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(202) 234-4433

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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700TH MEETING

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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WEDNESDAY

NOVEMBER 2, 2022

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The Advisory Committee met via teleconference at 8:30 a.m., Joy L. Rempe, Chairman, presiding.

COMMITTEE MEMBERS:

JOY L. REMPE, Chairman

WALTER L. KIRCHNER, Vice Chairman

DAVID A. PETTI, Member-at-Large

RONALD G. BALLINGER, Member

VICKI M. BIER, Member

CHARLES H. BROWN, JR., Member

VESNA B. DIMITRIJEVIC, Member

GREGORY H. HALNON, Member

JOSE A. MARCH-LEUBA, Member

MATTHEW W. SUNSERI, Member

DESIGNATED FEDERAL OFFICIAL:

DEREK WIDMAYER

P R O C E E D I N G S

8:30 a.m.

CHAIRMAN REMPE: Good morning. The meeting will now come to order. This is the second day of the 700th meeting of the Advisory Committee on Reactor Safeguards.

I'm Joy Rempe, Chairman of the ACRS. Other members in attendance are Ron Ballinger, Vicki Bier, Charles Brown, Vesna Dimitrijevic, Greg Halnon, Walt Kirchner, Jose March-Leuba, Dave Petti. And we expect Matt Sunseri to join us soon.

I note, though, we do have a quorum at this time. And similar to yesterday, the Committee is meeting in person and virtually. The communications channel has been opened to allow members of the public to monitor the committee discussion, and Mr. Derek Widmayer is the Designated Federal Officer for today's meeting.

During today's meeting, the Committee will consider the following topic: 10 CFR Part 53, risk-informed, technology-inclusive regulatory framework for commercial nuclear power plants, the proposed rulemaking language. The transcript of the open portions of the meeting is being kept.

It's requested that speakers identify

themselves and speak with sufficient clarity and volume so that they can be readily heard. Additionally, participants should mute themselves when they're not speaking.

At this time, I'd like to ask any other members if they have any opening remarks. Not hearing anyone speak up, I'd like to ask Dave Petti to lead us in our first topic for today's meeting.

Dave?

MEMBER PETTI: Thank you. Good morning, everyone. We had a full two days' subcommittee on details in the language, and I think all members attended, almost all members attended. So this is obviously going to be a much higher level given the time constraints. I don't have anything more except this is draft the final language that's about to be issued. It's a fairly big milestone, I guess, let's say.

I guess John Segala, you up to kick us off?

MR. SEGALA: Yes, thank you. Again, I'm John Segala. I'm a special assistant in the Division of Advanced Reactors and Non-Power Production and Utilization Facilities in the Office of Nuclear Reactor Regulation. Glad to be here today to discuss

the 10 CFR Part 53, which would be a new alternative risk-informed, performance-based and technology-inclusive framework for the licensing and regulation of commercial nuclear power plants.

The objective of Part 53 is to continue to provide reasonable assurance of adequate protection of public health and safety and the common defense and security to promote regulatory stability, predictability and clarity to reduce request for exemptions from the current requirements in 10 CFR Parts 50 and 52 to establish new requirements to address non-light-water reactor technologies to recognize technological advancements in reactor design and credit the possible response of some designs of commercial nuclear plants to postulate the accidents including slower transient response times and relatively small and slow release of fission products.

The NRC staff previously briefed the ACRS Full Committee on Part 53 in July and responded to the recommendations in the ACRS's fourth interim letter on September 30th. Since the July ACRS Full Committee meeting, the NRC staff has continued to engage extensively with stakeholders, and this had the opportunity to consider verbal and written feedback from the stakeholders as part of the staff's ongoing

efforts to enhance the proposed rule package.

On October 18th, the NRC staff briefed the ACRS subcommittee on the draft proposed Part 53 rulemaking package that the staff released on September 30th, which includes the draft proposed rule language for Framework A and Framework B, the accompanying preamble, which we used to call the statements of consideration, and five draft guidance documents supporting the draft proposed rule language.

Today, the NRC staff plans to provide the ACRS Full Committee a high level overview of the draft proposed Part 53 rulemaking package, including follow-on discussions on topics such as the generally-licensed reactor operator, or GLRO, and recent revisions made to the alternate evaluation for risk insights or AERI entry conditions.

We're looking forward to have discussions today and hearing any ACRS members' thoughts and feedbacks. That completes my opening remarks. I can turn it over maybe to Bob Beall?

MR. BEALL: Okay. Thanks, John. Our first presenter today is Jordan Hoellman. He's going to kick it off with a review of the Part 53 rule.

MR. HOELLMAN: Okay. Thanks, Bob. Thanks, John. Good morning, everyone. This is Jordan

Hoellman, I'm a project manager in the Advanced Reactor Policy Branch in NRR.

We can move to the next slide. This is just the agenda slide for today. I'll kick it off with an overview of the rulemaking schedule, the frameworks within Part 53 proposed rule language, then I'll turn it over to Bill Reckley to discuss the use of the quantitative health objectives in Framework A and fueled modules in Subparts E and O.

Marty Stutzke will talk about the AERI entry conditions. Boyce Travis will talk about the present standards in Framework B. And then Jesse Seymour will talk about the generally-licensed reactor operators and the human factors in other operator licensing guidance documents as part of the rulemaking package.

And then we'll wrap it up with just an overview of the guidance that we've developed over time to prepare for the review and licensing of advanced reactors and non-light-water reactor technologies.

Liz, you want to move to the next slide, please?

Okay, so this slide just represents the sort of schedule we've been on during the development

of Part 53. Over the past two and a half years or so, we've briefed the ACRS over 15 times. We didn't really feel it necessary to recap the entirety of the Nuclear Energy Innovation and Modernization Act, or NEIMA, and all the work that we've done previously.

As you may recall in the 2016-2017 time period, the staff developed the vision and strategy and implementation action plans for the licensing and review of non-light-water reactor technologies, focusing on our readiness within the existing regulations due to increased interest from reactor developers and Congress.

At the time, we focused on resolving key policy issues and closing gaps within the existing regulations. The enactment of NEIMA in 2019 required the development of a new regulatory framework by 2027. So that was kind of the rulemaking triggers there in the start period.

The rulemaking plan described developing a new 10 CFR Part that could, in a technology-inclusive way, address performance requirements, design features and programmatic controls for a wide variety of future reactors throughout the life of the facility.

The rulemaking plan described focusing the

rulemaking on risk-informed functional requirements, building on existing NRC requirements, mission policy statements and recent and ongoing activities. And the rulemaking plan also describes seeking extensive stakeholder engagement, including with this committee, on the content of the rule.

In October of 2020, the Commission approved the rulemaking plan in its SRM and directed the staff to accelerate the schedule to complete the rulemaking by 2024 to identify key uncertainties impacting the publication of the final rule, and to develop and release preliminary proposed rule language intermittently followed by extensive stakeholder outreach and dialogue.

In November of last year, the Commission approved its schedule extension to provide additional time for the staff to continue its efforts to reach alignment and discuss with external stakeholders on the scope of the rulemaking and further develop the rule language to allow additional time for external stakeholders to participate constructively and to ensure better coordination with a number of other advanced reactor activities.

The public comment period on the preliminary proposed rule language closed on August

31st of 2022. So that takes us to where we are now, on the right side of the slide, the October-November Subcommittee and Full Committee meetings, as we work to provide the proposed rulemaking package to the Commission in February of 2023.

So there were some questions during the subcommittee meeting on whether we'd have additional ACRS interactions during the rulemaking process, and of course we will. That's sort of indicated in the 2023-2024 timeline of the left side of the screen where we'll continue to have interactions with external stakeholders as we work to resolve comments and provide additional discussions on the rulemaking package after the rule is released for public comment.

CHAIRMAN REMPE: Before you leave that slide, I just want to try and understand the schedule. As you can imagine, the ACRS letter usually has some suggestions for improvements.

What will happen if there's some easy fixes in our letter, can you make some changes and still get the draft text to the commissioners by February 2023 is what you're shooting for, or is it just too late with the process? Maybe, we'd have a range of comment; some easy fixes, and some that we'll think about in the future if it's too hard to fix.

MR. HOELLMAN: Yes, thanks, Dr. Rempe. We do envision making or continue to make adjustments as the rulemaking package moves through concurrence of course. We value the Committee's input and plan to respond to the letters.

In our response, I think we will provide our thoughts on your recommendations and conclusions, any changes we would make in response, and that will be documented in our response.

CHAIRMAN REMPE: Thank you.

MEMBER DIMITRIJEVIC: I have a question of the same thing because that is in your preamble. In the Part 7, you have a specific request for comments where you requested comments in 20 different areas. So what is your position of that? You requested those comments, and when do you expect to receive them, address them or anything?

MR. HOELLMAN: Thanks, Vesna. I think we expect -- and part of our overall strategy and extensive stakeholder engagement is in getting the proposed rulemaking package available. What we released in September of this year was to sort of give some early indication of areas where we're interested in continued interactions with stakeholder and thoughts on specific language.

We've got similar questions in our advanced reactor stakeholder meetings on how can we continue to interact with the staff on these areas given that we're not in a formal comment period right now.

The way we've kind of responded to that is we aren't in a formal comment period because we're trying to get the package complete and work through all the internal reviews to get it to the Commission by February 2027. But we do recognize that there areas folks may want to interact with us on between now and when the proposed rule goes out for public comment.

And if there's a specific area within those questions that stakeholders want to engage on, we're open to adding it in as a topic for one our future stakeholder meetings and continue to gather input.

One of the key uncertainties and challenges I think we identified in our response to the SRM was that there's only a planned 60-day public comment period, and I think some of the members have recognized that that's rather short for a rulemaking of such complexity.

Some of the questions are specifically

targeted to areas where we continue to receive comments and questions, so we continue to seek input on those to refine the rule to get us to a place where we want to be. But on the schedule we're on, it's just -- we're trying to strike the right balance, I guess, in interacting and getting the rulemaking package complete.

(Simultaneous speaking.)

MEMBER DIMITRIJEVIC: In light of your -- let's say the first one, you're seeking comments of proposed organization and possibly improvements and blah, blah. So this is just sort of theoretical seeking because you will not have the time to do anything about that before February, right?

MR. HOELLMAN: Yes, so the --

(Simultaneous speaking.)

MEMBER DIMITRIJEVIC: -- you have a very nice organization of the things you're interested in the comments. My question is that, are you really interested in these comments?

MR. BEALL: Yes. Hi, this is Bob Beall. I'm the project manager for Part 53 rulemaking. Those questions in the draft proposed rule right now will be going out hopefully with the proposed rule for public comment. And so they will be addressed with all the

other comments we get on the proposed rule when issue the final rule in the 2024 timeframe. If the ACRS has some comments on those proposed questions, feel free to put that in the letter.

MEMBER PETTI: We will.

MR. BEALL: Like Jordan said, we'll see if we have time to address them in our response, or we will then address them --- any early comments, I will be addressing them in the follow-up.

MEMBER PETTI: Right. I didn't expect that you'd address all of our comments by the end of the year.

MR. BEALL: Right.

MEMBER PETTI: Some of them -- make sure we don't forget about them.

MEMBER DIMITRIJEVIC: Dave, my question is this has been indicated that they're open to change organization, but they obviously -- I don't believe that's true. There's many of these -- the requests for comments that I don't believe they're opened for those changes but asking for comments. That's my take.

It says that -- that's my question. Because if you are putting draft now, you're not going to change organization after that. That's my comment.

I understand that some of those questions are sort of nice they're there, but that is -- are you open to change the organization after the -- in the final?

MR. BEALL: I don't think we would ask the question if we weren't totally against the possibility of changing the organization. I think part of the reason we landed where we landed on the draft proposed rule language is we started down a path -- we've gotten multiple letters from ACRS saying this is a viable approach.

