of a peer review or a more in-depth, I don't know that that is, that's really the ultimate purpose of the construction permit stage.

As a matter of helping the staff establish their confidence to make the 50.35 findings, looking at how an applicant has performed the LMP process and gaining confidence in their ability to perform that process versus, you know, how absolutely correct the answers may or may not be at the construction permit stage, that understanding of how it was done and our confidence in their ability to do it is perhaps a little more important to us.

So I think that's where the self-assessment helps to provide that confidence, but we're not -- I wouldn't see the staff as looking at that and making a judgement of, well, this was done incorrectly, your self-assessment that you propose, we don't think that's correct or that's, you know, it's what we received, it's a piece of information and we look at that to evaluate.

DR. SCHULTZ: That's fair. Thank you.

MR. GILBERTSON: Okay.

MEMBER KIRCHNER: Well, as Steve is

probing you on this, I think it's a good point. Because you don't want this to be a confident theme in the sense of how confident you are there are good PRA practitioners. You really want to have confidence in the design. And the PRA should flesh out important safety aspects of the design. I think Steve's point is a good one here.

DR. SCHULTZ: Well, you stated it right, Anders, what you want to is understand and validate the capability that's being performed. And obviously that has a lot to do with the results of the overall evaluation of the design. But given that the PRA is fundamental here --

MEMBER KIRCHNER: Right.

DR. SCHULTZ: -- it's really important to have all of those discussions early on in this as it can be. So it's the group of reviewers that are going to be engaged in the review process. Everyone has a good feeling about what's happening on both sides of this.

MEMBER KIRCHNER: Yes.

DR. SCHULTZ: -- both the applicant and the reviewers.

MR. GILBERTSON: And I think that's a fair point, something we can take back. I think developing

guidance for what the staff would look for in that self-assessment, that could be challenging for sure, understanding that we get close to a suggestion of what is correct or not correct.

I understand that the desire to get to that point, that offers certainty for sure. But that's a difficult point to get to, I think.

DR. SCHULTZ: I'm not so much interested in providing guidance, having the early on interactions --

MR. GILBERTSON: Okay.

DR. SCHULTZ: -- knowing that level of competency we spoke about.

MR. GILBERTSON: Yes, understood. Okay.

MEMBER REMPE: Just a little nit, one question that is helpful when I've looked at these things over the years is to say, can you tell me how the design changed based on your PRA and how the risk profile changed? I remember one of the applications we reviewed in the past that show how the risk profile was going down based on design changes.

And again, I worked for a company many, many years ago where I used to laugh about the transient design because of the PRA and all of it. So yes, those kind of questions ought to be probed. And

I don't know, it seems like something to think about.

MR. GILBERTSON: Understood, yes. And we have put some thought into that, understanding the iterative nature, how much we need to understand about how that was constructed but ultimately, you know, getting to the end point of what does that mean to inform how we're reviewing what they actually submitted, and as a matter of arriving at our finding. So yes, I agree that that's important.

There are any number of ways they could do it. Like we were talking about earlier, the LMP process is very iterative if you lay the processes, the three main processes side by side at the table. You try and map things across, and when somebody might be doing this, and then they're doing this, and jumping back and forth, what their starting point is. That is important to know. Obviously, at the end of the day we're looking at what they submit. Thank you. Okay.

MEMBER DIMITRIJEVIC: Sorry, I just want to add something important. You also have, you know, the requirement for acceptability of probabilistic risk assessment, you know, as defined now in Appendix A which is like an equivalent for your support of what is in Reg Guide 1247.

So there is a requirement for acceptability, the applicants have to prove that their PRA is acceptable, right. And now the only question for you is how do they do that. You know, how do they satisfy Appendix A of your, you know, 1253?

MR. GILBERTSON: Yes, I would agree with that, how do they do that? And beyond that, how do they implement that tool as part of their decision process in implementing LMP?

Okay. I'll go ahead and move on. So understanding -- so the outcome of following the guidance developed in Appendix Bravo to DG-1404, Revision 1, should be a preliminary, complete set of licensing-based events and SSC classifications provided in support of the construction permit application.

Now I just wanted to also note that completeness of these items relates to, again, consistency with the preliminary design information which may have varying degrees of maturity in the construction permit stage and will help inform, among other things, the applicant's determination of the risk metrics and comparisons with the QHOs.

And understanding that the PRA, at the construction permit stage, subsequently will continue

to mature leading up to the operating license stage, the guidance addresses the need to provide a plan for maintaining and upgrading the PRA during construction and finalization of the facility design.

So the staff, you know, gaining and understanding of how an applicant tends to do that is certainly important. And one of the examples here that we note is, for example, a seismic design basis hazard level that is ultimately to be replaced, or expected to be replaced with a seismic PRA at the operating license stage.

Understanding how they would make that transition as it relates to actually performing construction, when is the, for example, when is the PRA updated, what thresholds need to be crossed to require, in their minds, that the PRA be updated, that would be important for us to understand.

And of course, CP holders are always encouraged to keep the NRC staff advised of changes to the completion plan for the PRA that wouldn't be expected to significantly affect the design of the facility.

Slide 20, please. Okay, so now what we're here to discuss, the comments received in the staff's resolution thereof on DG-1404, as Rebecca previously

mentioned, the staff conducted two separate comment periods wherein 73 comments were received on Revision 0, 30 comments were received on Revision 1 of DG-1404, and just a light was shown in that larger table on a previous slide.

The majority of the comments that were received were on the ARCAP and TICAP guidance documents. So again, that sort of impresses some of the greater interests in those documents.

So the next few slides, I'm going to provide a summary of just some of the notable comments and staff responses to those comments. Obviously the details of these comments and responses can be found in the documentation that was supplied in advance of this meeting.

The first item I wanted to talk about was removal of some clarifications and additions related to principal design criteria. So this was based on a comment noting that the staff position, c.6.a-1, it doesn't appear to provide any new guidance beyond what's in NEI 2107. And the staff agreed that there was some duplication. It's really the overall point of mentioning this.

And so in that example and other places we looked to find where we could eliminate some of that

duplication. And we found some places.

We removed a staff position addressing these risk informed performance based approaches other than the LMP methodology. This was based on a comment noting that the related staff position that was cited is not needed, because it's outside the scope of NEI 2107, because NEI 2107 doesn't address non-LMP applications. So again, we agreed that was out of scope, really just wanted to focus on the LMP applications.

Slide 20, oh, 21. Sorry. Okay. So another, I guess, a series of comments that we received related to guidance for manufacturing licenses and standard design approvals. So this is -- the comments noted that the guidance really only provides two options for demonstrating how a facility would meet certain construction permit regulations under Part 50.

So the staff acknowledged that the scope of NEI 2107 was just limited to COLs, combined licenses, design certifications, construction permits, and operating licenses. So accordingly, we revised Reg Guide 1.253 to remove the direct references to manufacturing licenses and standard design approvals processes.

And, you know, so ML and SDA applicants are always encouraged to engage in pre-application interactions with the staff if they seek to use NEI 2107, Provision 1.

Consistent with the staff's resolution of these comments, we did not adopt any of the recommended changes related to manufacturing licenses and SDAs.

Slide 22, please.

MEMBER DIMITRIJEVIC: This is the one thing that I didn't really understand. What is special about an SDA that they couldn't be included in this guidance? I mean, why there are exceptions?

MR. GILBERTSON: Joe?

MR. SEBROSKY: So the concern is, when you look at NEI 2107, it does not address manufacturing licenses and standard design approvals. So there's a gap there in that the underlying reg guide doesn't address manufacturing licenses and SDAs.

We were asked to provide additional guidance in the draft guide or in the reg guide when it comes to manufacturing licenses and SDAs. And we felt it was somewhat inappropriate to provide that guidance without the endorsement document, you know, 2107, providing that information.

We think there is a potential to revise, in the future, the guidance, both NEI 2107 and Reg Guide 1253, to include a discussion about manufacturing licenses and SDAs. For now, the thought is that if a manufacturing license, or an applicant, or an SDA applicant, wants to use the process, we urge them to come in and talk to us.

We believe at a high level that the design certification guidance is something that can be used to help with those pre-application discussions. So the short answer to your question is we didn't want to get out and fine 2107 for now.

MEMBER DIMITRIJEVIC: Okay, understand, thanks.

MR. GILBERTSON: Okay. So Slide 22, additional changes, we removed or we moved some of the references to supporting guidance from Reg Guide 1.253 into the ARCAP roadmap ISG. This is based on comments noting that informing to secondary references, that is not directly related to the endorsement of NEI 2107 and could substantially expand the documentation needed in the SAR.

So while we understand the point there, and the references may be useful information, the staff agreed they're not directly related to the

endorsement of 2107. So since the ARCAP roadmap ISG already provides similar types of references, and is really the more appropriate document for that, that's why those references were moved over into that ISG.

Another notable change, the entirety of what was Appendix Alpha in DG-1404 was removed. So this was related to resolution of the previous item relating that the purpose of Appendix A in DG-1404, Version 1, essentially became obsolete.

So again, the references to documentation and guidance that's being developed was more appropriately put into the ARCAP roadmap ISG. And as a result of that, Appendix Bravo to DG-1404, Revision 1, was promoted to Appendix Alpha in Reg Guide 1.253.

Slide 23, okay, so some changes resulting from comments on Revision 1, so again, this is really primarily going to relate to the guidance on PRA acceptability for the LMP-based construction permit applications.

The staff added language to indicate when a position relates either to achieving PRA acceptability, PSAR documentation on PRA acceptability, or archival documentation on PRA acceptability.

And this was in response to a comment

noting that the scope of the guidance in Appendix B, the DG-1404 was one, is inconsistent with the content of the scope of NEI 2107.

The staff considered this, and we acknowledge that there was a potential to create confusion regarding what needs to be done for the PSAR as it relates to PRA acceptability. And the guidance on PRA acceptability was not intended to convey any additional requirements on PSAR documentation that are already provided for NEI 2107.

To that point, the staff do consider that documentation needed to demonstrate the acceptability of the PRA and how PRA acceptability is achieved. Those two items are really intimately related in the same way that NEI 2107 addresses what is needed in the content of applications as well as how to develop that content.

So the next point, the staff revised Position Bravo.2.2 in Appendix B to DG-1404, Revision 1 to align with language used in NEI 2107. And this relates to a comment that the proposed staff position regarding documenting key assumptions, that that should be deleted. Because it's not necessary and goes beyond NEI 2107.

So the staff included this position as a

matter of emphasizing guidance in NEI 2107, Revision 1. And we ended up revising it to -- or we plan to revise it to state that such assumptions will be identified in the section of the SAR to which they apply.

So this staff position is meant to provide additional detail on identifying assumptions made in performing the PRA expected to be essential to the LMP-based safety analysis. And again, it's not to be construed as imposing additional requirements on the documentation of what are referred to as essential assumptions in the PSAR.

Additionally, the staff added some language to clarify the use of the term PRA. This was based on a comment expressing that the guidance contradicts itself regarding the use of this term. We saw that and recognized that there was some ambiguity there, and we rectified that.

And like a few slides ago, I think it's Slide 18, there was this box that I provided that sort of provides a little curly bracket showing those first three sub-bullet items. That's what we're generally referring to when we say the PRA. And that's consistent with how it's referred to in NEI 2107. And in cases where we specifically mean to refer to PRA

logic model, we've indicated as much in the guidance.

And then we reviewed some of the -- or the tables of applicability of supporting requirements, and we revised some of the designation for those supporting requirements. This was based on comments identifying that some of the designations potentially go beyond what can be accomplished at the construction permit stage.

So Member Petti, to your earlier question, the staff did provide -- or we performed the process in the PRA standard for identifying the applicability of supporting requirements that are tailored to your application. We did this with an understanding that we would expect to see a range of design maturities at the construction permit stage.

So while it's fair that one applicant or another may have more or less design maturity, and they may or may not be able to meet the requirements as we've designated them in the table, that's okay.

And the point was really more for those tables to just help facilitate, maybe do some of the legwork a little bit for applicants and say, look, this is where the staff are at right now. But this is not concrete, they're not acceptance criteria. They're not for conformance, or they're not required.

Slide 24, please. Okay, so now I'll just go over some of the comments that resulted in no changes. Regarding not expanding the scope of the guidance to accommodate light water reactors, we received comments that the guidance in DG-1404 should be extended to LWRs because NEI 1804 and 2107 are technology-inclusive.

And we've touched on this a little bit earlier. Because of the nature of the PRA standard that is invoked through NEI 1804, and the fact that there is sort of a dichotomy between PRA standards for light water reactors and non-LWRs, we felt that it was appropriate to maintain our scope just looking at non-LWRs.

And of course, like Joe had mentioned earlier, LWR applicants that would seek to use the LMP methodology, they're always encouraged to discuss their plans with the staff so that we could understand how they might attempt to adopt the non-LWR PRA standard, if that were the case, or some other process, some other guidance documents.

Which it's notable that the LWR PRA standards, while they're not fully developed to address the same scope as the non-LWR PRA standards, they are in the process of completing that work and

will soon have that.

Let's see, okay, Slide 25, please. Okay, so finally, this will be my last slide. We received some comments that certain staff positions, the Bravo 3.1.1 and 3.1.2 that relate to the risk metrics that should be determined, that this is already essentially covered in NEI 2107.

The staff chose to retain the staff position as it is, because of the potential for the language in NEI 2107 to be interpreted as only requiring perhaps a narrative description of the subject risk metrics.

So in that regard, the act of determining these risk metrics is meant to imply there's a broader set of information that should be provided about those risk metrics and that would be considered, such as preliminary quantitative or qualitative determinations of those values, of their risk metrics, as well as how they compare to the QHOs at the construction permit stage, and how they would meet the QHOs at the operating license stage.

The next point, regarding the meaning of addressing all sources, hazards, and plant operating states, we received a comment that, in part, indicates the idea that a PRA would address or include all

sources, hazards, and plant operating states is incorrect. Because some of the items may be screened out deterministically.

So the staff's response to this emphasizing, again, addressing all sources, hazards, and plant operating states, means identifying and somehow dispositioning them. So that includes potentially screening items out from inclusion in the PRA logic model. So we felt that was effectively already addressed in our guidance.

Regarding the notion that the LMP is risk informed, not risk-based, there was -- the same comment that I just referred to, it also talks about the LMP methodology being risk informed, not risk-based.

But together, there were a couple of other parts of the comment that, when you read it together, it can be construed to imply that addressing all sources, hazards, and plant operating states would make the LMP methodology risk-based somehow.

We wanted to -- we didn't make any changes to our guidance, but we offered a clarification on this in our response, that we disagreed with that characterization. LMP is never risk-based.

The PRA features heavily, but it is not a

primary tool for making decisions. There's always the other processes, especially for a defense in depth adequacy evaluation. So that's much more along the lines of a risk informed decision making process and consideration of many elements.

And then there was a comment that related to the staff's use of this phrase, full LMP implementation. So the comment expresses that the phrasing is inappropriate. There's no criteria for characterizing what full implementation of the LMP methodology means. And we do agree with that, there are no criteria.

However, the staff's purpose of using that phrase has emphasized that while the minimally acceptable PRA logic model described in the guidance may be acceptable for the construction permits application, like I mentioned before, there may be benefits of the LMP methodology that aren't being realized.

So it's really just an acknowledgment also that this sort of -- the optimized end point for the PRA logic model, as discussed in NEI 1804, is full scope, addressing all hazards, sources, and plant operating states.

And there was another comment that related

to the notion of meeting high level requirements, supporting requirements, and related staff positions on PRA acceptability. And the comment really just points out that the peer reviews generally don't involve meeting specifically the high level requirements from the consensus PRA standard.

The staff's response emphasizes that, as a matter of determining acceptability of the PRA, we'd look for whether the related staff positions are met, as in Reg Guide 1.247.

And those staff positions in Reg Guide 1.247 are written to be analogous to the high level requirements in the ASME/ANS non-LWR PRA standard which is, of course, only one way to meet the staff positions. And so the high level requirements in the standard are effectively met by virtue of meeting the underlying supporting requirements for them.

And finally, there were some scopes that the staff deemed to be out of -- some comments, I'm sorry, that were deemed to be out of scope. And these included a request to develop tables for light-water reactors analogous to the supporting requirement applicability tables. So that's clearly out of scope, but the staff did take that for broader internal deliberation.

And again, another comment making the guidance applicable to LWRs in general, there was a request for an extension to the comment period and another comment that related to the use and endorsement of consensus codes and standards as it relates to legal requirements.

So again, the details of all of that are provided in the documentation. So with that, that concludes my portion of the presentation. And I will hand it off to Joe Sebrosky.

CHAIR PETTI: At this point, we need to have our break. So I propose that we take a 15-minute break and go into recess. We're going to have to move faster. We only have -- so, ten minutes, 10:45.

MR. SEBROSKY: When we did the dry run on this, it was about two minutes per slide on the TICAP. It's about one minute per slide on the ARCAP. So it should go ---

CHAIR PETTI: We're hoping the ARCAP will go faster, yes, based on that.

(Whereupon, the above-entitled matter went off the record at 10:34 a.m. and resumed at 10:45 a.m.)

CHAIR PETTI: Okay, we're back in session, folks, 10:45. Joe, it's yours.

MR. SEBROSKY: My name again is Joe Sebrosky. I work in the Advanced Reactor Policy Branch. So the purpose of this portion of the presentation is to provide a high level overview of the nine ARCAP ISGs, and also discuss the comments that we received that led to changes in the document and comments that we received that we determined that a change was not needed.

This slide is consistent with a previous slide that Rebecca showed. If you look to the right where it says additional portions of the application, I know it's kind of an eye chart, but the reason I brought it up is this is essentially the table of contents for the ARCAP Roadmap ISG.

So you would see the first full chapters of the SAR with pointers to various ISGs. And then after the SAR discussion, the first full chapters of the SAR, the first thing you're going to see is tech specs, technical specification or guidance, which is going to point to an ISG. But the flow of this is consistent with the flow in the ARCAP roadmap ISG.

The other thing I wanted to mention that's in this slide is there's four appendices that are in the ARCAP roadmap ISG, Appendix A, Alpha, which is the pre-application guidance. This is something that was

previously included in the ARCAP roadmap ISG that we previously briefed the committee on.

There have been some adjustments as a result of both management and our legal reviews, and also as a result of the comments that we received. But the main portion of the document is something that was previously briefed to the ACRS.

Applicability of regulations to non-light water reactors, this Appendix Bravo, the last time we briefed the ACRS we only referenced a white paper. We had a place holder for Appendix Bravo. And we essentially said that we intend to take the white paper that was publicly available and place it in Appendix Bravo. So if you compare the white paper to what's in Appendix Bravo, there's not many changes. But it is a new appendix from what we previously briefed the ACRS on.

Appendix Charlie, the construction permit guidance, that was included in the previous document that we briefed the ACRS on.

Appendix Delta is new. It's the draft documents under development that may lead to future changes to the guidance documents. That's where you'll find a reference to DG-1413 that we talked about earlier.

So this slide went into the ARCAP roadmap comments. There were 68 comments that were received. It represents the second-most comments that we received, as Anders mentioned, the ARCAP roadmap ISG and the TICAP Reg Guide or foundational documents. So it's expected, it wasn't a surprise to us that this received the second-most comments.

Changes that were made because of the comments, we expanded the applicability of Appendix B to manufacturing license applications. So it previously talked about the requirements for design certs, as an example, combined licenses. But it left out, in some of the tables, manufacturing licenses. As a result of the comment, we added applicability of regulations for manufacturing license, non-light water applications.

We deleted a reference to the Facility Safety Program. That is not a requirement in 10 CFR Part 50 or 52. It was a placeholder for guidance for 10 CFR Part 53 which has, in the proposed rule, a Facility Safety Program. We removed it. We believe it's premature at this time. We're waiting for a Commission direction on 10 CFR Part 53.

We expanded the guidance on leaks from coolant systems to specifically address leaks from low

pressure systems. So when you look at the ARCAP roadmap ISG, it had references in it to high pressure leaks that you see from a standard review plan, Chapter 3.

One of the questions or the comments that we received was some of the non-light water reactor designs don't operate at high pressures. We need to provide guidance for low pressure systems.

So what you see in the guidance now is, you know, there's an expectation that, for such designs that are low pressure, environmental effects of fluid leaks on structure systems and components in the vicinity of the leak should consider factors such as fluid temperatures, corrosive effects, flammability, and radioactivity.

When it comes to principle design criteria the guidance for the principle design criteria was expanded to include a statement that each applicant is responsible for identifying the need for additional principle design criteria that are not informed by the LMP process. LMP process is for off normal conditions. There's principle design criteria associated with things like normal effluence that wouldn't come from the LMP process.

In this slide, we added a discussion on

operational programs. There was additional guidance that was provided to supplement the guidance associated with plant programs that are derived from the Licensing Modernization Project. So you'll see in the diagram that Rebecca showed earlier, that Chapter 8 includes plant programs that are relied on to support the LMP outcome.

What we did as a result of the comment is we provided additional guidance that applicants should review Appendix B of the ARCAP Roadmap ISG which is the applicability regulations. And if there are operational programs that are required because a particular regulation is applicable, and it's not picked up by the LMP, the expectation is that applicant would identify those.

Several items, as Anders mentioned earlier, several items were transferred from the TICAP regulatory guide to the ARCAP Roadmap ISG, because they're not part of the LMP process. For example, consideration of generic safety issues was an expectation that that be provided in the SAR. Our discussions are that's not something that the LMP would pick up. So we moved it out of the TICAP guidance and the ARCAP guidance.

(Audio interference.)

MR. SEBROSKY: Okay, sorry. Is this any better?

Okay. So that's the discussion of the changes that we made to the document as a result of comments that we received. Requested changes that were not incorporated we talk about on this slide and the next slide.

The staff did not add a statement that consensus codes and standards take precedence over the regulations. The NRC has not adopted a process for automatic endorsement of consensus codes and standards as suggested by the comments that we received.

The staff did not remove the guidance that the design information related to items such as translation of design basis hazard levels to loads on structure, systems, and components and the evaluations of those loads be included in the SAR.

The NRC did not agree with the comment and believes that -- does not believe that it's sufficient for an applicant to simply identify the hazard for which design measures have been implemented as suggested by the comment.

Slide 30, additional discussion of comments that were not incorporated, we did receive a comment on the ARCAP Roadmap ISG to remove Chapter 11

in its entirety, because the commenter believes that the information is not needed to support an NRC staff finding of reasonable assurance of adequate protection. We did not agree with that.

The NRC did not agree with the expanding the guidance for all the ISGs for light water reactors. That's an issue that we all touched on, as Anders mentioned previously. So that's the ARCAP roadmap overview and discussion of the comments.

I'll move on to Chapter 2 which is site information. So the LMP process does not provide guidance on evaluation sites. So ARCAP ISG Chapter 2 is very similar to the structure that you would find in SRP Chapter 2 for light water reactors. It provides guidance on the scope and approach for selecting the external hazards which must be considered.

The selection of the external hazards is to be informed by a probabilistic external hazard analysis when supported by available method status, standards, and guidance. So there's a discussion that if it is not supported, then a deterministic evaluation is appropriate.

Chapter 2 limits the amount of information that needs to be provided in the SAR to that necessary

to establish the design basis external hazards. If you look at SARs for operating reactors, you'll see that some of the key information in Chapter 2 is retained, but most of the information is labeled as historical, because it's only done once.

So there is an expectation that the information in Chapter 2 of the SAR will be limited in nature with the supporting information either submitted on the docket or available by audit (phonetic).

Chapter 2 refers to existing site evaluation guidance reg guides where appropriate. And it's fundamentally based on 10 CFR Part 100, Subpart B requirements. There were 12 comments received on Chapter 2.

Changes made because of the comments, we revised the frequency of occurrence of nearby industrial transportation material, military facility hazards to be considered in the design to be consistent with the existing guidance, and you will see it in redline strike out in the documents. There is a section that talks about -- that was removed that discusses event sequences of five in ten million initiating event frequencies.

We removed that and retained the guidance

that one in a million is appropriate if the data supports that, which gets to the second bullet to allow the use of a combination of probabilistic and deterministic methods to select external hazards.

There was a discussion in Section 2.6 about the need to perform a comparative, competitive, process for information on slope stability. That was thought to be unnecessary and was eliminated as a result of the comment.

The requested changes that were not incorporated include the development of a standardized process for screening out external hazards. There is two guidance documents, one that's draft, and one that's finished as final, that do lay out a process for screening out external hazards.