And then we started getting comments from stakeholders that mentioned things like, well, this doesn't quite align with international communities, guidance and rules. What if a developer would pursue international licensing before NRC licensing, and how would that work. Would we have to change our whole design or analysis to then fit within what we were proposing in Part 53 at the time?

And so that's sort of why -- or a reason why we took on the development of Framework B, which originally started as, if you recall, Part 50x, which tried to align or develop technology-inclusive requirements, tried to revise the existing requirements that were light-water reactor-focused to be more technology-inclusive.

We've been working, and I mentioned in the beginning in 2016, 2017, that was our initial focus in our implementation action plans was in recognition that early movers would -- Part 53 would not be available for them. They would need to come under Parts 50 and 52. So we started initially developing that.

And at the end of the slide, you'll see what the guidance development, what we've done over the years. A lot of it and still most of it is focused on Parts 50 and 52 because from a predictability and clarity standpoint, we want to have guidance available to support early movers. And we'll continue to learn and revise those guidance documents to support the final Part 53 rule as we move forward.

I don't think we're not looking for or not open to better suggestions on how to improve the rule. It's just sort of the timelines we're on, and how we sort of got here. I know we've talked about it a number of times. I know there's still external stakeholder concerns on some of it.

Okay, let's keep moving, Liz.

Here's kind of what we were just talking about, how we've got to Framework A and Framework B within the draft proposed rule language. As we've

mentioned before, Subpart A is our one subpart that's entirely common to both frameworks.

That has the general provisions, common definitions, and also framework-specific definitions for areas that just are -- the definition is specific to the methodology within the frameworks.

As we've noted before and in the rulemaking plan, Framework A was intended to align with the licensing modernization project, the PRA-led approach, following the DOE cost-shared, industry-led efforts.

Framework B, Subparts N through U, are the technical and application requirements for Framework B. As I mentioned, they were -- we initially developed them in response to stakeholder feedback requesting a technology-inclusive traditional licensing option that aligns more with international guidance and approaches.

It uses traditional uses of risk insights and design-specific rules. It requires applicants to develop principal design criteria. It also includes the alternative evaluation of risk insights, which Marty will discuss later.

The draft proposed rulemaking package consists of four enclosures that make up the federal

register notice, which is intended to help readers digest the numerous pages and be able to review the preamble along with the rule text without scrolling up and down a page or flipping back and forth.

We'll talk more about guidance later on this morning. Are there any questions on this slide or just keep moving?

Liz, next slide.

Okay, the front matter material in Sections 53000 and 53010 are relatively new. They weren't released publically until the draft proposed rulemaking package was released in September, but we've been discussing these over the last several months.

We hope that these sections provide some additional clarity on how the proposed rule is set up that each framework is stamped with their own set of consolidated requirements.

As Vesna mentioned, we know that we reached -- a major comment we've been receiving is that the rule should only consist of one framework, and that's what that specific request for comment in the federal register notice is sort of targeting.

I think we've noted in past meetings that we've tried to acknowledge this comment in the

preamble where we included a comment preamble discussion or subparts within the two frameworks that are similar or have requirements that essentially reproduce themselves. An example of that is Subparts G and Q on decommissioning.

I already mentioned, but the purpose of these sections up front is to really direct readers to understand that the frameworks are meant to be viewed independently with some exceptions, and Jesse will discuss some of them in Subpart F later on.

We think that it provides some additional clarity instead of having internal cross references within each subpart that might get confusing to the reader, applicant or the staff.

Liz, next slide.

This is Subpart A. This is the general provisions. I'll focus largely on the definitions. So 53020 is the common definitions. Most of the terms here are technically equivalent to the corresponding terms defined in Part 52 and intended to be consistent with other regulatory definitions or would be consistent with how the terms are used in existing regulations.

Commercial nuclear plan is one that we've talked about in the past. We started with the

definition that was intended to capture the NEIMA definition of advanced nuclear reactor. That caused some challenges with our stakeholders, and we didn't necessarily think it provided anything additional than what we would define as a commercial nuclear plant.

We do use plant more often in Part 53 than reactor because with some advanced technologies, radionuclide sources can be more prevalent in areas outside of the actual reactor vessel. So as a holistic look at the plant design, we want to make sure that all radionuclide sources are considered and identified and protected.

Manufactured reactor and manufactured reactor module, we tried to address some of our external stakeholders and potential vendors that are interested in manufactured reactor and using a manufacturing license.

And so we included the ability to load fuel at a manufactured reactor or manufacturing facility with proper mechanisms that prevent criticality while it's been transported to its final destination at a commercial nuclear plant.

As I mentioned before, some of the Framework A, Framework B definitions that are unique to the frameworks have to do with licensing basis

events and structure system component classifications. A lot of these in Framework A were derived from what was doing in the licensing modernization project as endorsed in Regulatory Guide 1.233.

I think generally that's all I wanted to cover on this slide. We did add the definition of safety function in response to some of the members' comments in their letter from August.

CHAIRMAN REMPE: I appreciate the changes you made as we indicated in the subcommittee meeting on the definition of safety function. But when I keep looking at this slide that you presented during the subcommittee meeting, I guess the thought comes to my mind still why couldn't you just use the one definition for Framework A to B.

Why is it you can't use that definition and apply it to both A and B? Because I know we heard, well, we want to a do a bottoms-up approach and have the design criteria before we identify the safety functions, but I would never know if my design criteria were complete unless I had thought at the beginning what safety functions were.

I know there's still this reluctance to jump in and do something that would be generally applicable to both frameworks. Is there something I'm

missing? Give me an example of why you couldn't have use this for Framework B?

MR. HOELLMAN: I'll start. I'll let Boyce maybe chime in or Bill. I think in general, we tried to capture the general piece you're talking about in the definition, but then we've included the Framework A and Framework B -- like how it would be implemented within the individual frameworks as sort of a subset of the definition.

Essentially, it comes from sort of how the safety functions are addressed by either design features and functional design criteria in Framework A.

So the safety functions play a distinct role in doing that using the specific design rules in Framework B and saying the principal design criteria essentially capture the same things, but we weren't sure what how would we implement that -- it's already implemented within the principal design criteria.

We thought just including it as a requirement in Framework B, we weren't sure how exactly to implement it. I don't know if Bill, Boyce --

CHAIRMAN REMPE: Give me an example on why you can't use it for Framework B --

MR. RECKLEY: This is Bill Reckley. As Jordan mentioned, the first part of the definition is basically common, and that is almost plain English, safety function.

The reason we felt compelled to distinguish how they're used within the two frameworks is Framework A, if I could remember, basically you derive your safety functions from what is needed to meet the high level of performance.

Whereas in Framework B, and largely existing in Parts 50 and 52, those functions are reflected through the general design criteria. They're going to be basically the same. This is engineering. They're basically going to be the same. Control heat level, control heat removal, contain the radionuclides.

So it's not surprising that in the end they look the same, but how they're used in the language is in Framework B, they're basically assumed from the beginning, these are your safety functions.

Whereas in Framework A, a slight difference. Instead of relying on the experience and the existing construct of the GDC, we say derive. I know that's a subtle difference.

CHAIRMAN REMPE: I'm still struggling

because, again, you may have a chemical hazard or something that is not embedded in the existing regulation and the general design criteria. And so to me, to know what the principal design criteria are for these non-LWRs, you should start thinking about what are the hazards first.

I appreciate what you did. You got closer to where you are, but I just don't know why you didn't take the next step and say, okay, identify what the hazards are and then see if all your design criteria and address those hazards. To me, it's just a logical approach.

MR. TRAVIS: Yes, and this is Boyce Travis from the staff. I think the disconnect is in Framework B, if we said define the safety functions, that's -- so ultimately in Framework B, the staff is making review findings against the principal design criteria that are utilized by the designer. The staff has to say, yes, these PDC are okay.

And in the review that the staff makes the findings against in Framework B, similar to how it's done in 50 and 52. The staff makes findings against those principal design criteria, which are more specific and cover the full spectrum of design -- a subset of what constitutes the safety functions for

the design as opposed to the top-down holistic approach in Framework A.

And so adding a requirement to define safety functions, in our view in Framework B, is adding another requirement that it's not clear how the staff aids. It's an additional burden on top of the principal design criteria, which we think cover it. But B, it differs from how the staff is making their review findings of Framework B coming from the bottom-up versus the top-down approach that's in Framework A.

CHAIRMAN REMPE: How will the staff know that the identified principal design criteria are complete unless everyone agrees on what the safety functions are? Anyway, I've made my point.

That's why I just wanted to bring it up because we were too nice, I thought, in the subcommittee meeting and I didn't harass you, but I kept thinking I must be missing something. I thought about it some more, and I don't get what I'm missing. But anyway, go ahead. I've belabored this point enough.

(Laughter.)

MR. HOELLMAN: Okay, so I think we can move to the next slide unless there's any other questions on Part A.

Okay, so this is just another overview of Framework A with some of the specific topics we plan to cover today. We're going to cover the QHOs in Subpart B, fueled modules in Subpart E and O. And then in Subpart F, the generally-licensed reactor operators, human factors and the associated ISGs that are part of the proposed rulemaking package.

So with that, I think I'm turning it over to Bill on the next slide.

MR. RECKLEY: Liz, just keep this slide here for a second.

Again, this is Bill Reckley. Just as a summary of Framework A, I know we've talked about it in numerous meetings. We tried to organize it somewhat like a systems engineering approach or sometimes we've talked about this as a top-down approach where we put the high level requirements in Subpart B and then follow that through the organization that set up like the life cycle of a facility to say what needs to be done within those stages of the life cycle to meet those high level criteria.

As Jordan mentioned, you go down through the subparts and the life cycle of site, being construction, operation and decommissioning with a few

licensing and general matters like quality assurance in the latter Subparts I, J and K.

Again, the important part of this, and we'll get into it on the next slide, is the establishment of the high level criteria, Subpart B. As Jordan mentioned, we'll talk about that. Jesse will talk about the generally-licensed reactor operators and other human factor issues later in the presentation.

So, Liz, if you can go to the next slide.

This is one we used during the subcommittee meeting to basically try to summarize an integrated approach that we try to reflect in Framework A. The first -- and we used the model that's been around since the 1990s in Regulatory Guide 1.174, risk-informed decisionmaking, to try make sure that we had captured things.

And also to try to make sure that Framework A would provide a comparable level of safety as is provided in Parts 50 and 52 for the operating fleet. So just going around clockwise really quickly, one of the first step there -- again, we had to tailor this somewhat because 1.174 is written to address changes to existing licensing basis whereas in Part 53 we're talking about basically starting from scratch

and forming the licensing basis. And nevertheless, works pretty well, we think.

And so the first step in that, in 1.174, is to make sure you're meeting the purpose of the existing regs. We tried to do is -- we were doing crosswalks and looking and through interactions.

One example, I think of this first box and just the exercises we went through is if you remember very early on in the process, as Jordan mentioned maybe two years ago, a lot of the discussion with the ACRS was on you have to have a requirement that the facility will be subcritical in the long term.

And we had not had that provision in the first draft. And so we added a requirement, a specific requirement, under the design requirements in 53 440 to require -- so through those internal interactions and interactions with stakeholders, interactions with the ACRS, we think we addressed all the topics that are addressed in 50 and 52.

The next one going, again, clockwise is defense in-depth. As we talked many times, there's specific provisions to assess defense in-depth. This, again, it's an area that's different in that in 50 and 52, defense in-depth is already built into the general design criteria and other requirements. It's a core

philosophy, but it's built in.

In Framework A, applicants are required to do an assessment to make sure we end up in a comparable place. Design requirements and margin, engineering margins, that is addressed in, again, the design requirements in 53 440 as well as in some of the other higher level requirements in Subpart B.

Going around again, the next step we've talked about, we'll talk about a little more I suspect, is a comparison to the safety goals. Remember, 1.174 was developed as a primary tool for risk-informed decisionmaking. So what did it bring into play that wasn't there, let's say, in the 70s or early 80s? That was risk insights from PRAs.

And so this step is to make sure that a facility meets the NRC safety goals. We're using the quantitative health objectives, the QHOs, as a technology-inclusive metric. And then lastly, the process requires that whatever you do, you monitor performance.

MEMBER DIMITRIJEVIC: Okay, this is Vesna. So there is a couple -- you took this straight from the Reg Guide 1.174. This is a good demonstration on the integration of the existing regulation in that time and the new one in the sense of defense in-depth

and safety margins and everything.

I mean, number one, I don't even know how that applies to here. You want to consider the new regulation as a change? You have a very little meeting performance in this. But the bad thing which I want to -- so this, how it is built, it was -- the data applied to core damage frequency and large early release frequency because all the criteria are based on that.

So because we don't really know are the new design going to have mounts and large releases to be introduced to HO on your Part 4. You proposed to replace that with QHOs. So let's say the plan comes, which really have a core damage frequency and large release frequency, and you want to use QHOs.

What's going to happen based on the current experience with Level 3, if you look in that NRC project, the Level 3, you will see that plans with core damage frequency of ten to minus two will satisfy the QHOs. So that doesn't really meet what you just said that you have to have a comparable level of safety.

That's one of my additional comments of QHOs. Because as it's shown in the Level 3 results, the US Level 3 -- so this is a couple orders of

magnitude different than what it was when they tried to connect core damage frequencies to the constant facilities and everything. So this is one of my comments that if you started QHOs and then try to come back to substitute measures, you will have a totally different safety goal.

MR. RECKLEY: Yes, I think we would acknowledge that with different technologies, you might have different constructs of what you're depending on in order to meet the QHOs.

And, again, to try to develop a technology-inclusive approach, we just didn't see how we could stick with the use of core damage frequency and containment failure given that some designs may not be built that way.

We did try in the preamble to reinforce that for those that want to develop surrogates or if we have light-water reactors under Part 53 that want to use existing surrogates, CDF and large release frequency, that that would be okay.

MEMBER BIER: I don't want to harp on this because I think it's a bit beyond the scope of Part 53 to address it, but I would also note, which I think I commented before, that at some level the current safety goals are kind of inherently not technology

neutral or at least size neutral because they were kind of gear around you have a 1000 megawatt plant and you're comparing it against coal generation.

You have, say, a five megawatt plant and the alternative is not coal generation, then sort of the whole rationale for those safety goals is not really strong anymore.

MR. RECKLEY: Right. I think that's actually a good point. I think we addressed it in the letter. It's kind of beyond the scope. We were sticking with established, recognizing that some of that, when did that, that means we were established forty years ago, but the Commission has, over the years, reinforced that it's okay to continue to use.

So that's probably about as far as we can go on this project. But we had recognized that a lot of what we're trying to do -- you cannot escape that it was developed in a light-water reactor world. In severe accident space, for example, you look at the severe accident policy statement, it's full of light-water reactors and maybe one or two lines that say, yeah, we'll take this concept to other technologies. But it was light-water focused.

But the concept we tried to capture, because it builds, again, an adverse aspect -- usually

a defense in-depth aspect when you get into severe accidents. So, point taken.

MEMBER DIMITRIJEVIC: My main point here was, because you quote them here, that is Reg Guide 1.174 on this slide. If you're using QHO, Reg Guide 1.174 is not anymore applicable. That's my main point.

MR. RECKLEY: Right. I'll acknowledge that, Vesna, that we took the concept from 1.174 and tried to use it. 1.174, like we just said, almost everything is light-water reactor-specific, so it's built for light-water reactor technologies in terms of what we're looking at, the prevalence of using Level 1 and Level 2 PRAs, CDF and large release frequencies. So, yes.

Dave.

MEMBER PETTI: Bill, I just want to just come at it. I love this slide. This is a critical point we'll see in the letter because I like it so much. But there are stakeholders who are making claims that Framework A is a higher safety bar, but it really isn't.

And this is what the staff has done to convince themselves that it is an equivalent level of safety. That's an incredibly important thing. It's

in the preamble. I know we've talked through in our meetings, but if you just read the rule alone, this doesn't come out easily.

Members, you'll see it. There's a whole couple paragraphs on this. I think this is fairly important because it anchors Framework A. It is a complete and different thought process, and that's why it was so important in the preamble, in my opinion, to help people understand how different it really is than Framework B.

And I don't think you get that sense when you just read the rule itself. You really got to look at the preamble. In some ways, I wish we had had the preamble before we had Framework A and B because it really helped a lot of things. So you'll see if it survives in that letter writing, but -- this is very important.

MR. RECKLEY: Liz, if we can go to the next slide. And I'll acknowledge, Dr. Petti, that the ACRS was asking for that explanation from the very beginning, and we kept, due to various reasons, saying we will get there.

We tried in the discussion tables and some of the things that we released in real-time to provide some of the explanation, but -- undoubtedly, it fell

short. So to that point, the primary thing that we needed to do was prove to ourselves a comparable or equivalent level of safety.

That might sound straightforward, but keep in mind that for the existing fleet, the confidence that there's an adequate level of safety is provided by them complying with the rules that were developed initially and as they've evolved over decades.

So there is no specific measure. Adequate protection is provided by meeting the rules, so it's a somewhat circular argument. When you bring in a new effort and say, we're actually going to use measures, but you can't really have it in numerical terms. That was the challenge.

We did go through -- some of this touches on what Joy was mentioning. Even under a traditional approach if you go back to the 1960s, they were doing things like this. That's why you get the same -- you end up largely in similar places is because this isn't a new concept.

But in any case, if you start on the right, we've used this echelon or hierarchy many times, safety criteria, then you use those to define safety functions. From safety functions, what are the design features I'm going to use provide those

functions. And then ultimately, how does that equipment need to perform to provide the function.

Now, I think one interesting thing, and Jesse's going to get to it later on, is under this Framework, you're allowed to use the same similar logic for people. And so that is, to me, one of the more interesting things is that we're looking, again, trying to take an integrated approach.

What's the role of the equipment, what's the role of the people, what's the role of operating programs in order to meet those things. So it does help to kind of have this structure throughout. The middle just repeats; I won't do that. Again, we've talked about it many times. The safety criterion in Subpart B.

And then just the caution, because we heard this from some, that we don't equate the QHOs to adequate protection. It's one of multiple considerations in our development and ultimately in the finding that we would make.

Liz, if we can go to the next slide that talks really about Framework B and the construct. I did want to mention just because it's another area that I think is a significant change and it affects both Frameworks A and B. And that is to include

provisions for the loading of fuel in a factory.

In order to do that and make it work, it's both a technical and somewhat legal consideration. We came up with the technical criterion in order to prevent criticality and work with our office of general counsel to say if that's met, you can do this activity and the thing that you have, which is basically a manufactured reactor module loaded with fuel, may not considered a utilization facility.

Because under the Atomic Energy Act, if we were to put it in that bin, then it would trigger a whole bunch of ramifications. Anyway, I just wanted to mention that.

Liz, I think if you go to the next slide, we can get into Framework B, and I'll turn it over to Boyce.

MR. TRAVIS: Yes, so thanks, Bill.

This is Boyce Travis from the staff. This slide --

MEMBER PETTI: Boyce, before you --

MR. TRAVIS: Yes, go ahead.

MEMBER PETTI: A time check, we're about halfway. We have one hour left. Thanks.

MR. TRAVIS: Yes, no problem.

I will be briefly, thankfully. This slide

provides a summary of Framework B as it's currently laid out in the rule. We had some extensive discussion in the subcommittee meeting to touch on various parts of Framework B.

I'll note most of them are similar or in some cases basically identical to Framework A with the exceptions that are in P and R that we discussed. Over the next few slides, the staff is going to revisit a couple of topics in Framework B.

One of which is codes of standards, another which is AERI that Marty is going to discuss. Aside from that, I'm not going to go into a lot of detail on Framework B. I'll use this opportunity, if anyone has any questions about other areas in this framework, I'll be happy to talk about them here.

(No response.)

MR. TRAVIS: Hearing none, I'm going to move onto Slide 12. The staff provided Slide 12 to kind of revisit and provide some clarification on the top of the codes and standards because this garnered a fair amount of discussion during the subcommittee.

A lot of that discussion was focused on the draft requirements related to codes and standards in Framework A versus what's in Framework B. I kind of want to step back and highlight what the role of

codes and standards in Framework B is.

With regards to non-LWRs, we think Framework A and Framework B are fairly consistent in that -- there's a provision in Framework B specifically that requested description and justification for codes and standards not previously endorsed or accepted by the NRCD (phonetic) for those to be used in the design.

Because we recognize that non-LWRs are probably going to be use codes and standards in order to justify how their components meet various design requirements. And those design requirements, we didn't want to be prescriptive, and we wanted to allow for commensurate qualification of those components with their safety significance.

And so in that sense, Framework B and A are consistent for non-LWRs. For LWRs, Framework B has some specific requirements for what light-water reactor codes and standards are applied because our target an equivalent level of safety with the existing requirements.

And as Bill has noted earlier, the existing requirements for light-water reactors have been developed with extensive operating, decades of operating experience, and an adherence to a certain

set of codes and standards that have been used.

And so currently, those codes and standards are reflected as requirements in Framework B specifically for light-water reactors. The specifics of that are detailed in the requirements. It does create, I'll say, a difference in how codes and standards are applied for LWRs in Framework A and Framework B.

Part of that is derived from the difference in philosophy that's used in the two frameworks. Framework A, as Bill noted, an integrated approach that involves the comprehensive, detailed consideration of the full spectrum of event sequences.

Whereas Framework B is the more traditional, stylized deterministic analysis with simplifications and conservatism that's coupled with some checks on defense in-depth effectively. I sense we're going to have a discussion here, so I'll open it up --

MEMBER BROWN: Yes, this is Charlie Brown. I had a question.

MR. TRAVIS: Go for it.

MEMBER BROWN: I have asked in previous meetings about general design criteria as opposed to kind of more amorphous claims (audio interference).

No, I've got it on. I just didn't bother to talk into it. Thank you. I'm sorry.

John, I have some interest in humor here. I need more wire.

So I raised that point before, and I think others have pointed out that Framework B has the old framework of 10 CFR 55(a)(h). I'm interested in H in many circumstances. You talked about proposed changes in 55a. I didn't get that out of the previous meetings (audio interference).

Right now, there's general design requirements, GDCs, there's specific things in that area that I use frequently because guidance -- not guidance, specific, we got to go by this, this and this, although they're general principles.

Are you going to change that? You talked about making changes. Why do we have to change 55(a)(h) if it's going to be light-water reactors. You're going to turn those into jelly beans as well?

(Audio interference.)

MR. TRAVIS: Yes, so let's see if I can address this appropriately. So setting aside the PDC and GDC for the moment. 5055a as it stands in the proposed rule right now is going to continue to apply to light-water reactor designs that are 5052 in

Framework B.

There are conforming changes as part of this rule package to ensure that they fall within the umbrella requirements of 5055a. Right now, there's no proposal to include non-light-water reactors under the umbrella 5055a.

They would have to propose appropriate codes and standards for whatever equipment needs to be qualified up to the safety level they're proposing --

MEMBER BROWN: That's for advanced reactors?

MR. TRAVIS: Correct, yes. For non-light-water reactors.

MEMBER BROWN: I got that, but --

MR. TRAVIS: Light-water under Framework B, which under the proposed rule, would still be required to meet these.