The one that's been listed that has been issued as final is guidance on volcanic hazards. There's a discussion in there about how an applicant may be able to screen out volcanic hazards for its site.

And then in a draft guide for flooding hazard assessments, there's an Appendix K in the draft guide that discusses the process for potentially screening out a hazard, the flooding hazard. So in our comment we, comment resolution, we referenced

those two documents. But we did not adopt the standardized approach for all hazards.

The next --

MEMBER DIMITRIJEVIC: I'd like to just ask you about the Chapter 2. So on the parts of Chapter 2, you know, that the methodology summarizes, because now chapter 2, it actually has everything in, you know, that will be put separately for comments?

MR. SEBROSKY: I'm sorry, I'm not sure I quite understand the comment. So there's a Chapter 2 that comes out of the LMP process --

MEMBER DIMITRIJEVIC: Okay, so it's --

MR. SEBROSKY: -- and that's different.

(Simultaneous speaking.)

MEMBER DIMITRIJEVIC: -- Chapter 2 which is the SR, right?

MR. SEBROSKY: Yes. So there's a Chapter 2, if you go back to the previous figure that Rebecca showed you'll see, coming out of NEI 2107, a designation of the chapters that are based on the LMP approach. And I think Chapter 2 is methodologies out of the LMP approach.

MEMBER DIMITRIJEVIC: Right.

MR. SEBROSKY: What we determined is we needed a chapter on site information, because the LMP

process does not address the site characterization. So Chapter 2 of the ISG is very consistent with Chapter 2 of the light water reactor standard review point. So if you look at Chapter 2 out of the LMP process, it's titled methodologies, and analysis, and site information.

MEMBER DIMITRIJEVIC: Right.

MR. SEBROSKY: But it doesn't -- you see that, if you went back to that slide, you'll see site information as an asterisk. And the asterisk points to ARCAP ISG Chapter 2. And I hope that makes sense.

MEMBER DIMITRIJEVIC: Well, I have to think about that again. So okay. All right, I can look at that differently.

MR. SEBROSKY: So the next chapter to talk about is Chapter 9. So when you look at the ISGs that we developed, for the most part they're outside of the LMP process. This is an example, Chapter 9, control of normal effluent site contamination and solid waste.

The LMP process is for off-normal conditions. So Chapter 9 is analogous. If you look at the light water reactors in the review plan you would see the same type of information in Chapter 11. We, for Chapter 9, applied a performance-based approach for the level of detailed information

provided in the SAR related to control of routine plant effluence, and plant contamination, and solid waste.

When it comes to changes that were made because of comments, we provided additional discussion for Chapter 9 on content for design certification, standard design approvals, and manufacturing licenses to identify the kinds and quantities of radioactive materials to be produced, and means for controlling and limiting radioactive effluence, and how the design will minimize contamination and control gaseous and liquid effluence produced during normal operations. So we added that discussion.

And we also provided a caveat that programmatic information may be addressed in the COL application and not addressed in design certs, standard design approvals, and manufacturing licenses.

The guidance also allows for an alternative approach for providing detailed system descriptions by requesting exemption requirements if it can be demonstrated that compliance with 10 CFR Part 20 can be established through a performance monitoring program.

Additional discussion was added on what information would be needed to support such an

exemption to confirm that the design features and programmatic controls effectively limit the release of radioactive effluents.

So when it comes to the changes that were not incorporated, these were all recommendations. So I believe the guidance, the commenter interpreted as related to Draft, Part 53. We believe it's clear that for now the ISG is for 1552 applications.

We did not delete the guidance directing applicants to provide a summary of estimated doses. We believe that's important. There was a comment to remove what was perceived to be prescriptiveness and only referenced industry standards. We do not agree with that comment.

And we did not remove references to the NEI template documents that the commenter suggested. We believe those NEI template documents that were approved by a SECY evaluation are important when considering development of the content for Chapter 9.

Chapter 10, similar to Chapter 9, is for normal operations. It provides guidance on occupational doses. Again, if you look for an analogous section in the SRP you would find this in Chapter 12 of the light water reactor standard review plan.

For Chapter 10 it implies a performance-based approach for level of detail in the information provided in SAR. There were no changes that we made to the document because of comments. We only received two comments on the document, one of which requested that the guidance be expanded to include light water reactors which, again, we don't intend to do at this time.

The other comment included a statement, without requesting a change, that as low as reasonably achievable concepts would, from their perspective, they don't believe that was included in the guidance that we have in Chapter 10.

We believe it is. The NRC staff doesn't agree with the interpretation that Chapter 10 does not include an expectation that the design include as low as reasonably achievable. We believe it's pretty straight forward to us.

Chapter 11 on organization and human systems interaction, I'd like to turn it over to Jesse Seymour to go through these slides.

MR. SEYMOUR: Okay Thank you, Joe. My name is Jesse Seymour. And I am an operating licensing examiner, human factors, technical reviewer in the NRR Office of Licensing Human Factors Branch.

I was one of the NRC staff that worked on the development of ARCAP Chapter 11 and more recently on the resolution of public comments, which I worked on in concert with Dr. David Desaulniers, who is our senior technical advisor for human factors in NRR.

I will be providing a brief overview of the scope of Chapter 11 along with the changes that we've made and related comments that we took into consideration.

Next slide, please. As an overview, ARCAP Chapter 11 draws upon the existing standard review plan where it's appropriate to do so. But where it is appropriate, it also adapts that guidance to make it technology inclusive versus it being light-water reactor centric.

A portion of Chapter 11 provides guidance regarding the construction and management of operating organizations in a manner that parallels that of NUREG 800, Chapter 13, but in general it does so at a higher level that still covers a comparable scope in areas like staffing, training, qualifications across the organization.

There is also an underlying assumption that advanced non-light-water reactor applicants coming in under Parts 50 and 52 will need to navigate

applicability issues from some regulations while also needing exemptions from others. So this is addressed as relevance within the scope of those requirements.

A key example of this is licensed operator staffing where the exemption process of NUREG 1791 is explicitly called out.

Importantly though, there is no treatment of either remote or autonomous operations within this guidance. And in that sense Chapter 11 remains geared towards what we would typically consider to be more traditional concepts of operations, and those that we are more likely to encounter in the near-term.

Additionally, a number of lessons learned from recent staff experiences in both the Vogtle combined license and NuScale design certification are incorporated also. This includes staff takeaways concerning the cold licensing of operators under plants under design certifications, context and also COL context, and those are incorporated into the guidance.

` Finally, the guidance also includes means for evaluating the adequacy of human factors considerations within an application as well as whether human factors engineering related post-TMI requirements have been appropriately addressed.

Next slide, please. We carefully considered the public comments that we received for Chapter 11 and coordinated with both INL and the Division of Advanced and Non-Power Reactor staff to disposition those.

In some cases, we determined that changes were warranted. The changes made in response to comments included primarily adding references and clarifications for the areas that are, you know, summarized here on the slide. So, again, pointing back to existing guidance that could be used within the existing SRP where it was appropriate to do so. Again, some of this is at the higher level organization for construction management in the operating organization, things that would typically hold true in a technology neutral manner and providing some additional regulatory clarifications there as well.

The changes made in response to comments, again, primarily referenced clarifications. We determined that changes weren't warranted in response to the remaining comments beyond that. And those are listed on the bottom out there. And I will talk about that.

In general, we assess that the material in

question in some cases was already adequately clear. Where some comments were suggesting the removal of material, we assessed that removing the material wouldn't be consistent with fulfilling any needs to provide regulatory guidance. So, again, by taking some material out, you actually make things less clear and more difficult to navigate in our assessment or because separate processes already exist to address the given issue that was covered by comments. And I want to highlight that last bulleted item, in particular, which is in that vein.

Within the context of our proposed Part 53 work, we did develop a revised approach to on-shift engineering expertise that offered some enhanced flexibility over the traditional shift technical advisor.

For the purposes of ARCAP, more broadly, Part 50 and 52 facilities, we have not engaged the Commission regarding any proposal to make generic changes to the existing shift technical advisor framework. However, that being said, on a case by case basis, Part 50 and 52 applicants and licensees could certainly propose different approaches to the shift technical advisor. And we would continue to consider those proposals on their individual merits.

In some cases, this may involve the need for us to engage the Commission due to policy implications, as was the case with NuScale and the revised plant topical that we discussed before the committee a few years ago.

So, again, you know, that's a matter that we intend to continue to address on a case by case basis as it comes up within Parts 50 and 52. But we are not proposing any type of a generic modification to that traditional STA approach. And that's all within the context of that final comment that's there.

So I wanted to pause and just see if there's any questions before I turn it back over to Joe. Yes?

MEMBER BIER: Yeah. I do have a couple of quick questions or comments, one that's really more kind of editorial than substantive. In the discussion of the process for exemptions, there is kind of a heavy reliance on the NuScale example to illustrate that.

And, you know, if this document is still in effect 10 or 15 years from now, NuScale may not be top of mind for the people who are reading it. So I would just recommend that we change -- that that gets changed to say something like, you know, if you want

to have, you know, more reactors per operator or, you know, fewer people in the control room or whatever as concrete examples rather than you could do what NuScale did kind of.

So that's just an editorial suggestion that may, you know, help for clarity of the document.

The other question -- I mean, you mentioned that this is currently tied to 50 and 52, but that there is kind of some thought or what would happen if and when Part 53 is in effect. Have you thought about how generally licensed reactor operators would be covered here and would it be by exemption or would your revise the document to officially allow it or how would that be treated?

MR. SEYMOUR: So with regard to general licensed reactor operators, and this is a really fascinating, you know, discussion just from a kind of procedural standpoint, what we proposed within Part 53 was to create a separate class of reactor facility where that would apply. And that was done largely for staff support reasons because under the Atomic Energy Act, you have to have uniform conditions of licensing operators across the various classes of reactors.

For the general licensed reactor operator, as the name would imply, it's a much different form of

licensing, again, general. And when you compare that to the specific licensing that is used for ROs and SROs, it would be legally very challenging to try to create a carve-out that lives within Part 50, 52 and 55, where that could exist.

Now that being said, and this is something that we've shared with, you know, stakeholders we have in the pre-application space, you can take a senior reactor operator, and you can request modifications via exemption to the licensing process into some of the scope of an existing senior reactor operator and still individually license them. And that flexibility is there.

You know, hypothetically, you could have a senior reactor operator power a reactor whose licensure and training program more closely resembles a research and test reactor. I mean, that's within the realm of possibility if, you know, the safety case was there for that, you know, again, their role in the fulfillment of safety.

So through our mechanisms that are there that are viable within 50 and 52 and 55, they get you almost the way there. But, again, you know, having that difference in licensing is difficult, unless you have a distinct class of reactor.

MEMBER BEIER: Thank you. That's helpful.

MR. SEYMOUR: If there's nothing else, I'm going to turn it over to Joe.

MR. SEBROSKY: Thanks, Jesse. And this is Joe Sebrosky. The next item to talk about is ARCAP ISG Chapter 12 on -- it should say post-manufacturing construction inspection testing and analysis program.

So Chapter 12, if you looked in the standard review plan for Part 52 applications, you would find this material in SRP Section 14. But the difference is for Chapter 12, it covers both construction permits and operating licenses as well as Part 52 concepts like ITAAC, inspection staff's analysis of acceptance criteria.

It's broken into two phases. So there is a Phase 1, which is pre-fuel load. And if you looked at the Part 50 construct, you would see that that covers up through the construction permit, but prior to the operating license. But Part 52 construct, it would go up to the fuel load or the 52.103(g) finding. And, again, the 52.0103(g) finding, if you demonstrated the ITAAC had been met under 10 CFR Part 52, you could receive the fuel load.

So the construct of Chapter 12 as a Phase 1 approach, which is prior to fuel load and then it

talks about the expectations for SAR content to cover that area and then post-fuel load, which includes after the operating license is issued or the 52.103(g) finding is made.

So the idea when you look at the pre-fuel load test program, that's expected to be discussed in the SAR. It would support the issuance of an operating license if the initial test program is unsatisfactory under 10 CFR Part 50 or the authorization load fuel SAR includes ITAAC.

The second bullet differentiates, as indicated, it differentiates between Part 52 and Part 50 applications that aren't required to include ITAAC.