(Simultaneous speaking.)

MEMBER BROWN: -- doesn't -- it would fall under that same category?

MR. TRAVIS: That's correct.

MEMBER BROWN: I call of those light-water --

MR. TRAVIS: That is currently what is being proposed, and I think we're going to continue to

iterate internally to figure out what the best path forward is.

MEMBER BROWN: Is there going to be any effort to try to -- you talked about now the non-light-waters. Is there going to be any attempt to try to take or utilize what we know? If you look at the GDCs and a few things like that, a lot of them, they're very, very generalized.

They would apply, theoretically, to any type of reactor, not specific to whether it's sodium or lead-bismuth or whatever would be or whatever the other coolants are, et cetera.

Is there going to be any effort to try to tailor so that the non-light-water reactors that fall under the Part B as well? Is that what you're talking about? Somebody wanted to do a non-light-water and advanced reactor under Framework B, could they do that?

MR. TRAVIS: Yes. Framework B is tailored to be technology-inclusive. It could be a light-water reactor or non-light-water reactor.

MEMBER BROWN: So when you said on your initial statement, you said this doesn't apply to non-light-water --

MR. TRAVIS: Sorry, there's a bifurcation

in Framework B for codes and standards in that it does prescriptively say there are certain codes and standards that LWRs, whether it's a BWR or PWR, are going to have to apply. It isn't that prescriptive for non-light-water reactors.

MEMBER BROWN: Okay, I got it. That's fine. Now, I understand a little bit. That's all --

MR. TRAVIS: Okay. Happy to provide the clarification.

MEMBER KIRCHNER: In practice, Boyce, what would your expectation be under this language? For example, say in this non-LWR advanced reactor design, you identified a fission product barrier.

Typically, most reactors are going to have some kind of primary system. Is the expectation that that primary system would be made into an equivalent standard as the ASME Boiler and Pressure Vessel Code, and how do you signal that to the applicants?

MR. TRAVIS: I think this is a really good question. I'm going to maybe speak a little philosophically for a moment, so I apologize. I will try to get to an example at the end that may make it a little a bit more concrete.

But I think given the broad spectrum of the designs that are being considered, we didn't want

to go down the path of actually saying, yes, your primary system, for instance, has to meet this level of standard.

Because there are different safety implications for the integrity of the primary system among the advanced reactor designs. For instance, there might be reactor designs where only a very small portion of the primary system, because let's say it's a low pressure, needs to be qualified for integrity.

For instance, the vessel and some connections below or above a certain height to prevent a siphon effect or a leakage effect. We would expect then there would be an as-we-like standard applied to that vessel and those connections because that integrity is sufficiently important that it's serving as a fission product boundary.

I say as-we-like. As-we-like is the one I'm aware of, we think there might be others that could do that role for certain reactor designs. And so yes, the expectation is for SSCs, they are being relied on for a level of safety as a fission product barrier.

There would be an appropriate standard or code of standard or mechanism that we can point to and say, yes, that level of functional performance by that

component is going to be assured by this code or this standard.

And for many applications, I think there are cases where these materials and what's being done is new enough that that standard may not be sufficiently developed yet.

I think as we license these reactor designs, we're going to learn some things and probably but some of this into guidance, for instance. So I don't think we wanted to do the same thing we did with 5055a and say, and here's the list of codes and standards that are going to apply.

Sorry, I'm not really answering the question of how do I signal that. I think eventually it will be signaled through guidance, but there's still an expectation that whatever you are relying to have your safety performance for your SSCs is going to be qualified in some ways. And one of the best ways to do is an appropriate code and standard.

MEMBER KIRCHNER: Yes, that's a reasonable way to address the question. I'm just looking at it from the perspective, one is engineering, two from the eyes of the public.

Because you've gone through significant effort, as Bill outlined earlier, to demonstrate that

you're going to achieve an equivalent level of adequate protection or however you want phrase it, level of safety.

And I've heard the arguments from some of the proponents for advanced designs that were low pressure, so the primary system isn't as important as in an LWR. It depends on the design, of course, especially if you're reliant on the coolant that's in the primary system no matter what the pressure is.

I appreciate your challenge here because you don't want to be overly prescriptive not knowing what the design might be like. But it's just in my mind, the expectation would be that if it provides one of those critical safety functions, then the integrity -- one of the ways ensuring the integrity of the function is through going through an ASME code by case. Or if it's in the reactor protection system, IEEE equivalent and so on. Well, I made my point.

MR. TRAVIS: I agree with you 100 percent. Our expectation is that for applications that are similar to what's being seen in the industry today, for instance, RCS boundary, a reactor protection system, there's going to be a code and standard employed. And of those codes and standards, we know which one currently is used to make that

justification.

But given, again, given the just huge spectrum and variety of things that are coming in, it doesn't -- it's both a challenging task, and it doesn't necessarily benefit us to start prescribing them in the regulation itself. If we have to go down that road, I think guidance would be the way we would go.

MEMBER KIRCHNER: Thank you.

MEMBER BROWN: This is me again, Charlie. I just want to amplify the -- if you look at the standards -- can you hear me okay?

On the technology neutral side. It's interesting to go back and reflect on even how we've been using the current standards the 93 -- 603-1991 IEEE standard. It's got all the architectural stuff in it.

Control of access is really the only one because there was only physical access at that point, not electronic access, which we're struggling with and figuring out how to deal with now. But that's a remarkably technology neutral -- it doesn't tell you to use vacuum tubes, or mag amps or transistors or any -- it doesn't tell you. It just says, hey, you need these overall architectural standards functionally.

And that's kind of the bulwark of what you put together. So having that be amorphous, there's going to be, even in the non-light-water reactors, you got to generate steam somehow. People are going to say, oh, we're going to have thermal -- I don't know, some kind of heat transfer into these magic thermoelectric conversion devices with tons of powered electronics.

I'll believe that when I see it since I've dealt with it for 20 years, 30 years. That's not easy. Steam drives the big generators. So if the stuff you look at, you're going to have steam somewhere more than likely.

There's high pressure somewhere in that system, and it's connected directly to the primary systems. So you're going to have some reasonable standards of that interface. You just can't leave it -- we know how to deal with that interface on the secondary sides, but I just think we need some thought going forward as to how you do this into going forward.

There's some areas where it's transparent. You're going to have some type of reactor monitoring systems, some type of safety systems, whatever they are, the old standards really would apply. So I'm

just encouraging you to think broadly.

Don't throw the baby out with the bathwater because we know how to do that, and we see the systems we're developing today, and the new applications would work just as well. We still got to monitor the plant whatever the pressures and temperatures and neutron configuration they have.

MR. TRAVIS: Fully agree. I think this is just another -- it's a challenging task for the staff. There's flexibility and certainty are, in a lot of cases, on the same axis. By affording that flexibility, there's -- it is going to make their view a little more challenging in some cases. And it's not as easy as checking the box. But we have been considering it, and we'll continue to consider going forward.

MEMBER BROWN: Thanks.

MEMBER PETTI: Let's keep moving.

MR. TRAVIS: Sorry, Dave.

MEMBER BROWN: Sorry about that, Dave.

MR. TRAVIS: Sorry, this is my last slide. I'm going to pass it over to Marty Stutzke.

MR. STUTZKE: Good morning, I'm Marty Stutzke from the staff. I wanted to talk to you about the evolution of the alternative evaluation risk

insights approach, emphasizing the AERI approach that has been developed. The underlying purpose is the various Commission policies.

Second, and I guess probably most important thing for this presentation, is we have the AERI entry conditions since the subcommittee meeting a couple of weeks ago in order to address various stakeholders' comments and further consideration of the insights we got from the MACCS calculations. I'll explain that in some detail.

As a result of changing the entry conditions, we went back and made sure that we didn't deter perhaps some unintended consequence. The AERI referenced elsewhere in the regulations. Notably, the determination that a facility is a self-reliant mitigation facility, which enables the use of generally-licensed reactor operators. And last but not least, we're continuing to develop our draft regulatory guides DG-1413 and 1414 that enables and support the AERI approach, like that. It's been an exciting week.

Next slide.

I had presented this slide at the subcommittee meeting that lays out how the various policy statements from the Commission have informed

the development of the AERI process.

I point you to the upper left box that talks about the advanced reactor policy statement that says we expect advanced designers to comply with the safety goal policy statement. Like that.

Later on, goes down and says, well, we expect you to comply with the severe accident policy statement and to use PRA as the design tool. When you read the PRA policy statement as shown on the lower left corner, it recognizes that not everything needs to be a full fault tree, event tree, type of approach.

There's other ways to do risk assessments like that. What's challenging here is indicates broadly in a fault tree should apply to complex systems. This is a big challenge to define. What is a complex system?

So we need some way when we write a regulation that translates those subjective terms into something like that's a more crisp sort of yes or no. If you meet this criteria, you're allowed to do AERI. If not, something else. That's been a big challenge for us.

But anyway, that enables the use of the AERI process in lieu of a PRA if the entry conditions are met. (Audio interference.)

With that, next slide. Why did we actually revise the entry conditions? Well, some stakeholders commented that the current ones, the ones that we presented at the subcommittee meeting, were overly conservative.

And by that, what seems to be meant is that we were screening out plants that should be allowed to perform an AERI in lieu of a PRA. Of course, the way that the entry conditions are structured is anybody can perform a PRA. That's always the option.

AERI would only be needed if they met the certain conditions and didn't want to invest in doing the PRA. I fully recognize PRAs can be enormously time-consuming and resource-intensive. I personally done about 40 in my career.

On top of what we have in the various industry consensus standards that tell us how to review PRAs, it's quite laborious at times. The intent behind AERI is necessarily don't need to bring all of that mechanism into play.

Second thing is that we re-examine the scoping calculations that Keith Compton presented to you at the subcommittee meeting. And I came to realize, remember those earlier AERI entry conditions

were fixated on trying to dose at a 100 meters met certain criteria.

And I looked at it and began to realize that was probably an inadequate predictor of the overall risk. Specifically, if you've got elevated plans or buoyant releases.

And with the result that even though you could have met the entry conditions, you can be -- sometimes the conditional risk would be well above the QHOs, could be well below the QHOs. So we're trying to reduce the variability. Last and not least --

MEMBER KIRCHNER: If I might add too, we recently renewed methodology for EPZ sizing and we came to the same -- not the exact same conclusion, but you could have situations where a close in dose at 100 meters just like this entry level condition might not be the best metric of evaluating EPZs, sizing.

MR. STUTZKE: Yes, I appreciate that. I realize the AERI entry conditions are dependent on the sizing of the EPZ or other aspects. But yes, it's a technical problem, and I'll show you a slide in just a minute. Last but not least, just the desire to provide increased flexibility and how you demonstrate the AERI entry conditions are met.

Next slide.

These are the revised AERI entry conditions. You'll notice in Paragraph A in this language, we have eliminated this notion of dose at 100 meters and replaced it with the notion of consequence evaluated anywhere in the area between the EAB or within ten miles of the EAB meets this 2.5 rem criteria.

We replaced the language in Paragraph B to specify how to identify the postulated boundaries as they were found. So you'll notice the notion that you need to search for all radiological sources, you need to consider internal/external hazards, focus on the combination, failures to get you into the bounding event.

Last but not least, consideration of various commission of various commission and omission, like that. Realize in order to -- you have the bounding event, one of the more of the plant's safety functions have failed, had a major release going on beyond the DBA like that.

So the intent here was to reword the entry conditions being more -- I'll characterize it as possibly other than do this and this and this rather than, well, don't do that in the analysis. So we think that it should be more effective.

Next slide.