The third bullet just is a bullet that shows where the requirements that describe pre-operational testing can be found for both Part 50 and 52. It provides guidance as I indicated earlier prior to fuel load and then provides guidance under Phase 2 on what should be described in the SAR when it comes to initial start-up testing up to and including power accession testing.

MEMBER HALNON: So, Joe, before we get into the comments, I just had one as I was reading through this. I'm trying to go down the work of these reactors be placed in this world. And the thing that

it's a high probability that they will be placed in very harsh environments, either deserts or places that could be dark for two hours a day or those types of things.

I didn't see any real pointers to making sure that the mission, that the support system's heating, ventilation, lighting, those types of things critical to the mission of the operators and potentially security and other areas is looked at to make sure that where it is being placed is compatible with those support systems.

That was the only thing I could find that I really was wanting after all of these.

MR. SEBROSKY: I understand. So just to repeat back, the guidance to the extent that the reactor is placed in a harsh environment, we would want to see a test program that ensures prior to fuel load or after fuel load as part of the initial start-up testing that it's going to work in that harsh environment.

MEMBER HALNON: Yeah. The support systems are adequate for those areas that -- because a reactor in Central Ohio will be different than the support systems needed for Northern Alaska and taking a standard design and say I think I'm going to put it

from here to there may not be adequate. I know you see that other places in the application process in making sure support systems are able to support whatever safety functions they're doing.

But when I got through all of this, I thought about, well, how will those work? Is there enough lighting? Is there enough HVAC to support the mission? And I don't know if it has to be a test program or at least a mention that just ensure that the support systems are adequate for your testing, something to that effect.

So think about it. I'm not saying that it's a deficiency. I'm just saying that's what I felt like I was -- if I was a reviewer I would want to have some push to look at that portion of the plant.

MR. SEBROSKY: I understand. Thank you. So on this slide, Slide 45, the changes that we made because of the comments, we changed the title from post-construction to post-manufacturing and construction to reflect in some aspects of the initial test program and/or the ITAAC inspections test analysis and acceptance criteria could be completed at the manufacturing facility.

We clarified that the COL holder has the responsibility for verifying the completion of ITAAC

including verifying the ITAAC that were completed at the manufacturing facility have been maintained.

We clarified that for a construction permit application, the content of the initial test program descriptions can be limited in scope to the Phase 1 or pre-fuel load inspections testing and verification that would be required under 10 CFR Part 50, Appendix B. Such content would include a description of the scope objectives and programmatic controls associated with the pre-operational test program.

We removed a reference to review committee and replaced it with guidance that the application should include a discussion for establishing a defined set of qualified operating and technical plant personnel to review, evaluate and disposition the inspections test and verification results.

The changes that were not incorporated included the staff disagreed that additional information regarding ISG Sections that applies to construction permits is needed because from the staff's perspective, we believe there is sufficient guidance for construction permit applications.

The next ISG to talk about -- so you'll see there are three ISGs that are outside the

construct of the SAR. This one is one of them, in-service inspection, in-service testing. The next one I'll be talking about is an ISG on technical specifications and the last one, fire protection for operations.

So the ARCAP in-service inspection and in-service testing, ISG is based on the use of a plant specific PRA to identify the structures, systems, and components to be included in the programs.

The ISI guidance is based on the use of these two ASME Boiler Pressure Vessel Code sections that are provided on this slide in the sub-bullets, Section 11, Division 2, on the requirements for reliability and integrity management and then Section 3, Division 5, for high temperature reactors.

The IST guidance is based on the existing in-service testing program approach with additional guidance for passive components and notes that ASME is developing a new OM-2 code for in-service testing of components in new and advanced reactors, including non-light-water reactors.

So one of the things that the IST discusses when it comes to passive components provides guidance for things like heat pipes that you don't see in the light-water reactor operating fleet. It again

uses plant specific risk information to determine the scope of the IST.

There were 43 comments received on the ISI/ISG so it's the third most comment we received on the documents.

So changes that were made because of comments we noted or we added that applicants can use ASME in QA1, quality assurance requirements for nuclear facility applications implementing Section XI, Division 2, guidance. This is consistent with the Reg Guide that was recently issued, Reg Guide 1.246, which endorses ASME Code Section XI, Division 2.

We allowed the use of unissued consensus codes at the construction permit stage provided they are officially issued prior to submitting the operating license application and provided design finality is not being requested on any portion of the design affected by the OM-2 codes. And we allow applicants for multi-module plants to provide standard ISI and ISG programs to each module without having to develop separate program approvals, provided the modules are identified.

MEMBER BALLINGER: This is Ron Ballinger. I think -- while this OM-2 code is being developed, there's another code call Fitness for Service-1, which

is an ASME extensive code, at least mention it.

MR. SEBROSKY: I understand the comment. I will take that back and talk to ISI and ISG folks in our group.

Of the requested changes that were not incorporated, the staff did not want to make a discussion of the process to be followed when the in-service inspection program identifies that degradation has occurred.

The NRC staff believes that the guidance in the ISG supplements, the guidance found in ASME Section X1, Division 2. The NRC staff disagreed with removing the discussion on passive components because the staff believes the topic is not specifically addressed by ASME and the topic is important for some of the designs like the heat pipe example that I provided earlier.

The NRC staff did not believe additional guidance for graphite and composite materials are needed to be included in the scope of the in-service inspection guidance because the staff believes that is an implicit part of the licensing modernization project process which should identify whether the graphite and certain materials in their design warrants an in-service inspection program.

So the next ISG to talk about is the one for technical specifications. The reason that we developed the ISG for technical specifications is when you look at the 5036 criteria for tech specs, it needs adaption to correlate to the analysis and output from the LMP-based approach described in 18-04.

So when you look at this guidance, you will see tables in it that talk about the requirement from 50.36. And then it maps it to the outcome from the LMP process.

The guidance also addresses content for the tech spec administrative control section and recommended tech spec format.

So changes that remain because of the comments, we added reference to NEI 18-04, the section that addresses risk metrics that are different from -- excuse me, core damage frequency and large early release frequency metrics for use in developing limiting conditions for operation and completion times. Molten salt fuel reactor or damage frequency doesn't mean much.

We added guidance for technical specification information. That should be included in the preliminary safety analysis report based on the requirements found in 10 CFR 5034(a)(5).

If you look at that requirement, there is an expectation that the probable subjects of technical specifications should be included in the PSAR with attention to information which may significantly influence the final design or form the basis for the preliminary limiting conditions for operations.

We added that discussion and exemption may be needed based on the correlation between the language in 50.36 to the analysis and outputs of the risk informed LMP approach.

The changes that were not incorporated, the staff did not revise the guidance -- revise Reg Guide 1.177 -- the title of that Reg Guide is Plan Specific Risk-Informed Decision-Making -- to align with NEI 18-04 risk metrics because the NRC staff believes the guidance in the technical specific ISG is sufficient at this time without having to revise that Reg Guide.

The staff noted in response to the comment that there are no near-term plans to revise 50.36 to include criteria from all of the factors. That's the technical specification.

This is the last ISG, and it's for fire protection for operations. So the reason fire protection for operations was developed is the LMP

process is expected to address fire protection for the design, but it doesn't. The LMP process is not going to include the programmatic controls.

So 10 CFR 50.48 requires each operating plant have a fire protection plan that meets the requirements of 10 CFR Part 50, Appendix A, Criteria 3, for light-water reactors or the applicant's proposed design criteria that have been deemed acceptable by the NRC.

So we do expect the principal design criteria for non-light-water reactors that's analogous to the general design criteria, Appendix A, Criterion 3.

When you look at the guidance that's in this ISG, it includes concepts from NFPA 805. NFPA 805, which is included in Requirement 10 CFR 50.48(c) is not applicable to a non-light-water reactors. But we believe the concepts in NFPA 805 that are fundamentally a risk-informed approach are appropriate for guidance for non-light-water reactors.

The scope of the ISG addresses the review and application content regarding the fire protection program for operations, including application descriptions of the management and policy program direction and the integrated combination of procedures

of personnel that implement fire protection activities.

MEMBER HALNON: So a quick question, and correct me if I didn't read it correctly. But it appears the ISG makes an overall overriding assumption that there is a classic fire brigade available. Is that true?

MR. SEBROSKY: I believe that is the going in position.

MEMBER HALNON: Okay.

MR. SEBROSKY: There is the potential that a classic fire brigade may not be needed for some of the designs if it can be demonstrated that it is not necessary.

MEMBER HALNON: Yeah. So that branch, looking at a non-fire brigade plant may be incipient detection type relying on the offsite is -- it didn't seem to have a tie or a push to look that way in case. And I didn't know if there was something that I was missing.

We have already done one, I guess, perceived non-light-water type Part 50, and they didn't have a fire brigade. And they relied on offsite. So we had to go to the emergency plan and have it tied in the emergency plan to make sure that

the offsite was ready to fight fires onsite.

So that branch, tied to the emergency plan and the presumption that there's a fire brigade always didn't match up to me. So I would suggest maybe take a look at it and maybe figure some way to make sure that the reviewers first asking the question fire brigade, yes/no. If no, where do you go? If yes, then the rest of the ISG works great. And then the if no, we will need to have it tied to the emergency plan to follow that trail to make sure that everything is copacetic and covered.

MR. SEBROSKY: Thank you for the comment. So we received many comments on fire protection. As a result of the comments, the changes that you see here are editorial in nature. And this is a listing of the comments that were received that we did not incorporate.

Many of the comments requested deletion of guidance material, like removing references to general design criteria, deleting clarifying text regarding acceptability of NFPA 805. The staff provides a basis in the comment resolution tables for why such information is sought to be appropriate to be kept in the guidance document.

So this ends the presentation on the nine

ISGs. The next two slides are just acronyms and initial lists.

CHAIR PETTI: Thank you, Joe. At this point, given the late hour, we do have some public comments that I would like to take and then we can talk about the comments and next steps.

So if anyone has a public comment, please identify yourself and your comment.

I see Brandon. I can't read your last name easily.

MR. CHISHOLM: Yes, hello. And thank you for the opportunity to address the subcommittee. I am Brandon Chisholm of Southern Company. And today I am speaking on behalf of the industry-led TICAP team concerning the important guidance documents that have been discussed today.

So in particular, I highlight the technology inclusive content application project for the TCAP guidance document, that is NEI 21-07 and the NRC's draft Regulatory Guide DG-1404, Revision 1, which addresses it.

As you know, TICAP built on the licensing modernization project, or LMP, which is documented in NEI 18-04 and endorsed by the NRC in Reg Guide 1.233. Together NEI 18-04 and NEI 21-07 and the associated

NRC guidance documents form a workable basis for a risk-informed and performance-based advanced reactor license application that is submitted under the existing regulatory framework.

In fact, as discussed earlier today, both advanced reactor program, or ARDP, vendors, those being X-energy and TerraPower's Natrium, are among the multiple near-term applicants using LMP and TICAP for their applications.

Both LMP and TICAP were initiated by Southern Company on behalf of the industry and were carried out through cost share and supported by the Department of Energy's Office of Nuclear Energy.

There were many industry partners and participants playing key roles, including Idaho National Laboratory, the Nuclear Energy Institute, reactor vendors and private consultants.

Most importantly, the guidance was developed with extensive interaction with the Nuclear Regulatory Commission staff generally in public meetings. Perhaps the most significant example of such interaction was the inclusion of staff observation and multiple tabletop exercises to illustrate the application of the guidance on a variety of advanced reactor technologies during the

development of NEI 21-07.

As evident from the discussion of the public comments today, industry and the NRC did not, and still do not, have complete alignment on every single point that is associated with the guidance. Nevertheless, all parties share the goal of developing a risk-informed and performance-based approach to regulation of advanced reactors that would provide a reasonable assurance of adequate protection of public health and safety and also be usable, transparent and implementable for all reactor technologies.

Through extensive cooperative efforts in full view of stakeholders and the public, we believe that the parties have overwhelmingly succeeded in achieving that goal.

One topic of conversation that I would like to make a quick note about is the documentation of hazard analysis in the safety analysis report.

As was mentioned, there are multiple requirements in the NEI 18-04 methodology, where analyses using tools like checklists, what if assessments, hazard and operability studies, failure modes and affect analyses and others would be used and incorporated into a risk-informed and performance-based process.

Two such examples will be the requirements for hazard identification and screening in the non-LWR PRA standard and the comprehensive evaluation of defense-in-depth adequacy.