MEMBER PETTI: I'm a little confused. I also thought there was language in that about you could take credit for some inherent safety functions. And there was also discussion of the self-reliant mitigating facility as an entry requirement. That's all gone now?

MR. STUTZKE: Well, the self-reliant mitigation facility that enables the use of GLROs, that was really never in the original condition. What we said was if you met the original AERI entry condition plus other criteria, then you would be deemed a self-reliant facility.

MEMBER HALNON: It's the other way around, Dave.

MEMBER PETTI: It's the other way around.

MR. STUTZKE: Yes, it's the other way around.

MR. SEYMOUR: This is Jesse Seymour. On the last slides, I'm not sure how it plugs in, but the actual self-reliant mitigation designation happens over in 53.800 --

MEMBER PETTI: Okay, because I could imagine there's a plant -- this is a hazard-based criteria if I understood that.

MR. SEYMOUR: Correct.

MEMBER PETTI: But I can imagine there are some designs that are not necessarily fully meet the self-reliant definition but clearly would meet the AERI. That's still a lot.

MR. SEYMOUR: Yes. When we get to my slides, I'll explore how that works. But one thing that's important to remember is even a plant that meets AERI when it enters into those criteria, it still has other criteria that have to be met. Specifically, for defense in-depth, that's not tied to credited human action. Again, there's more to being a GLRO self-reliant mitigation facility than just meeting AERI by itself.

MEMBER PETTI: Yes, I understood that. I'm talking -- I'm looking at the exact opposite. I don't want to do a GLRO, but I want to do AERI. I have a plant that I'm pretty sure can get into these entry conditions.

But because of the restrictive nature of the definition of self-reliant mitigating facility, it's very gray whether or not I need human action based on some aspects of the design. But they're still allowed to do a more streamlined AERI approach. I've seen some microreactor designs that may actually

be in that campus.

MR. STUTZKE: Next slide, Liz.

MEMBER KIRCHNER: Dave, may I make an observation. That last slide, Marty, this is very good to hear. I'm making a mental note that you're -- sorry, I can't read with or without glasses. When you have A and B for -- in terms of guidance for evaluating EPZ sizes. This is a very good, distinct way to go about evaluating a proposed EPZ. Just making an observation, thank you. Keep going.

MR. STUTZKE: Next slide, please. This points to the results of the MACCS calculations. I drew this cartoon to explain things to my managers like this. The idea is simple. Hot air rises. But we get some energy into the plume even though it's at a ground release that actually rises up over the 100-meter reference point with the -- what MACCS was telling us was that the major event of the largest dose in the ten-mile area was around four to five to six miles depending on how much energy you put in the plume.

And of course, the area is bigger, so more people are exposed to that higher dose, it was raising the conditional risk, like that. It's obvious in retrospect, but being said, the presumption that I had

used before with my back-of-the-envelope type of calculation was, well, obviously the further away you move from the reactor, the dose should go down, right? But that's not necessarily the case.

We found that it can -- varying answers by an order or two of magnitude. So the intent was, as shown in the graphic on the left-hand side, it was to limit the maximum dose anywhere within the annuals. And that should work. But we're in the process of doing a bit more confirmatory counts and things like that.

Next slide.

So what MACCS scoping calculations were telling us was if you get a 25 rem lifetime dose, nominally 50 years, then the conditional individual early fatality risk over that ten-mile region from the EAB outward generally would meet 2x10-6 per event. And assuming one of them appeared, then you've demonstrated at least the QHOs.

Moreover, the MACCS scoping calculations were telling us the first year dose seemed to be the controlling or the limiting dose. In other words, you meet 2.5 rem the first year, you're going to meet 25 rem over the lifetime due to various reasons. Radioactive decay, weathering, groundshine, stuff like

that.

The second point here is 2.5 rem, let's say, almost coincidentally is a small fraction, 10 percent, of the traditional dose limits that have been used in Part 100 and over in 5034.

What we're trying to say here is if you meet the AERI entry conditions, 2.5 rem over the first year, you've met the 25 rem, at the worst two-hour interval at the EAB, and you've met the 25 rem over the duration of a (audio interference).

Converse is not true, however. So this is an indication of how the AERI conditions restricts itself. In other words, not every plant would be eligible to perform an AERI.

MEMBER HALNON: Marty, this is Greg. The ten miles, is that intended to have any similarity to the ten-mile EPZ issues in Part 150?

MR. STUTZKE: The answer is no. It's purely coincidental.

MEMBER HALNON: Okay. I would hope that in the guidance you would make sure that people don't confuse the two, especially with the new --

MR. STUTZKE: You're not the first one to point this out. Actually, when the safety goals were first formulated, it was a 50-mile radius. There was

big debate that your average (audio interference) people closer would get more dose than --

MEMBER HALNON: It's a nominal issue --

(Simultaneous speaking.)

MEMBER HALNON: -- based on counties and jurisdictions.

MR. STUTZKE: Right.

MEMBER HALNON: So just make sure that that's clear in your guidance.

MR. STUTZKE: Will do. Next slide. As I mentioned before, the AERI entry conditions not only used to determine when an AERI can be performed in lieu of a PRA. They're also used to consider when you need to meet requirements for the mitigation beyond design-basis event and combustible gas control.

As Jesse just commented, and certain people will elaborate further, in combination with other conditions the AERI entry conditions are used to define when a plant is a self-reliant mitigation facility.

But one of those things that I would emphasize here that actually seemed to be confusing among the staff is just because you perform an AERI, you're not relieved from meeting all the other requirements in Framework B. It is not like a maximum

hypothetical accident. Everything still applies to you.

In other words, you need to have a bunch of design criteria, et cetera, et cetera, like this. And as I mentioned before on the second bullet there, some applicants may elect to perform a PRA even if they meet the AERI entry.

MEMBER HALNON: This is Greg again. The question comes in if they decide to do a PRA right after an AERI, they still must have GLROs, even though they meet the AERI condition. And maybe that's a question for Jesse later on.

MR. SEYMOUR: When I display The comparison of Framework B and the criteria that are there, it will show the comparison between non-AERI and AERI facilities. I think that will make it more clear than if someone were to come in and all that, simply to do a PRA. There should be a reasonable pathway for them --

MEMBER KIRCHNER: The sub-bullet there strikes me as a little bit -- I get the point you're making, but what if a self -- a facility, a commercial nuclear power plant, let me use the right terminology, comes into you and meets the self-reliant mitigation facility criteria but opts to have a senior reactor

operator and licensed reactor operators?

Why couldn't they do that? Because they feel that your process for SROs and ROs is a higher level of reliability in terms of protecting their investment. This sub-bullet seems to say you must have GLROs because you're a self-reliant facility. Why would you ever turn anyone down and say, we want a senior reactor operator and licensed reactor operators --

MR. SEYMOUR: This is Jesse Seymour again. It's a good question. What I can say is that in earlier versions of the language, it was structured as an alternative, that a facility that met those requirements had the alternative using generally-licensed operators, meaning specifically licensed SROs and ROs.

We did make a change later on based upon some internal reviews for the work that we did to make a clean demarcation between the two types of facilities. And some of the language has been adapted over time has attempted to make a more clear class distinction between the facilities that fall on one side of the line and the other.

A big driver for that in the nature of the Atomic Energy Act and the language that's used in the

Atomic Energy Act regarding the prescribing of uniformed conditions for operator licensing for various classes of reactors.

So in order to provide an alternative to have this new generally-licensed operator, we had to define a class to maintain uniformity. It becomes problematic to try to allow multiple types of operators fall within the same class of facility. So again, there had to be a clear demarcation.

Something that, and I think Bill Reckley had said this well before. In order to meet the criteria to be deemed a self-reliant mitigation facility, it is the designer that's going to have to make the case for that.

Whether or not they elect to put the time and effort into fully fleshing out that case to achieve that designation is going to be something that falls upon them. Again, I think I'll just leave that right there. But there is time and legwork that will have to come in to achieving that bar.

MR. STUTZKE: Okay. Next slide, please.

You had seen this before at the subcommittee about the generally organization of DG-14 and 13, which is the identification of the licensing events. I would just point out again, it applies not

only to Part 53 but also apply to Parts 50 and 52 like that.

So it's a general purpose methodology like this, which continued to make informing changes and editorial changes to both these DGs based on comments we've received during the subcommittee like this. We will be hanging on every word that goes on this afternoon to try to get a leg up.

As she had pointed it out, there's not a lot of time, and the holidays are approaching. My characterization of the situation, at least my team that's developing this, is like right standard rudder, all engine flank. We're moving fast, trying to be responsible, but it is challenging.

Next slide.

Final one, again on DG-14 for the actual AERI methodology guidance like that. Nothing new here again. We're continuing to refine it like this. Pointing out we changed the title from framework to methodology because we'll be using the key language. We tried Framework A and Framework B, and then we had an AERI framework. And it's like, man, this is -- it's confusing.

Did that, and again the box down at the bottom, it's like, well, you may always decide to

develop a PRA and it's my plug for my 40-some odd year career of doing PRAs. Great. And further provides a way to take advantage of risk-informed initiatives, this manages completion times, risk-informed categorizations, things like that. Anyway, hope I left you enough time, Jesse.

MEMBER HALNON: Okay. Thanks, Marty. I appreciate it.

Liz, can we move to the next slide, please.

Okay, so as mentioned before, my name is Jesse Seymour. I'm an operator licensing examiner and human factors technical reviewer in NRR.

I'll be providing a follow-up on a recent subcommittee presentation which both myself and other technical staff from NRR and DRO provided an update on rule language and overview of key guidance.

We intend to support the overall Part 53 framework within the specific areas of operating licensing. Human factors, engineering, and operator staffing.

Our updates on the status of Part 53 rule language that we covered at the October 19th meeting included how we consolidated our Framework A and B requirements using a common sublanguage for Subpart F,

and how we had expanded the provisions for generally-licensed reactor operator staffing to include pathways under both Frameworks A and B for both AERI and non-AERI facilities as well.

We also discussed how we had elected to retain the same provisions for on-shift engineering expertise, namely in the form of to grade individuals possessing plant familiarity.

Additionally, my colleagues and I provided overviews or draft guidance documents covering the review of operator licensing examination programs, the review of staffing plans, and for developing scalable human factors engineering review plans.

Today, I'd like to provide some additional discussion regarding a number of points that have been raised by the Committee members at that meeting.

Liz, we can move to the next slide, please.

So within the general topic of operator licensing, the numbers raised several points that I would like to speak to here. It was asked that we give further consideration to some form of regulatory approval that would precede the licensing of generally-licensed reactor operators.

This is a general matter that has been

carefully considered during the overall development of that particular licensing framework. In considering those, we've taken into account the programs used to train and examine. Generally-licensed reactor operators would need to go undergo NRC approval and are intended to be subject to ongoing inspection thereafter.

Additionally, facilities will be required to maintain and administer the processes associated with generally-licensed operator training and qualifications as an enforceable condition of their facility license.

Under 53805, GLROs will also be subject to relevant requirements of Part 26 and Part 73 as they relate in part to matters of behavioral observation and site access.

Importantly while the nature of general licensing would make certain features of individual licensing problematic, such as would be the case if we would attempt to incorporate a mechanism to approve each individual becoming a GLRO, there is no comparable difficulty to taking enforcement action against individual GLROs once they're in the position.

And the necessary mechanisms for taking that enforcement action on an individual basis have

been incorporated into the revisions of 53810.

MEMBER HALNON: Jesse, this is Greg. In the interest of time, I'll just go through what the concern is and try to state it clearly. When we went to the certified operator program, we lowered the bar pretty far, in our opinion, on the pedigree of the individual.

Not necessarily the training, but we agreed that the training and everything was going to be okay with the pedigree of the individual. So you brought in a GLRO which answered the accountability issues and the enforcement issues and the authority of the federal licensing issues.

But I still think the bar is low when you allow a licensee to train somebody, put them on a list say, you're now licensed, without any NRC verification -- at least the paperwork is all it said. The medical is all done. Everything else is done.

So that's why we've made the comment that at least get a verification that before a person starts licensed duties that there is a federal acknowledgment and verification that that person has completed the necessary stuff.

Obviously not to the level of an SRO and RO licensed person, but at least a verification by the

federal government. So that's the point that we were trying to make is -- and out of all the people on the Committee, you would expect me to say, give the industry maximum flexibility since that's where I came from. So take note. I think that that's too low still.

MR. SEYMOUR: I appreciate the comments. Something that I would speak to, and I understand that perception on this is probably going to be -- that's a reactive after-the-fact thing is that the mechanisms that are being deployed at the level of facility to ensure that people are suitable to be placed on that list are going to be subject to ongoing inspection enforcement.

Again, if it's in inappropriately, that will be something that's enforceable against the facility licensee. Again, does that alleviate your dominant concern there, which I understand people get onto that list in the first place absent of that check.

What I can say is that that's something that we've considered pretty carefully. Something that I would offer too is your concern, and I guess just to kind of parse that out a little bit more, is your concern primarily that there's going to be some

type of malfeasance on the part of the plants or just an oversight?

MEMBER HALNON: Yes. There may be other pressures, commercial pressures, other things that are driving an increased union pressures, other things that might be driving a more robust list than what could be done.

Tell me that you've never had any operator training malfeasance in the present system, and I would say, don't worry about it. Clearly, we have. Especially with new licensees coming in, some of the folks that may not have a lot of experience operating in the nuclear regulatory world.

MEMBER BALLINGER: This is Ron Ballinger. I've not read the enforcement part of (audio interference) but what does enforcement mean? What do you do? As part of enforcement, could you take over the process of certifying the GLROs, for example. Could that be one of the enforcement actions which would basically take care of that problem?

MEMBER HALNON: I think we were talking, Ron, of individual enforcement and the accountability of the individual.

MEMBER BALLINGER: Oh, okay. Sorry.

MEMBER HALNON: The overall enforcement is

always there with the inspection for the licensee but the individual is what we were talking about.

MEMBER BIER: The other thing is my sense, and this is something I haven't looked at for a really long time, but if lines haven't been updated, they may be by now kind of negligible and cost of doing business.

MR. SEYMOUR: With regards to the overall enforcement, again just to clarify. The mechanisms are there to take enforcement action against both the facility licensee and against individuals who are covered under that general license.

If you go into the actual language that we use under 53810, one of the provisions that's built in there is to actually suspend the ability of individuals to be covered under the general license.

Again, we apply comparable conditions of license to those individuals in many regards is what we will see with senior reactor operators and reactor operators. And we retain that capability to disallow any given individual on top of anything else in terms of individual enforcement to disallow any given any individual to be recovered by the general license.

MEMBER HALNON: This is Greg. Just one last point is I would think that many, not all, of the

enforcement actions taken against individuals are post-event issues, in a reactionary -- you might have some with medical paperwork and other things that are caused, but it's going to be post-event. So the reactionary piece should be in quotes.

MR. SEYMOUR: There's a point that I would like to make. Again, this is Jesse. I understand the need for time. I will definitely move on. What I want to point out too is that when we look at things that we do that are proactive vs reactive.

I don't know if this is necessarily articulated anywhere. Something that's been a factor that should anchor thinking is what is the scale of the safety impact that's associated. And in the case of the senior reactor operators and reactor operators, the staff facilities that aren't meeting this bar to be considered a self-reliant mitigation facility.

We see their role as being one where they could be called upon to substantially influence the safety outcome of the public. So in that case, we don't see a reactive only approach as being sufficient to provide public confidence.

In the case of generally-licensed reactor operators, we're talking about facilities that have entered into a different class by meeting more

stringent safety criteria. And because of that, again, adopting a primarily reactive stance is something that we feel would be justifiable based upon, again, that comparative safety context.

MEMBER HALNON: Okay, and I think there's room in between. I think maybe you should look at even a -- much like what we do when we send a package to the NRC and hear nothing in 90 days, you're on the list or something to that effect. So there's room in between, however, some of that oversight (audio interference.)

MR. SEYMOUR: Thank you, and I captured your comment.

MEMBER PETTI: Matt, did you have a comment?

MEMBER SUNSERI: I did, but it was addressed. I was going to bring us to the point of the enforcement is reactive. What we're talking about is proactively reviewing the candidates before they assume duty, so I think it's been covered. Thanks.

MR. SEYMOUR: Okay.

So another area that we were asked to further discuss was how changes to the licensed operator tasks stemming from plant modifications that translate into adjustments to the examination (audio

interference) appropriate modifications to the facilities. Kind of a two-edged comment there that raised some really interesting points.

So first, I would like to say that our overall approach, which spans everything going from the original systems approach to training-based operator training program all the way through the tail end of the process of licensing examination itself has to be constructed so as to balance the flexibility and inherent adaptability of the (audio interference) process with a need for holding the standard of a comprehensive and rigorous examination process.

In that regard, it's important to point out that we make a distinction between the complete body of mass an operator needs to know, which is addressed more flexibly. And specifically, that's something that we cover under guidance that has not gone before the Committee up to this point. That is training program review guidance. That addresses that broader body of knowledge.

Again, that's something that we see the SAP (phonetic) process that's adapting as the needs of the facility and of the operators change. That is distinct from our body with specific knowledge and abilities that have significant importance of

fulfillments of duties that having nexus to safety or an important administrative nature. So again, a smaller subset.

Tighter controls are imposed upon changes to that latter pool of material because of the need to ensure the content domain for the licensing examination is neither permitted to exclude essential material nor to become too dilute and thus fail to examine important topics.

MEMBER HALNON: This is Greg. I think the design control process adequately (audio interference) next to the training program given in today's world, you go through a checklist, you make sure that there's no changes to the program. If there is, you establish a rapport with the training staff who will fix it.

I think the plan was is that there's a breakpoint where you do a modification where you cease to be a self-reliant mitigation facility. What is the check and balance to ensure that going forward, the training is within the regulatory framework?

Because if you can't say that you're a self-reliant mitigation facility, you can't have GLROs. You have to have SROs and ROs. Is that a concern, that breakpoint? Or are you going to continue to -- once you, at the beginning of design,

you establish GLROs and you're there forever regardless?

MR. SEYMOUR: This is something we've come around to a few times in the past. It is complicated, right, because it raises issues of finality and some other aspects as well, too. The first aspect that I would like to point out is that when that issue arises, there is a change to an analysis.

And Bill Reckley has made good points on this on the past, too. A change to analysis, plant modification or something that shifts that nature of the operator with respect to ensuring acceptable safety outcomes.

The owner-operator, the designer, whoever that party may be, they're going to have to make a decision in terms of how do you address that. Do you address it via a system, or do you address it via person, right?

You go ahead and take a design approach that keeps the person in that role that they previously were. Or do you take the approach of now relying upon human action to mitigate the event that now needs to be mitigated. So again, there's going to be that initial decision point that's built in there.

Another factor that comes into play too,

and again this does not directly address the question. By design, the senior reactor operator training and licensing requirements as the Committee has now seen in the guidance and the general license reactor operator guidance is driven by similar methods.

Very, very similar in terms of finding what that testable content domain is, making sure that important knowledge and abilities are tested to identify the competence of the individuals there. There's other things that are different in terms of assuming that those are there. I should say ensuring, not assuming that similar mechanisms.

So at the end of the day, things that are determined to be significant for either sets of operators to do will fall within that domain to be tested and examined on.

The final part is ultimately that the Commission does retain a broad authority to impose conditions on the facility licensee that are necessary to provide an adequate assurance of public health and safety.

Again, if the need arises that we have to take action via issuing an order or something to that effect to modify the facility license that requires something different, that is a possibility. Now, we

thought through that contingency.

One thing that we think is a very nice feature is the general similarity construct of the GLRO training examination programs and the SRO programs. So while there may be a need in the aftermath of that to shift to an individual licensing operator. Fundamental pieces of the parts of those programs shouldn't be -- they shouldn't be dramatically removed from one another. Again, it would be a transition to an individual license --

MEMBER HALNON: Yes, I would agree, Jesse. It's incremental. However, there's other things besides operator actions that drag you out of the self-reliant mitigation facility. It could be the level of passivity in the system, it could be a barrier that you're eliminating, adding to or changing.

So there's other things that may -- it's probably more of a legal question than it is an actual capability question. So the mechanism of how that gets caught and how it's looked at again looks reactionary and then scrambling with exemptions and other mechanisms to allow an interim period to the license operators or continue with some kind of exemption process.

You're right. It's complicated, and it may be one of those things that we have to have happen first before we actually figure out how to deal with it.

MEMBER BIER: If I can follow up briefly. I'm less concerned about the reactive nature. Maybe it's a problem, but as Greg said, sometimes you have to experience it to learn from it. But more concerned about just what the transition would be if, for example, we discover a situation where operator actions are necessary.

Are they then no longer considered self-mitigating? What's the process by which they would come under the new licensing regulations? Would be there a waiver, would there be a possibility of saying, you can still have the GLRO with some additional criteria.

I just want to make sure that's kind of being kind of thought through in an organized manner and not ad hoc panic the first time we're in that situation.

MR. SEYMOUR: It's a good comment. I can say that that's nothing that currently exists in terms of a written product at this point. It's something that we've had the debates about going through that

thought exercise to make sure the mechanisms are there.

And some of what happens in the aftermath with that type of thing, again, because you're getting into enforcement. It becomes a legal matter. What I can say is I have been involved in escalated enforcement actions in the past. Not as a licensee, as the regulator.

What has transpired in the orders that I've been involved with is for certain actions articulated within the order, there was a time to comply with each item that was within those orders. Again, that was a carefully developed product. Again, to make sure that there was a reasonable to come into compliance that was commensurate with the nature of what was going on.

Again, the Commission can issue a shutdown order. Again, if there's something that's completely unacceptable. We could do that. In other contexts, we allow a timeframe to come into compliance. But again, that's nothing that I can say that we've gone through and specifically penned a paper on.

CHAIRMAN REMPE: Members, we've got five minutes left. We still have slides, and we have public comments today. We're supposed to be done at

10:30, so quick answers to understand things and quick responses, please. Thank you.

MR. SEYMOUR: Okay. Yes.

So a further topic of discussion was how the GLRO criteria interrelate with the AERI criteria. And as Marty Stutzke has already provided an overview of AERI, I'd like to illustrate on the next slide how those criteria fit into determining which plants would and would not be staffed by generally-licensed reactor operators.

Liz, if we could move to the next slide, please.

So this slide summarizes the GLRO criteria. So again, the criteria that determine whether or not a plant is a self-reliant mitigation facility as they apply across Part 53 in its entirety.

The gray column on the left lists certain principles that we identify as being appropriate to inform this operator licensing staffing related threshold during our earlier work that preceded us actually sitting down and drafting the Part 53 requirements.

These principles should be viewed as initial guidelines for the development of the associated criteria that ultimately needed to be

balanced against matters, practicality and certain pragmatic considerations such as the overall magnitude of radiological hazard and other factors.

The second column in pink summarizes the criteria and how they were applied within Framework A. So again, the Framework A criteria are in the pink column. These criteria are heavily intertwined with revisions of Subparts B and C. Another key point is that they also incorporate the insights gained via a PRA.

The third column in green shows the criteria for Framework B facilities that do not meet the criteria for an AERI and instead a conduct PRA. So again, I think this speaks to an earlier question here. So if we just follow that green column all the way to the bottom, that illustrates that.