While the LMP and TICAP reflects the perspective offered by Member Martin, that hazard analysis is a key piece of understanding the safety and design of any system, I would just like to note that the requirement to explicitly document the results of the hazard analysis in the SAR will be a new and potentially unbounded requirement for an applicant.

However, as mentioned earlier, the hazard analysis documentation does exist in the documentation that supports the development of the SAR.

So to conclude my comments here today, the ARDP projects are continuing apace. It is of paramount importance to Southern Company as well as the mission of the industry-led and DOE supported project for the NRC to complete its guidance documents in an expeditious manner.

There are additional initiatives underway and plans to further develop the risk-informed performance-based advanced reactor regulatory framework by NEI 21-07 and the associated NRC guidance

documents need to be put in place as soon as possible.

We urge the ACRS to act promptly on DG-1404 and the associated Reg Guide 1.253 and the other ARCAP guidance documents. Thank you again. And that's the end of my comment.

CHAIR PETTI: Thank you. I see Benjamin Holtzman.

MR. HOLTZMAN: Yes. Thank you. Can you guys hear me okay?

CHAIR PETTI: Yes.

MR. HOLTZMAN: Okay. Thank you. This is Ben Holtzman from the Nuclear Energy Institute. I would echo a lot of what Brandon just said so I won't specifically do that. But I will encourage you as well to move forward as judiciously and expeditiously as possible in the finalization of these guidance documents.

Industry is very interested. And there are companies, as we've been discussing, who are planning on using them. And generally industry believes that the documents are very good. There's always room for improvement, of course, but these documents are a great step forward in terms of providing a predictable and usable regulatory guidance.

And so I would just like to just again reiterate our support of not only industry, but NRC staff's efforts in the development of these guidance documents. Thank you very much.

CHAIR PETTI: Thank you. Any other public comments? Any other comments? Okay. So, members, any broad comments? I've been taking notes so I've noted maybe two or three things that I can put into the letter.

I want to thank the members who provided input. I've got good input from Matt and Greg and Vicki. And so I've got a pretty good draft together. And I will go and put some more -- sprinkle some of these comments I heard today in there.

MEMBER HALNON: Dave, can I ask one more question of this panel?

CHAIR PETTI: Mm-hmm. Sure.

MEMBER HALNON: And I was just curious on the fire protection comments. I mean, they were probably made by very experienced fire protection industry folks. Is that why most of them -- all of them were rejected that they just didn't come in an informed set of comments? I mean, it struck me that 100 percent of the comments were rejected.

MR. SEBROSKY: The majority of the

comments -- I'm trying to say this. A majority of the comments --

MEMBER HALNON: They were trying to get you to draw back on the guidance and requirements.

MR. SEBROSKY: Right.

MEMBER HALNON: I get that.

MR. SEBROSKY: So there was a particular individual that across the ISGs believed that we didn't need them. That we could rely on --

(Simultaneous speaking.)

MEMBER HALNON: That got reflected.

MR. SEBROSKY: And that person also provided multiple comments along those same lines for the fire protection.

MEMBER HALNON: Okay. So you say you have general fire protection staff in the industry so ISG. I don't want to speak for industry, but, I mean, from your perspective you feel relatively okay about --

MR. SEBROSKY: Yes.

MEMBER HALNON: Okay. That's fine. Thanks. I just wanted to -- I probably would have struck them too when we got them.

MR. SEBROSKY: Yes.

MEMBER HALNON: Okay. Thanks.

MEMBER BROWN: Yes. Just a question.

Back in our prior discussion when we were going through all of this stuff in detail, comments were made relative to some of the documents that were referred to, like, in my areas, as a design review guy, for instance, issue a control that says for non-light-water reactors. And we talked about that guide because it was virtually identical in those circumstances to the one we developed for some of the past projects.

And we suggested that somehow it ought to not be known as just non-light-water reactors. I noticed when I went through it that the references to it still had parentheses as non-light-water reactors. And it came down to that there was a comment by somebody that said, hey, you didn't need it at all. You all said no. We took it out of, I think, the Reg Guide 1.253 or something and put it in a roadmap.

It's pretty sparse, the whole thing, relative to the INC world. So that's why I was interested in seeing what the perception was.

MR. SEBROSKY: Yes. So just to clarify and the I'm going to turn it over to Ian Jung. I was looking past you because Ian can help on this.

MEMBER BROWN: He's not going to yell at me, is he?

MR. SEBROSKY: We believe that DRG is very important. The fact that we moved it from DG-1404 Reg Guide 1.2 (audio interference). I believe that the LMP process is found in the I21-07. And DG-1404 Reg Guide 1253 is going to identify safety-related INC systems and non-safety-related special treatment INC systems. And when it comes to reviewing those INC systems that DRG is important.

I would turn it over to Ian to talk about the plans to broaden potentially applicability to light-water reactors.

MR. JUNG: Ian Jung again. The committee's recommendation to DRG related to light-water reactors led to a footnote within the DRG that the DRG design refuel guide for INC is technology inclusive from INC perspective so it can be used for light-water reactors.

MEMBER BROWN: So you did incorporate the thought process over which when you say it's a footnote?

MR. JUNG: Right. I mean, there was some negotiation on that. But in reality, actually just moved the light-water reactors, like BWXY. They are planning to use DRG as a guidance. They are engaged with light-water reactor divisions for INC. So

practically, the guidance is being used, and your emphasis on -- your committee's emphasis on fundamental INC design principles are cornerstones of those guidance. And I think those are going to be executed in all non-light-water reactor and light-water design as a safety focus.

MEMBER BROWN: I was just concerned that, you know, it has been obviously in a sense an issue of considerable discussion over the last 15 years of my participation. And that was kind of the crown jewel of bringing everything together as we moved through various projects. And then the DRG was developed, I think, it was for -- I have forgotten which one of the boiling water reactors it was in there. EBWR or something like that.

MR. JUNG: The mPower design at the beginning of NuScale.

MEMBER BROWN: And it was really complete. And now to just see it subsumed into a footnote somewhere even though theoretically it's going to be recognized. Because a lot of the stuff we're going to be seeing, it's not going to be all advanced reactors. People are going to be using conventional light-water -- just regular light-water reactors. We're going to be involved in a lot of the work that's being done.

So I'm kind of worry about having the ability to carry that whole 15 years' worth of effort developing the details and now it's kind of relegated into a footnote in the --

(Simultaneous speaking.)

MR. JUNG: -- to make sure that for non-LWR entities, like x-Energy and Natrium reactors, and those plants are all using designer review guides for SDR guidance.

MEMBER BROWN: It is in the references. And I did check out where it was used or brought up in the entire -- in the documents supplied to us. So just curious. All right. I'm not going to be around forever. I'm getting long in the tooth to phrase it.

MR. JUNG: DRG, it's a great guidance.

MEMBER BROWN: As long as you guys are maintaining that emphasis even though I may be pushing up daisies in a few years, it's nice to have that emphasis still there. I'm finished.

CHAIR PETTI: I wanted to ask Joe to be sure. You would like a letter from us?

MR. SEBROSKY: I'll defer to my boss, Steven.

MR. LYNCH: Hey, good morning, still, for a few more minutes. This is Steve Lynch, chief of the

Advanced Reactor Policy Branch. So the NRC staff met with the committee today to provide an update on the status of the development of the TICAP and ARCAP documents with a focus on how we plan on addressing the public comments received.

While we were not explicitly expecting the committee to prepare a letter for this effort, the staff, as always, is prepared to engaged with the ACRS full committee and receive any recommendations and conclusions that the committee may want to provide in a letter.

MEMBER BROWN: Can I ask one other question relative to that? I don't want to drag this out, but was there a reason for doing that as a footnote as opposed to a more direct reference? Did you all have that discussion? You can see this bothers me a little bit.

(Simultaneous speaking.)

CHAIR PETTI: Charlie, there's some really important footnotes in the regulation we can go point out to you.

MEMBER BROWN: So I'm not the only one that's been relegated to a footnote?

CHAIR PETTI: Correct. Correct.

MR. JUNG: A footnote for light-water

reactors is very similar to non-LWR discussion we had on overall --

(Simultaneous speaking.)

MR. JUNG: -- framework. Bringing light-water reactor framework into it potentially can delay the issuance of DRG. That was one of the reasons. Because we have a whole set of organizations to review and concur on, potentially addressing different opinions.

MEMBER BROWN: Okay. Well, I 'm bringing this up since somebody supposedly is going to be around after me. I'm not going to live forever. And he's about 20 years younger than me. So you're going to get stressed using that I suspect --

CHAIR PETTI: And I got one other thing I'd like to --

MEMBER BROWN: -- his participation. I'm done. Thank you.

CHAIR PETTI: We have four minutes.

MEMBER HALNON: I just want to mention throughout these guidances, you put a lot of sort of the parking lot as the pre-application engagement in the process without a lot of structure around what that looks like. Many of those pre-application engagements are proprietary so they're not public and

available to other companies to see how they did.

As you get through that, I would recommend you keeping some lessons that could be generically applied to other pre-application processes so that you're not getting a new ROC every time you come in. I think there is some pre-application guidance for the light-water reactors out there that is in some kind of --

CHAIR PETTI: There is the Appendix A. I really like it.

MR. SEBROSKY: Yeah. So Appendix A in the ARCAP roadmap ISG is the pre-application guidance that --

MEMBER HALNON: Okay. I missed that. I didn't see that.

CHAIR PETTI: No, it's in the letter. Because we talked this ad nauseam as a committee --

MEMBER HALNON: Yeah, because it is --

CHAIR PETTI: -- about the need and the timeliness.

MEMBER HALNON: -- important now.

CHAIR PETTI: You guys hid it.

MEMBER BROWN: I'd like to just follow-up on your comment. We developed an ISG in the INC world for pre-application processes. We did this 10 or 12

years ago. And is that part of this overall ISG so there's still that available for the pre-application review? Because that really gets a lot of the complications. What should he expect? What should the applicant expect? And that was pretty comprehensive back then. So is that still part of this -- in play also?

MR. JUNG: This Appendix A is for all disciplines. It covers very critical elements. So that in INC area pre-applications are in a sense are actually --

MEMBER BROWN: Are a part of that? Okay. All right. Thank you.

CHAIR PETTI: Okay. And remember, you guys, we can talk about this at full committee. We have a hard stop in two minutes because we have a lunch meeting. I just want to --

MEMBER BROWN: I can't be ignored

CHAIR PETTI: -- I just want to thank the staff for their time today, and we'll see you in full committee. We have finished this session.

MEMBER REMPE: So I want to remind the virtually attending members that they have a different --

PARTICIPANT: You're not on, Joy.

MEMBER REMPE: I think I am. Okay. There's no speaker up there so I don't worry about it as much. But anyway, I want to remind those members who are here virtually that there is a different invitation and the meeting will start at 12:15.

And also there is a third invitation at 1 o'clock for a different meeting. So just kind of look at your calendar. If you've got a problem, talk to Larry, and he'll figure out what needs to be said. But I think we're good. Thank you. I'm going to log off of this one right now. Okay?