As can be seen while there aren't differences in what certain requirements are mapped to and how certain criteria are structured, the overall requirements between the pink and green columns, so again Framework A and the non-AERI PRA-based Framework B, generally mapped to one another.

Again, we had to adapt where things point to in some cases. We had to align other requirements to achieve the same thing. In the case of defense in-

depth, we actually had to craft a standalone defense in-depth requirement because we didn't have an equivalent to Framework A's provisional Framework B. But again, in general, the two mirror each other from a philosophic approach.

MEMBER HALNON: Jesse, let me help you just move along here. Let me just very briefly summarize our comment, and we can probably move on.

We just wanted to make sure that you walk through each of the criteria and make consistent the terms that you're using. Sometimes we'll use credibly, reliable, sometimes we use human actions credited, sometimes we use interface -- you know, introduce the passive with caveats, sometimes single barriers, and AERI brings in those criteria.

So just walk through that language and make sure that it's the way you want it and it's consistent. It feels like different people wrote different portions of it. That's really the only comment. We don't have any issues with the criteria.

MR. SEYMOUR: Okay.

MEMBER PETTI: I'm still confused a little bit. You can meet the GLRO criteria under AERI without this human action. There's no words in 34II that says that you have to do stuff without credited

human action. Is that correct?

MR. SEYMOUR: So under the modified AERI criteria, it is true that the way you meet the qualification has changed. Again, I offer that I don't want to infringe on Marty's wording that's there. But an important point to keep in mind is this.

In identifying that bounding event, one of the things that has to be considered are the influence of credible human errors commission and omission. In doing that, and also looking at combinations of system failures and so forth, you have to show that bounding events, and again, Marty, please interrupt if I misspeak.

But that, quote-unquote, kind of worse case event that drives everything still falls under a very conservative radiological dose criteria. Again, set at 2.5 rem. So in that case, what we had to do was take a bit more of a open-minded stance in looking at what is it reasonable to draw the line at here.

What I will say is the new AERI criteria, that's something that's very fresh to us. Again, just last week we started looking at that. And we are still digesting that and considering its appropriateness.

As can be seen here, we already stack an additional defense in-depth criteria on top of the AERI qualification. And we certainly can add additional provisions to the GLRO criteria that are added on top of just meeting AERI.

So again, as we go through and we further evaluate that, we do basically preserve that ongoing work that's still there that we may opt to say we need to put a restriction against crediting human action in any way, shape or form or something to that effect.

MEMBER HALNON: So Dave, in 34AA IIE connects to, and says you can't use operator action to meet the dose criteria --

MEMBER PETTI: So, I'm confused. I'm going by his latest language he showed us today. The stuff that we got, the subcommittee has changed. That language isn't --

MEMBER HALNON: That wasn't the dose criteria. Not on the B side which says you have to go and meet that without human action.

MEMBER PETTI: In the table, does it -- doesn't incline enough for me. There's still a requirement of meeting stuff without human action.

MEMBER HALNON: In bigger letter B, this is big letter A. The only language had dose criteria

and then the criteria how you had to make that dose criteria, which was part of it was passive and other things with no credit or human action. So they changed the dose criteria, but you guys didn't change big letter B.

(Simultaneous speaking.)

MR. STUTZKE: Yes, in fact we did. What we said was --

MEMBER HALNON: Now, I'm confused.

MR. STUTZKE: What it now says that you have to consider them when you're defining the bounding events.

MEMBER HALNON: You have to consider the human actions --

MR. STUTZKE: Yes, the human actions while you're defining that bounding event. Not that you're prohibited from having --

MEMBER HALNON: So it just amplifies my comment. Walk through that and make sure that you got some consistent language requirements.

MR. STUTZKE: Absolutely.

MEMBER HALNON: And that's something that we continue to look at. Something that I do want to put out there that gives us a reason to think through this very carefully is this. Fundamentals in the AERI

qualification. Drawing a very conservative line for the radiological hazard.

Again, set at 2.5 rem, which to keep it in perspective is half of the occupational dose limit that we established. So again, just keeping it in the 30,000-foot view.

And the other thing that we do is we say for that event that caused that limiting radiological dose, again, you have to show that you considered how those human errors of doing things you shouldn't do or not doing things that you're required to do contributed into that and taking it into consideration and so forth.

The last piece of it, and again is that we still retain the defense in-depth requirement. What we say is irrespective of that, you still have to provide for a layered defense in-depth scheme that doesn't have dependence on any single barrier or any reliance on credited human action right there.

Again, that helps us to account for things like uncertainties in the analysis. And again, the potential that via reliance on this AERI approach that perhaps there is human action embedded in there somewhere. So again, an outside barrier.

MEMBER PETTI: I'm just looking at the new

criteria. That opens up the door a lot. MHTGI (phonetic) would meet that criteria in spades. That PRA claim one rem at the site boundary, which is like 300 meters.

I always thought AERI as sort of microreactors, but that dose criteria is going to open it up a little bit. So now you're going to have larger systems that have grown more complex that can meet the dose criteria potentially. You have to think about this a little bit. I always envisioned it as the smaller micros not these bigger sort of intermediate-sized things that could be the case.

MR. SEYMOUR: Again, just going through and making sure we covered everything here. I think we have covered what we needed to talk about. Again, I do appreciate the comments. But I'd like to go ahead, for the sake of time, and just to move to onto the slide.

(Pause.)

MR. SEYMOUR: I just want to silence this alarm so it doesn't go off again. My apologies for that.

So now, this is my final slide, what I'd like to do is finally I'd like to address several points that were raised regarding operational staffing

by the members.

First, a concern was raised that the preliminary proposed framework would potentially for allow for plants with no operators at all. So I want to reiterate a point that I made in the past that there is no allowance for zero-operator staffing within this framework.

And that even in the least restrictive conceivable iteration of where this would pan out, the staffing requirements would still place a licensed individual in a position of cognizance of a plant operations at all times during the operating phase while the reactor is fueling.

Another point that was raised that asked us to give further consideration to the engineering expertise degree requirement and whether factors like experience would serve as a surrogate for that educational requirement.

This is a point that we in NRR DRO have given deep consideration to. And as the members will recall back a year ago, we actually began our Part 53 work from a standpoint of looking to not carry forward the role that was akin to a traditional shift technical advisor.

However in the course of our work,

including our consideration of the Committee's past letters, we ultimately settled upon the stance that an appropriately-degreed individual can complement and augment the plant operation's experience of an operating crew in a way that helps serve as a counter to the uncertainties that may accompany the introduction of new reactor technologies.

Building upon that perspective, we sought to temper this requirement with new flexibility in how it's met, and we feel that the end result represents something that is both modern and relevant.

Another facet of the engineering expertise role that we were asked to consider was the adequacy of the training requirements provided for under our framework. As noted in the prior meeting, this is achieved in a manner that is twofold.

First, personnel requirements of 53830 would include individuals fulfilling the engineering expertise role as an example of who would be covered by a systems approach training-based training process.

Again, building upon that further, our staffing plan review guidance then lists specific topical content for the reviewer to check within such programs, including areas like reactive theory plant systems, accident analysis and mitigating core damage,

again, specific to individuals in that engineering expertise role.

A separate concern that was raised was related to the possibility for engineering expertise that is being provided remotely to be rendered unavailable by way of disruption of communications. On this point, I want to reinforce that making sure of the engineering expertise role is supportive in an advisory nature that is neither directive or mitigative.

Thus, the unavailability of the engineering expertise role should have no direct bearing on whether or not any given plan event could be successfully mitigated from a standpoint of credited response.

The final point that I would like to address is the concern of the requirements within the portions of Subpart F of the consideration here might allow for remote operations.

Here, I want to be clear in our intention that we only intend that the framework that we've established for staffing and human factors engineering operator license training is capable of adaptation in the future concepts of operations without the need for subsequent modification via rulemaking.

To that end, we have merely crafted requirements that are capable of addressing a wide spectrum of operational approaches. Whether or not remote operations will be one of them remains a broader issue that is simply beyond the scope of this limited subset of Subpart F to enable or otherwise address with sufficiency. That's my final slide, so turning it over to Jordan unless there's any questions.

CHAIRMAN REMPE: So autonomous operation is brought up in the past. There were documents that are regulatory documents that basically said we don't have to deal with this now because there's other documents that say you can't do it. Now you're saying the rule language is going to allow this? And are those other documents not going to hold?

And I didn't bring the references with me. I know, Matt, you came up with some that you sent out and I found some others. What's the story here? Are those documents still valid or not?

MR. SEYMOUR: The point that I was simply trying to make is that just from the Subpart F operational requirements that we talked about, they're built to be adaptable to a wide range of --

CHAIRMAN REMPE: Right now, those others

documents hold autonomous operation is not allowed?

MR. SEYMOUR: So I would say is that you could build a reactor that was autonomous, our requirements are still going to say have at least a generally-licensed reactor operator in a position of oversight with certain indications, the ability to shut down the reactor, all the things that we articulate. We don't allow for any reactor to be unattended and unsupervised, if that makes sense.

CHAIRMAN REMPE: I think what your answer is, is yes, we don't allow autonomous operation at this time. I can't get a yes or no.

(Laughter.)

MR. SEYMOUR: It's not trying to give an opaque answer. What it is is the ability for a reactor to operate itself autonomously is independent from its ability to be allowed to do that in a completely unsupervised way.

Again, if the reactor runs itself, what it does it takes the operator from being a hands-on role and shifts them, in a human factors engineering perspective, what we consider to be a position of supervisory control.

Again, it moves the role of the operator to oversight. But again, the two are -- again, I know

it's kind of mincing words and so forth. There's nothing that would preclude you from building a reactor that could operate itself. Our rules say that's nice, but someone will always be in a position of oversight having cognizance over that reactor --

MEMBER BROWN: That means on-site as opposed to be in New York City while the city is operating in North Alaska?

MR. SEYMOUR: So our requirements, and again I'm just talking about our limited subset Subpart F, is neutral on the location of those individuals. Again, that's by design so we can adapt to future concepts --

MEMBER BALLINGER: What you're saying is --

MEMBER BROWN: My brain is fried.

MEMBER BALLINGER: -- you're basically taking the NASA approach? The satellite that's humming along out there with the reactor operating. Nobody riding in that satellite, but the reactor is capable of notifying somebody who is a supervisor to take action remotely.

MR. SEYMOUR: I think a better way to frame this discussion is that so you get to that point of remote operation, there's other considerations that

would need to be addressed there simply beyond the scope of this work.

A key issue, and we've talked about this before, is cybersecurity. Again, that's beyond the scope of our work here. I think we have Ishmael Garcia (phonetic) available on the call today. If we want to talk about what impediments there are there and the current state of that work, that's something we can pull him in on.

But that's not something that our requirements here in Subpart F don't get over that hurdle for you. So again, if someone wanted to come in and do that in a way that's remote, there's other things that they would have to address before they could even get to where our flexibility is in that regard.

MR. RECKLEY: Jesse, this is Bill. If I can, because we talked about this a number of times. Whereas the rule doesn't specifically preclude it and say this is not allowed, neither does it build in how we would do that review in any proposal that would say, well, we're going to have remote operation, would have to be reviewed, approved, go through this Committee.

And we would have to address some of the

things that, Joy, you mentioned. We are just now studying how we would approach that to do the review of a proposal should it ever come. But the wording in the rule language does not say, this is not allowed.

MEMBER BALLINGER: So again, what you're saying is -- fission battery. I'm using another one of these microreactor examples. Someone wants to put a fission battery in a steel mill, could they do it?

MR. SEYMOUR: So what would happen is, and we're just going to say for the sake of discussion, this was an inherently safe fission battery.

MEMBER BALLINGER: Yes, all the lying that they do about it. Yes.

(Laughter.)