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

Advanced Reactor Content of Application Project (ARCAP) Interim Staff Guidance (ISG) Documents and Technology Inclusive Content of Application Project (TICAP) Guidance Documents Status

ACRS Regulatory Rulemaking, Policies and Practices Subcommittee

November 16, 2023

U.S.NRC

United States Nuclear Regulatory Commission

Protecting People and the Environment

Purpose and Agenda

- Provide a high-level overview of the Technology Inclusive Content of Application Project (TICAP) Regulatory Guide 1.253 and the nine Advanced Reactor Content of Application Project (ARCAP) Interim Staff Guidance Documents
  - Include overview of the comments received and the NRC's disposition of these comments
- Agenda
  - High-level overview of ARCAP and TICAP structure
  - Discussion of Regulatory Guide 1.253 (TICAP Guidance)
  - Discussion of ARCAP interim staff guidance documents
  - Path forward

Background

- ACRS Future Plant Designs Subcommittee Previous Briefings
  - March 17, 2021
    - Provided a high-level overview of the structure of ARCAP and TICAP
  - July 21, 2021
    - Updated overview of structure of ARCAP and TICAP
  - December 17, 2021
    - Provided a high-level overview of the draft white paper versions of the nine ARCAP ISGs and the TICAP draft regulatory guide

Background

- ACRS Future Plant Designs Subcommittee Previous Briefings (continued)
  - After these briefing the NRC staff's near-term focus is that the ARCAP and TICAP guidance is being issued to support near term 10 CFR Part 50 and 52 non-light water reactor applications
  - Longer term the NRC staff will update the guidance as appropriate to support the 10 CFR Part 53 rulemaking effort

Background – How to Access Draft Documents and Comments

- Revision 0 of ten draft documents were reissued in May of 2023 (ADAMS Package No. ML23044A038).
- Revision 1 of the TICAP guidance was issued is September of 2023
- All of the documents are available in Table 2 of the public ARCAP/TICAP webpage https://www.nrc.gov/reactors/new-reactors/advanced/rulemaking-and-guidance/advanced-reactor-content-of-application-project.html

ARCAP ISG Title	ADAMS Accession #	Regulations.gov Docket ID	# of Comments
Draft DANU-ISG-2022-01, Review of Risk-Informed, Technology-Inclusive Advanced Reactor Applications – Roadmap	ML22048B546	NRC-2022-0074	68
Draft DANU-ISG-2022-02, Chapter 2, "Site Information"	ML22048B541	NRC-2022-0075	12
Draft DANU-ISG-2022-03, Chapter 9, "Control of Routine Plant Radioactive Effluents, Plant Contamination and Solid Waste	ML22048B543	NRC-2022-0076	13
Draft DANU-ISG-2022-04, Chapter 10, "Control of Occupational Doses"	ML22048B544	NRC-2022-0077	2
Draft DANU-ISG-2022-05, Chapter 11, "Organization and Human-System Consideration"	ML22048B542	NRC-2022-0078	12
Draft DANU-ISG-2022-06, Chapter 12, "Post Construction Inspection, Testing and Analysis Program"	ML22048B545	NRC-2022-0079	9
Draft DANU-ISG-2022-07, "Risk-Informed ISI/IST Programs"	ML22048B549	NRC-2022-0080	43
Draft DANU-ISG-2022-08, "Licensing Modernization Project-based Approach for Developing Technical Specifications"	ML22048B548	NRC-2022-0081	8
Draft DANU-ISG-2022-09, "Risk-Informed, Performance-Based Fire Protection Program (for Operations)"	ML22048B547	NRC-2022-0082	23
Draft Regulatory Guide 1404, "Guidance for a Technology Inclusive Content of Application Methodology to Inform the Licensing Basis and Content of Applications for Licenses, Certifications, and Approvals for Advanced Reactors"	ML22076A003	NRC-2022-0073	73
Draft Regulatory Guide 1404, Revision 1 – added Appendix B to provide additional guidance for expectations for a probabilistic risk assessment (PRA) at the construction permit (CP) stage	ML23194A194	NRC-2022-0073	30

ARCAP/TICAP Background

- Overview of ARCAP/TICAP draft guidance documents provided during an advanced reactor stakeholder public meeting on June 7, 2023
  - Overview included a discussion of changes to draft guidance documents from white paper versions of the documents
  - See slides 96 through 144 at ML23157A018
    - Includes both NRC staff slides and Nuclear Energy Institute Slides
  - Meeting occurred during the open comment period for the documents
    - Included information on how to provide comments on documents

- Public meeting held on August 22, 2023 (after public comment period ended), to provide commenters an opportunity to discuss their comments
  - Meeting summary available at: ML23236A481

ARCAP/TICAP Background

- Public meeting held on September 26, 2023, to discuss DG-1404, Revision 1
  - DG-1404, Revision 1, included additional guidance related to construction permit probabilistic risk assessment development
  - Meeting held during public comment period
    - Purpose was to facilitate stakeholder understanding of guidance and to provide information on how to provide comments on the draft guidance
  - Meeting slides available at: ML23265A185

- Material to support today's meeting available at: ML23283A092
  - Includes ten comment resolution tables and ten guidance documents
    - Guidance documents provide a comment identification that provides a reason for the change

- ARCAP/TICAP Public Webpage provides links to key meetings and documents associated with the development of these documents (see: https://www.nrc.gov/reactors/new-reactors/advanced/rulemaking-and-guidance/advanced-reactor-content-of-application-project.html)

ARCAP/TICAP Background

- Guidance for developing and reviewing technology-inclusive, risk-informed, and performance-based non-light water (non-LWR) applications

- Being developed to support 10 CFR Part 50 and 10 CFR Part 52 applications
  - Needed to support expected near-term non-LWR Part 50/52 applications using the licensing modernization project (LMP) process in NEI 18-04, Revision 1

- The NRC staff intends to revise the guidance per the final Part 53 rulemaking language

ARCAP Background

- Broad in nature and intended to cover guidance for non-LWR applications for:
  - combined licenses
  - construction permits
  - operating licenses
  - design certifications
  - standard design approvals
  - manufacturing licenses
- Encompasses TICAP
  - TICAP is guidance for off-normal reactor states only.
    - ARCAP encompasses everything needed for a license application.

TICAP Background

- TICAP scope is governed by the LMP-based process
  - LMP uses risk-informed, performance-based approach to select licensing basis events, develop structures, systems, and components (SSC) categorization, and ensure that defense-in-depth is considered

- Industry developed key portions of TICAP guidance
  - See NEI 21-07, Revision 1, "Technology Inclusive Guidance for Non-Light Water Reactors Safety Analysis Report Content for Applicants Utilizing NEI 18-04 Methodology," (ADAMS Accession No. ML22060A190)

- RG 1.253 (issued as DG-1404) proposes to endorse NEI 21-07, Revision 1, with clarifications and additions
  - There are no proposed exceptions

ARCAP and TICAP - Nexus

Outline Safety Analysis Report (SAR) – Based on TICAP Guidance

1. General Plant Information, Site Description, and Overview
2. Methodologies and Analyses and Site Information*
3. Licensing Basis Event (LBE) Analysis
4. Integrated Evaluations
5. Safety Functions, Design Criteria, and SSC Safety Classification
6. Safety Related SSC Criteria and Capabilities
7. Non-safety related with special treatment SSC Criteria and Capabilities
8. Plant Programs

Additional SAR Content –Outside the Scope of TICAP

9. Control of Routine Plant Radioactive Effluents, Plant Contamination, and Solid Waste
10. Control of Occupational Doses
11. Organization and Human-System Considerations
12. Post-construction Inspection, Testing and Analysis Programs

Audit/inspection of Applicant Records

- Calculations
- Analyses
- P&IDs
- System Descriptions
- Design Drawings
- Design Specs
- Procurement Specs
- Probabilistic Risk Assessment

Additional Portions of Application

- Technical Specifications
- Technical Requirements Manual
- Quality Assurance Plan (design)
- Fire Protection Program (design)
- Quality Assurance Plan (construction and operations)
- Emergency Plan
- Security Plan
- Cyber Security Plan
- SNM physical protection program
- SNM material control and accounting
- Fire Protection Program (operational)
- Radiation Protection Program
- Offsite Dose Calculation Manual
- Inservice inspection/Inservice testing (ISI/IST) Program
- Environmental Report and Site Redress Plan
- Financial Qualification and Insurance and Liability
- Fitness for Duty Program
- Aircraft Impact Assessment
- Performance Demonstration Requirements
- Nuclear Waste Policy Act
- Operational Programs
- Exemptions, Departures, and Variances)

* SAR Chapter 2 derived from TICAP guidance as supplemented by ARCAP interim staff guidance Chapter 2, “Site Information”

- Safety Analysis Report (SAR) structure based on clean sheet approach
- Additional contents of application may exist only in the SAR, may be in a separate document incorporated into the SAR, or may exist only outside the SAR.
- The above list is for illustration purposes only.

TICAP and ARCAP Roadmap Common Guidance

- Applicability is now only for non-LWRs
  - Recommends that light-water reactor applicants wanting to use ARCAP/TICAP guidance engage in pre-application discussions
- All ISGs provide applicant guidance and NRC staff review guidance in separate sections
- Removed references that did not have complete NRC staff review
  - Appendices added to several ISGs to list in-development guidance documents that could affect future revision of those ISGs

TICAP and ARCAP Roadmap Common Guidance

- Importance of Principal Design Criteria (PDC)
  - TICAP guidance covers PDCs associated with the licensing modernization project (i.e., those associated with off-normal conditions)
  - ARCAP Roadmap ISG and associated ISGs (e.g., ARCAP Chapter 9) contains PDC guidance for normal operations
  - RG 1.232, “Guidance For Developing Principal Design Criteria For Non-light-water Reactors,” (ML17325A611) provides additional guidance for reviewer consideration
  - ARCAP Roadmap ISG recommends discussion of PDC during preapplication phase

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Technology Inclusive Content of Application Project – Overview and Discussion of Comments on DG-1404

TICAP – High Level Overview

- Goal is to develop technology-inclusive guidance that proposes an optional formulation of advanced reactor application content that is based on a risk-informed, performance-based approach for demonstrating that plant safety meets the underlying intent of the current requirements

- Guidance is intended to increase efficiency of developing and reviewing an application

- Scope is governed by the LMP methodology to facilitate a systematic, technically acceptable, and predictable approach for developing key portions of a design's SAR
  - The LMP methodology provides processes for identifying LBEs, classifying and establishing special treatments for certain SSCs, and ensuring DID adequacy

- The LMP methodology is based on a full-scope probabilistic risk assessment (PRA)
  - All sources of radiological material,
  - all hazards,
  - all plant operating states,
  - full analysis of scenario progressions (i.e., analyzed from initiator to radiological consequence)

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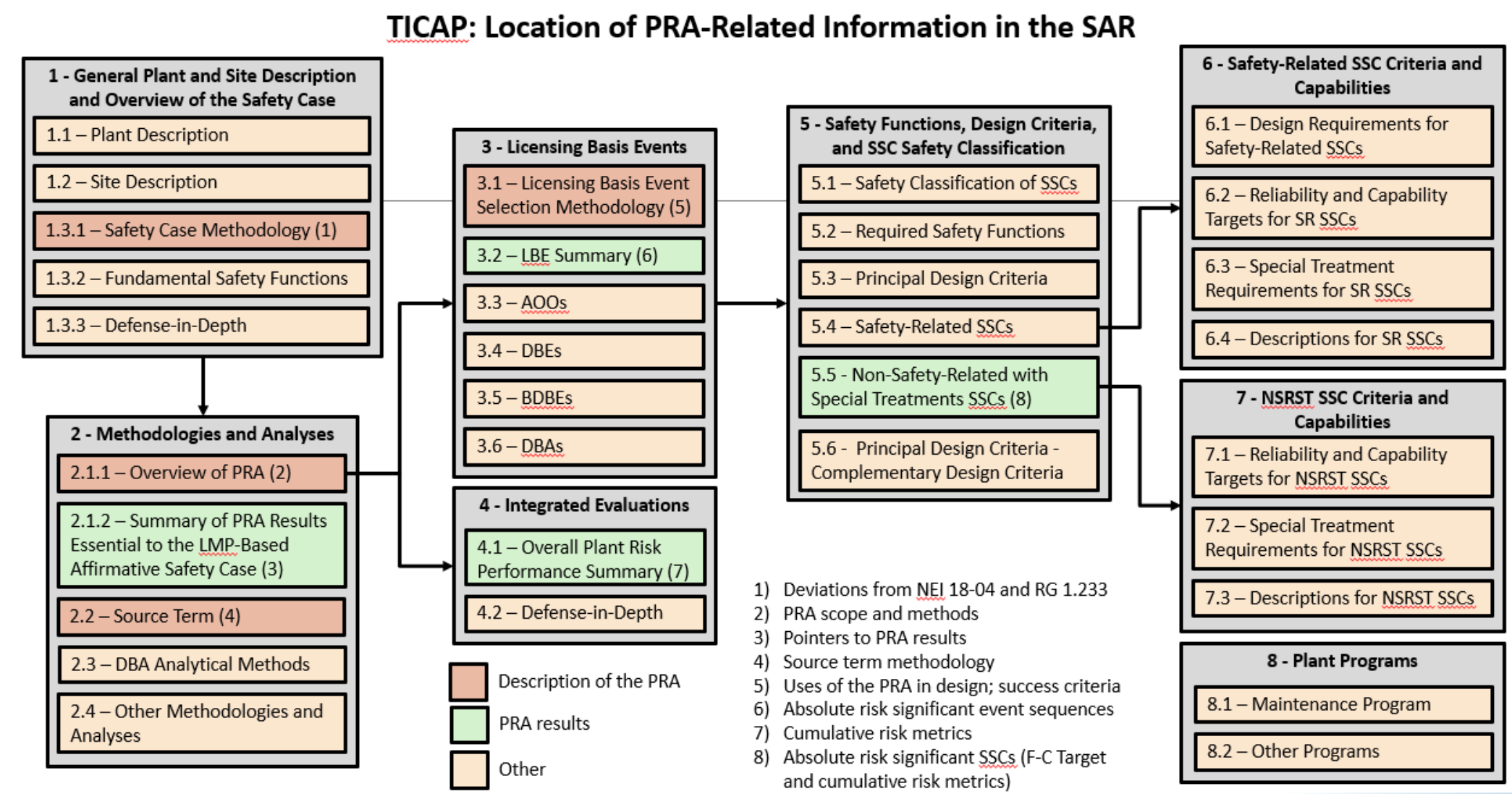
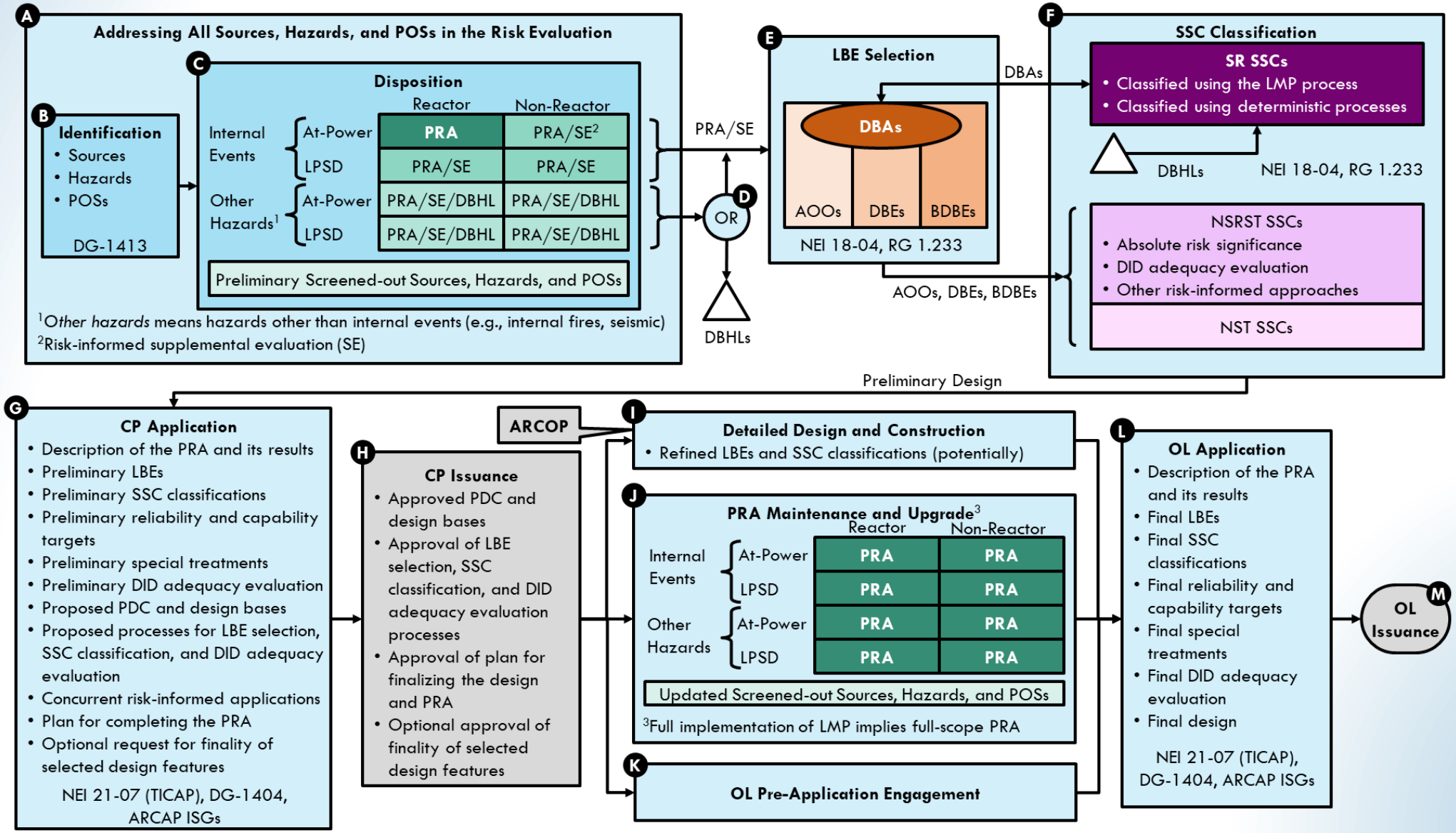
TICAP Guidance



TICAP Construction Permit/Operating License Guidance



Construction Permit PRA Acceptability

Key Points from DG-1404, Revision 1:

- All sources, hazards, and plant operating states (POSs) should be addressed (i.e., identified and dispositioned) in the CP application, where *dispositioned* means each item is either:
  - Modeled in the PRA logic model,*
  - Screened out of the PRA logic model with justification,*
  - Accounted for using risk-informed supplemental evaluations, or
  - Accounted for using design-basis hazard levels (DBHLs) for hazards other than internal events

NOTE: Generally referring to *the PRA* implies these three items

- As a minimum, the LMP-based CP application should be supported by an internal events, at-power, reactor PRA logic model, which represents the fundamental plant response model that:
  - helps demonstrate the applicant's ability to develop an acceptable PRA logic model and
  - establishes an acceptable foundation for upgrading the PRA logic model as the design progresses
  - while acceptable for the CP stage of licensing, achieving only the minimum scope of the PRA logic model may not realize the full benefit of the LMP methodology

* The ASME/ANS non-LWR PRA consensus standard, ASME/ANS RA-S-1.4-2021, provides requirements and processes for defining the scope of the CP PRA logic model.

Construction Permit PRA Acceptability

Key Points from DG-1404, Revision 1 (continued):

- A self-assessment of the PRA logic model, screening analyses, and risk-informed supplementary evaluations helps reduce the need for in-depth NRC review
  - This could be a peer review but is not required as such

- The CP application should provide a preliminary, yet complete**, set of LBEs

- The CP application should provide a preliminary, yet complete**, SSC classifications

- Further expectations
  - The CP application should provide a plan for maintaining and upgrading the PRA during construction.
    - Example: Replacing a seismic DBHL with a seismic PRA
    - CP holders are encouraged to keep the staff advised of changes to the PRA completion plan that significantly affect the design.

** Consistent with the maturity of design information and relative to the scope of the PRA logic model, screening analyses, and risk-informed supplementary evaluations supporting the CP application.

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TICAP Comments

- Seventy-three comments received on DG-1404, Revision 0
- Thirty comments received on DG-1404, Revision 1
- Most comments related to the ARCAP/TICAP guidance documents
- Changes resulting from comments on Revision 0:
  - Removed clarifications and additions related to principal design criteria (PDC)
    - NRC staff determined that the PDC guidance found in NEI 21-07, Revision 1, is sufficient such that RG 1.253 clarifications and additions are not needed
  - Removed an addition related to information applicants need to supply when using a risk-informed, performance-based approach other than LMP
    - Agreed with commenter that this approach is outside the scope of RG 1.253

TICAP Comments

- Changes resulting from comments on Revision 0 (continued):
  - Provided clarification regarding use of guidance for a manufacturing license (ML) or standard design approval (SDA)
    - NEI 21-07, Revision 1, provides guidance for combined licenses, design certifications, construction permits and operating licenses but not MLs or SDAs
    - Removed RG 1.253 applicability of guidance to MLs and SDAs
      - Added discussion that ML and SDA applicants should consider the design certification guidance and make appropriate modifications
      - ML and SDA applicants are encouraged to discuss their intended use of the guidance with NRC staff during preapplication interactions
      - Other suggested additions related to MLs not accepted by the NRC staff

TICAP Comments

- Changes resulting from comments on Revision 0 (continued):
  - Moved references to supporting guidance from RG 1.253 to the ARCAP Roadmap ISG
    - Examples include reference to design review guide for instrumentation and control and ASME Section III Division 5 guidance
      - NRC staff agreed with commenter that such references are outside the scope of RG 1.253 and more properly belong in ARCAP Roadmap ISG
    - As a result of this comment DG-1404, Appendix A – Guidance Documents Under Development was removed from RG 1.253
      - Guidance documents under development found in Appendix D of ARCAP Roadmap ISG
      - DG-1404, Appendix B (CP PRA guidance), is found in Appendix A to RG 1.253

TICAP Comments

- Changes resulting from comments on Revision 1:
  - Affiliated staff positions with one of the following:
    - PRA acceptability
    - Documentation needed in the SAR to demonstrate the acceptability of the CP PRA
    - Archival documentation needed to demonstrate the acceptability of the CP PRA
  - Documenting essential assumptions in the PSAR
  - Clarified the use of the term PRA
  - Clarified that tables on supporting requirement applicability are not required
  - Revised applicability of some supporting requirements

TICAP Comments

- Comments related to Revision 0 that are resolved with no changes:
  - NRC staff did not expand the guidance to light water reactors (LWR)
    - The scope of NEI 18-04, Revision 1, and NEI 21-07, Revision 1, are limited to non-LWRs
      - Based on the ASME/ANS non-LWR PRA consensus standard endorsed for trial use (i.e., full-scope PRA)
      - The series of PRA consensus standards needed to achieve a full-scope PRA for LWRs has not yet been endorsed
    - LWR applicants choosing to use LMP for their applications are encouraged to discuss their plans with the NRC staff

TICAP Comments

- Comments related to Revision 1 that are resolved with no changes:
  - Descriptions of risk metrics used that address meeting the QHOs
  - Emphasizing the meaning of *addressing* all sources, hazards, and POSs
  - Addressing that LMP is risk-informed, not risk-based
  - Addressing the meaning of the phrase “full LMP implementation”
  - Meeting high-level requirements and related staff positions on PRA acceptability by virtue of meeting underlying, applicable supporting requirements in ASME/ANS RA-S-1.4-2021
  - Out-of-scope comments

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Advanced Reactor Content of Application Project Roadmap – Overview and Discussion of Comments

ARCAP Roadmap Overview

- Provides guidance for other portions of the application outside of ISGs including emergency plan, security, financial qualification and insurance and liability
- Includes four appendices
  - Appendix A – Preapplication Guidance
  - Appendix B – Applicability of Regulations to non-light water reactors
  - Appendix C – Construction Permit Guidance
  - Appendix D – Draft Documents Under Development

Additional Portions of Application

- Technical Specifications
- Technical Requirements Manual
- Quality Assurance Plan (design)
- Fire Protection Program (design)
- Quality Assurance Plan (construction and operations)
- Emergency Plan
- Security Plan
- Cyber Security Plan
- SNM physical protection program
- SNM material control and accounting
- Fire Protection Program (operational)
- Radiation Protection Program
- Offsite Dose Calculation Manual
- Inservice inspection/Inservice testing (ISI/IST) Program
- Environmental Report and Site Redress Plan
- Financial Qualification and Insurance and Liability
- Fitness for Duty Program
- Aircraft Impact Assessment
- Performance Demonstration Requirements
- Nuclear Waste Policy Act
- Operational Programs

ARCAP Roadmap Comments

- Sixty-eight comments received
- Represents second most comments received on ARCAP/TICAP guidance documents
- Changes made because of comments:
  - Expanded the applicability of Appendix B (Applicability of Regulations to Non-LWRs) to Manufacturing License applications.
  - Deleted reference to the Facility Safety Program.
  - Expanded guidance on leaks from coolant systems to specifically address leaks from low pressure systems.
  - Added guidance that applicants need to consider safety concerns beyond those identified by the LMP process when identifying PDCs applicable to their design.

ARCAP Roadmap Comments

- Added guidance that applicants are responsible for identifying needed programs beyond those specified in Section 8.

- Transferred several items (e.g., consideration of LWR GSIs) from DG-1404 to the Roadmap, since they are not part of the LMP process.

Requested changes not incorporated:

- Add a statement that consensus Codes and Standards have more weight and take precedence over regulations.
- Eliminate the design detail required in the SAR. Only identify the hazards for which design measures have been implemented.

ARCAP Roadmap Comments

Comments not incorporated (continued)

- Delete Chapter 11, “Organization and Human-System Considerations”. Commenter indicated that “The relationship with safety is tenuous.”

- Extend the applicability of the documents to LWRs. (NOTE: expanding the applicability to LWRs is under consideration as a future action. The current limitation to non-LWRs is for consistency with NEI 18-04 and 21-07, who’s scope is non-LWRs.)

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Advanced Reactor Content of Application Project Chapter 2 “Site Information” Overview and Discussion of Comments

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Chapter 2 Overview

- Chapter 2 provides guidance on the scope and approach for selecting the external hazards which must be considered in the plant design.
- The selection of external hazards is to be informed by a probabilistic external hazards analysis, when supported by available methods, data, standards and guides.
- Chapter 2 limits the amount of information that needs to be provided in the SAR to that necessary to establish the design basis external hazards.
- Chapter 2 refers to existing site evaluation guidance (e.g., RGs) where appropriate.
- The guidance in Chapter 2 is based upon the requirements of 10 CFR Part 100, Subpart B.
- 12 comments received.

Chapter 2 Comments

- Changes made because of comments:
  - Revised the frequency of occurrence of nearby industrial, transportation and military facility hazards to be considered in the design to be consistent with existing guidance.
  - Allow the use of a combination of probabilistic and deterministic methods to select external hazards.
  - Eliminated the need to submit comparative information on slope stability.

- Requested changes not incorporated:
  - Development of a standardized process for screening out external hazards

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Advanced Reactor Content of Application Project Chapter 9 – Control of Effluents, Plant Contamination and Solid Waste

Overview and Discussion of Comments

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Chapter 9 Overview

- Applies a performance-based approach for level of detail of information provided in the SAR related to control of routine plant radioactive effluents, plant contamination and solid waste

Chapter 9 Comments

Changes made because of comments:

- Clarified application content for design certifications, manufacturing licenses, and standard design approvals
- Clarified what design information is necessary when an applicant requests an exemption to 10 CFR 50.34 content requirements

Requested changes not incorporated:

- Delete guidance the commenter interpreted as related to draft Part 53
- Delete guidance directing applicants to provide a summary of estimated doses
- Remove prescriptiveness; only reference industry standards
- Remove references to NEI template documents not previously formally endorsed but previously approved via safety evaluation

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Advanced Reactor Content of Application Project Chapter 10 – Occupational Dose

Overview and Discussion of Comments

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Chapter 10 Overview

- Applies a performance-based approach for level of detail of information provided in the SAR regarding the control of occupational dose

Chapter 10 Comments

Changes made because of comments:

- None

Requested changes not incorporated:

- None, but staff disagreed with a comment statement that the program to control occupational exposure does not extend ALARA into the design

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Advanced Reactor Content of Application Project Chapter 11 Organization and Human Systems Interaction

Overview and Discussion of Comments

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Chapter 11 Overview

- Supports Part 50 and 52 non-LWR applications with relatively traditional concept of operations
  - Does not address remote or autonomous operations
- Guidance to applicants and NRC reviewers on:
  - Organizational staffing
  - Qualifications
  - Training
  - Operator Licensing: staffing exemptions, licensing during plant construction (i.e., cold licensing), considerations for new programs, other exemptions
- NRC staff also incorporated human factors engineering (HFE) guidance to supplement LMP and TICAP guidance

Chapter 11 Comments

Changes made because of comments:

- Added references to existing guidance covering level of detail for organizational information in CPs, OLs, and COLs (SRP Sections 13.1.1 and 13.1.2–13.1.3)
- Added applicable regulations in the acceptance criteria section
- Clarified acceptance criteria for addressing numbers of licensed and non-licensed operators; added reference to 10 CFR 26.205(c)

Requested changes not incorporated:

- Delete entire ISG or major sections; rely on NEI 18-04, "Risk-Informed Performance-Based Technology Inclusive Guidance for Non-Light Water Reactor Licensing Basis Development"
- Delete guidance related to topics the commenter interpreted as (draft) Part 53 requirements
- Add references to 10 CFR 50.34 (post-TMI requirements) topics
- Add clarification on technology neutral approaches for a site to meet the requirement for engineering expertise

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Advanced Reactor Content of Application Project Chapter 12 – Post Construction Inspection Testing and Analysis Program Overview and Discussion of Comments

Chapter 12 Overview

- Intended to provide guidance to the NRC staff regarding application content that would support making the finding that the constructed plant has met the applicable Part 50 and Part 52 regulations to support issuance of an operating license or authorization to load fuel, respectively
- ISG differentiates between 10 CFR Part 52 applicants that must include inspections, tests, analyses and acceptance criteria (ITAAC) and 10 CFR Part 50 applications that are not required to include ITAAC.
- Requirements to describe preoperational testing and initial operations in OL and COL applications are contained in 50.34(b)(6)(iii) and 52.79(a)(28), respectively.
- Provides guidance for:
  - post-manufacturing and construction inspection, preoperational testing (i.e., tests conducted following construction and construction-related testing, but prior to initial fuel load), analysis verification, and
  - initial startup testing (i.e., tests conducted during and after initial fuel load, up to and including initial power ascension).

Chapter 12 Comments

Changes made because of comments:

- Changed “post-construction…..” text to “post-manufacturing and construction” or just “post-manufacturing” if applicable
- Clarified content requirements for MLs and COLs referencing MLs
- Clarified text regarding pre-operational testing under a CP
- Removed specific reference to test review committee

Requested changes not incorporated:

- Add additional information regarding what ISG sections apply to CPs
- Remove acceptance criteria that the commenter interpreted to go beyond 10 CFR Part 50

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Advanced Reactor Content of Application Project Inservice Inspection/Inservice Testing Overview and Discussion of Comments

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ARCAP ISI/IST Overview

- The ISG provides guidance for developing risk-informed, performance-based ISI/IST programs for non-LWRs.
- The ISG guidance is based upon the use of a plant-specific PRA to identify the SSCs to be included in the programs.
- The ISI guidance is based upon the use of:
  - ASME BPV Code, Section XI, Division 2, “Requirements for Reliability and Integrity Management (RIM) Programs for NPPs,” for developing the ISI program using risk information and an expert panel.
  - ASME BPV Code, Section III, Division 5, “High Temperature Reactors,” for designs using high temperature materials and notes that ASME is developing a flaw evaluation Code Case for high temperature materials.

ARCAP ISI/IST Overview (continued)

- The IST guidance is based upon:
  - Existing IST program approach, with additional guidance for passive components, and notes that ASME is developing a new OM-2 Code for inservice testing of components in new and advanced reactors, including non-LWRs.
  - Using plant-specific risk information to determine the scope of the IST program and proposed testing frequencies.

- 43 comments received.

ARCAP ISI/IST Comments

Changes made because of comments:

- Allow the use of NQA-1 when implementing ASME BPV Code, Section XI, Division 2.
- Allow the use of unissued consensus codes at the CP stage provided they are officially issued prior to submitting the OL application and provided design finality is not being requested on any portion of the design affected by the unissued codes.
- Allow applicants for multi-module plants to apply standard ISI and IST programs to each module, without separate program approvals, provided the modules are identical.

ARCAP ISI/IST Comments

Requested changes not incorporated:

- Eliminate the discussion of the process to be followed when the ISI program identifies degradation has occurred, because ASME BPV Code, Section XI, Division 2, provides guidance in this area.
- Delete the discussion in the IST section on passive components.
- Include graphite and ceramic composite materials in the scope of ISI, because these materials are included in ASME BPV Code, Section III, Division 5.

  NOTE: The ISG does not preclude the inclusion of these materials because ASME BPV Code, Section III, Division 5, is to be used in the development of ISI for high temperature materials.

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Advanced Reactor Content of Application Project Technical Specifications

Overview and Discussion of Comments

ARCAP Technical Specifications - Overview

- The text in the 10 CFR 50.36 regulations for TS content needs adaptation to correlate to the analysis and outputs of the risk-informed LMP approach described in NEI 18-04.

- Guidance addresses content for TS administrative controls section and recommended TS format

ARCAP Technical Specifications Comments

Changes made because of comments:

- Added reference to NEI 18-04 section that addresses risk metrics for use in developing LCO completion times
- Added guidance for technical specification information in PSARs
- Added guidance regarding the need for an exemption to 10 CFR 50.36 LCO criteria

Requested changes not incorporated:

- Revise RG 1.177 to align with NEI 18-04 risk metrics
- Revise 10 CFR 50.36 to include criteria for non-LWRs

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Advanced Reactor Content of Application Project Fire Protection for Operations

Overview and Discussion of Comments

ARCAP Fire Protection for Operations-Overview

- 10 CFR 50.48(a) requires that each operating nuclear power plant have a fire protection plan that meets the requirements of either 10 CFR Part 50, Appendix A, Criterion 3 for LWRs or the applicant's proposed principal design criteria that have been deemed acceptable by the NRC.
  - Although 10 CFR 50.48(c) – NFPA 805 – does not apply to non-LWRs, concepts associated with this risk-informed approach are included in the draft ISG

- The scope of this ISG addresses the review of the application content regarding the fire protection program for operations including application descriptions of:
  - Management policy and program direction and the responsibilities of those individuals responsible for the program/plan's implementation.
  - The integrated combination of procedures and personnel that will implement fire protection program activities.

ARCAP Fire Protection for Operations Comments

Changes made because of comments:

- None

Requested changes not incorporated:

- Add reference to NEI 21-07
- Remove statements that the commenter interpreted to be from draft Part 53 (planned) requirements
- Remove references to general design criteria
- Remove prescriptive guidance regarding fire protection program
- Delete clarifying text regarding acceptability of NFPA 805
- Clarify relationship between PDC 3 and RG 1.232
- Delete reference to RG 1.189
- Remove/relax guidance regarding fire brigades for advanced reactors
- Delete references to verification and validation (V&V) of fire models
- Delete acceptance criteria and replace with only commitments to codes and standards
- Add expectations for fire protection programs in CP applications
- Add endorsement of NFPA 804
- Remove references to the term Authority Having Jurisdiction (AHJ)
- Remove/revise criteria in the guidance that may not apply to SMRs
- Remove references to a monitoring program for a non-NFPA 805 plant

Acronyms and Initialisms

ADAMS	Agencywide Documents Access and Management System
ANS	American Nuclear Society
AOO	abnormal operating occurrence
ASME	American Society of Mechanical Engineers
ARCAP	Advanced Reactor Content of Applications
ARCOP	Advanced Reactor Construction Oversite Process
BDBE	beyond design-basis event
CDC	complementary design criteria
CFR	Code of Federal Regulations
COL	combined license
CP	construction permit
DBA	design-basis accident
DBE	design-basis event
DBEHL	design-basis event hazard level (NEI 18-04)
DBHL	design-basis hazard level (NEI 21-07)
DC	design certification
DG	draft regulatory guide
DID	defense in depth
EAB	exclusion area boundary
FOAK	first-of-a-kind
FR	Federal Register
FSAR	final safety analysis report
GSI	generic safety issue
HFE	human factors engineering
ISG	interim staff guidance
ISI	inservice inspection
ISG	inservice testing
ITAAC	inspections, tests, analyses and acceptance criteria
LBE	licensing basis event
LCO	limiting condition for operation
LMP	Licensing Modernization Project
LPSD	low-power and shutdown

Acronyms and Initialisms (continued)

ML	manufacturing license
NEI	Nuclear Energy Institute
NEIMA	Nuclear Energy Innovation and Modernization Act
NFPA	National Fire Protection Association
NLWR	non-light-water reactor
NPUF	non-power utilization facility
NSRST	non-safety-related special treatment
NST	no special treatment
OL	operating license
PDC	principal design criteria
POS	plant operating state
PRA	probabilistic risk assessment
PSAR	preliminary safety analysis report
RFDC	required functional design criteria
RG	regulatory guide
RSF	required safety function
SAR	safety analysis report
SDA	standard design approval
SE	supplemental evaluation
SR	safety related
SRM	staff requirements memorandum
SSC	structure, system, and component
TEDE	total effective dose equivalent
TICAP	Technology-Inclusive Content of Applications
TIRICE	Technology-Inclusive, Risk Informed Change Evaluation
TIMaSC	Technology-Inclusive Management of Safety Case
TS	Technical Specification