MR. SEYMOUR: So this hypothetical, right. We'll say that this would go in, that it would satisfy the criteria to be a self-reliant mitigation facility by virtue of its inherent safety characteristics.

At that point, what we would say is, okay. We would then establish that somewhere. Again, we're going to use leave that open to the broader discussion, you have a generally-licensed reactor operator. They could have oversight of more than one, because we say facilities. We use the term plural; we leave that open.

A generally-licensed reactor operator would have to have cognizance over that thing for its entire operating phase. So again, there would have to be someone that was in a position of oversight in a continuity of responsibilities between individuals. So they would be responsible for technical specifications for that.

They would have to have indications. Again, we articulate certain proposed TMI requirements we've adapted what type of indication they have to have. They have to get capability of shutting down that fission battery from their location. They would have the capability of dispatching operation and maintenance personnel to that facility.

They would retain the administrative responsibility for any notifications associated with it. Maintenance controls, things of that nature. So again, we're very prescriptive about the capabilities that that individual would have to have. But that would represent kind of the basement level.

Now in terms of is that practical for a fission battery. What I would say is we temper that by not limiting how many of those fission batteries this operator might have cognizance over.

So it could be that, again, if you were

able to come in and make that case down the road, again, if we resolve all the other issues, you know, road ops (phonetic), could someone remotely be monitoring a dozen of these things? That case could be made.

Again, we leave our requirements open to do that so that in the future if things to that point, our requirements could adapt to that. But again, what we have is just by itself insufficient on its own to address the full question (audio interference.)

What we do is we make sure that we're adaptable from a staffing standpoint, licensing standpoint, from a human factors engineering standpoint, to be able to scale up and scale down and to look at things differently.

Again, a key point. We don't focus our human factors engineering requirement on the control room anymore. We focus on specific locations where humans fulfill plant safety functions (audio interference) safety functions. Again, that's one of those key things is how do you address this concept of operations that a future plant might not have a traditional control room.

We don't want to have a regulation that doesn't work because they don't have a, quote-unquote,

control room. So what we do is we disassociate that and say what were we trying to achieve, we want the human being to have the capabilities to maintain the plant's safety.

So again, it's just the type of thing that we do there. We simply try to make something that's adaptable, that's broadly technology-inclusive. When the other factors align, we should be able to adapt our requirements in a way that supports safety.

MEMBER SUNSERI: This is Matt. I have a comment.

I think this is all very reminiscent of what we discussed in the subcommittee meeting the other day. It seemed to me that the conclusion that we walked away with and we'll likely discuss in our letter report, at least discuss the potential for it to be in the letter report, is if a remote operator exists that meets all these criterias you're describing, our recommendation is however that operator provides the oversight of the facility, should there be an impairment that requires that operator to intervene that that same impairment does not also prevent the operator from intervening. If you understand what I'm saying. That's all I wanted to comment on.

MR. SEYMOUR: Yes, I appreciate the comment. Thank you. Again, it's a valid point. Again, I understand that it's something that may be in the letter, and we will definitely consider that.

Liz, if we can move to the next slide, please. I think Jordan's up.

MR. HOELLMAN: Yes. Hi, everyone. This is Jordan Hoellman again. I'm not going to touch too much on this, but I'd like to just open it up if there's any questions. I know we kind of talked about a number of these guidance documents in detail at the subcommittee meeting.

The focus should be on the Part 53 column there with the specific italicized documents that we presented in subcommittee last month and then some additional guidance documents being developed for the security side in Part 26. If anyone has any questions about any guidance.

(Pause.)

MEMBER PETTI: Okay, thank you.

Before we go to public comments, I just want to thank the staff. This has be a monumental effort. You step back at this stage and look at what's behind us. It was a tremendous amount of effort to get here. I appreciate all of the good

discussions we've had.

With that, we are 20 minutes behind. We do have some hard stops, so I don't know how it's all going to work in terms of whether we'll get the letter read in before the hard start. We might not. We might have to do --

(Simultaneous speaking.)

MEMBER PETTI: So, yes, let's start with public comments. Please identify yourself in your comment. I guess we have someone from the Breakthrough Institute, so they should go first because they notified us.

MS. FRANOVICH: Thank you. This is Rani Franovich. Can you hear me?

MEMBER PETTI: Yes.

MS. FRANOVICH: Okay, thank you. Dr. Rempe and ACRS members, I speak on behalf of the Breakthrough Institute. It's an independent global research center that identifies and promotes technological solutions to environmental and human development challenges.

The Breakthrough Institute does not receive funding from industry. We believe new and advanced reactors offer critical pathways to deep decarbonization, and we advocate for appropriate

regulation in the licensing and oversight of reactors.

Nuclear power advances clean energy goals, enhances environmental quality and supplies reliable electricity to the transmission grid. As such, timely deployment of safe, innovative and economically viable designs is an urgent public interest.

The Breakthrough Institute has closely followed the development of Part 53 and express concerns and comments. The ACRS has independently identified many of the same issues. Numerous concerns remain unresolved and alignment with stakeholders has not been achieved.

The ACRS plays an important role in ensuring the NRC staff delivers a usable rule that satisfies NEIMA. We strongly urge the ACRS to recommend the Commission redirect the staff to, one, expeditiously work with external stakeholders in a more open, collaborative manner.

Two, come to agreement on unresolved issues like what should be governed by regulation versus guidance. And three, significantly streamline the rule to be more performance-based and appropriately risk-informed.

Timely agreement on these matters can be reached if the NRC staff changes its regulatory

posture, adopts a customer service ethic, and is open and receptive to relocating detailed, prescriptive requirements to guidance.

We appreciate this opportunity to express the public's interest in this crucial rule and its as yet unrealized potential to enable the rapid deployment of new and advanced reactors. Thank you.

MEMBER PETTI: Thank you. Other comments from the public? Identify yourself in your comment.

(Pause.)

MEMBER PETTI: Okay, not hearing any, I turn it back over to the chair.

CHAIRMAN REMPE: Okay, so at this time, we're going to go off the record.

(Whereupon, the above-entitled matter went off the record at 10:53 a.m.)

Advisory Committee on Reactor Safeguards (ACRS)

10 CFR Part 53 "Licensing and Regulation of Advanced Nuclear Reactors"

November 2, 2022

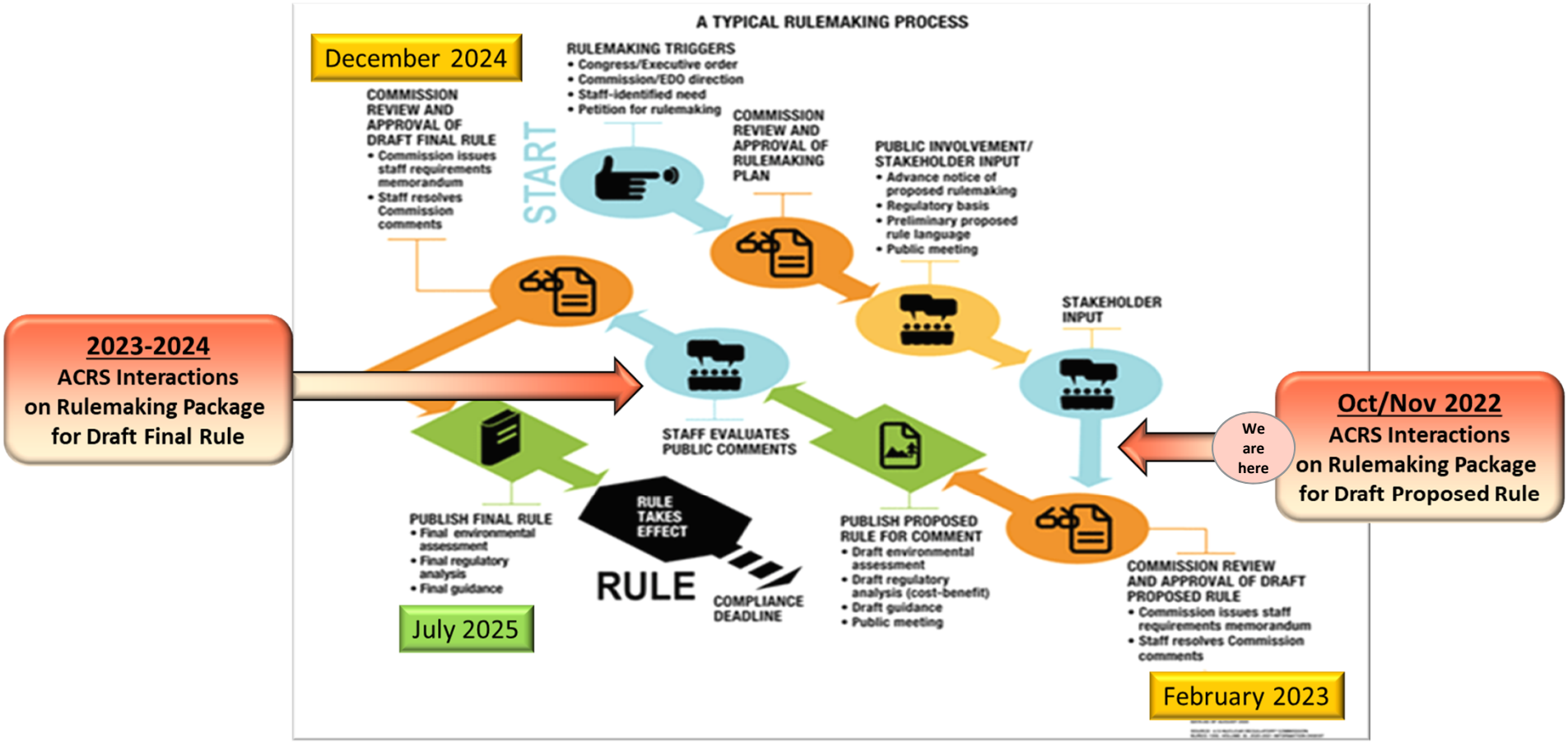
Agenda

8:35 am – 10:30 am

Staff presentation on 10 CFR Part 53, “Risk-Informed, Technology-Inclusive Regulatory Framework for Commercial Nuclear Plants,” Proposed Rulemaking Language

- Rulemaking Schedule
- Part 53 Licensing Frameworks
- Risk Insights/Quantitative Health Objectives (QHOs)
- Fueled Modules
- Codes and Standards
- Alternative evaluation for risk insights (AERI)
- Generally licensed reactor operators (GLROs), Human Factors, Engineering Expertise
- Guidance

Rulemaking Schedule



Part 53 Licensing Frameworks

Subpart A - General Provisions

Rule Package (ML22272A034)

Subpart B - Safety Requirements
Subpart C - Design Requirements
Subpart D - Siting
Subpart E - Construction/Manufacturing
Subpart F - Operations
Subpart G - Decommissioning
Subpart H – Application Requirements
Subpart I - License Maintenance
Subpart J - Reporting
Subpart K - Quality Assurance

Framework A

- Probabilistic Risk Assessment (PRA)-led approach
- Functional design criteria

Subpart N - Siting
Subpart O - Construction/Manufacturing
Subpart P - Operations
Subpart Q - Decommissioning
Subpart R - Application Requirements
Subpart S - License Maintenance
Subpart T - Reporting
Subpart U - Quality Assurance

Framework B

- Traditional use of risk insights
- Principal design criteria
- Includes an AERI approach

Sections 53.000 and 53.010

- Purpose
  - Provide optional frameworks for the issuance, amendment, renewal, and termination of licenses, permits, certifications, and approvals for commercial nuclear plants
- Frameworks
  - Framework A and Framework B are distinct
  - Applicants and licensees subject to the rules in this part must only use the subparts applicable to one framework

Subpart A – General Provisions (Definitions)

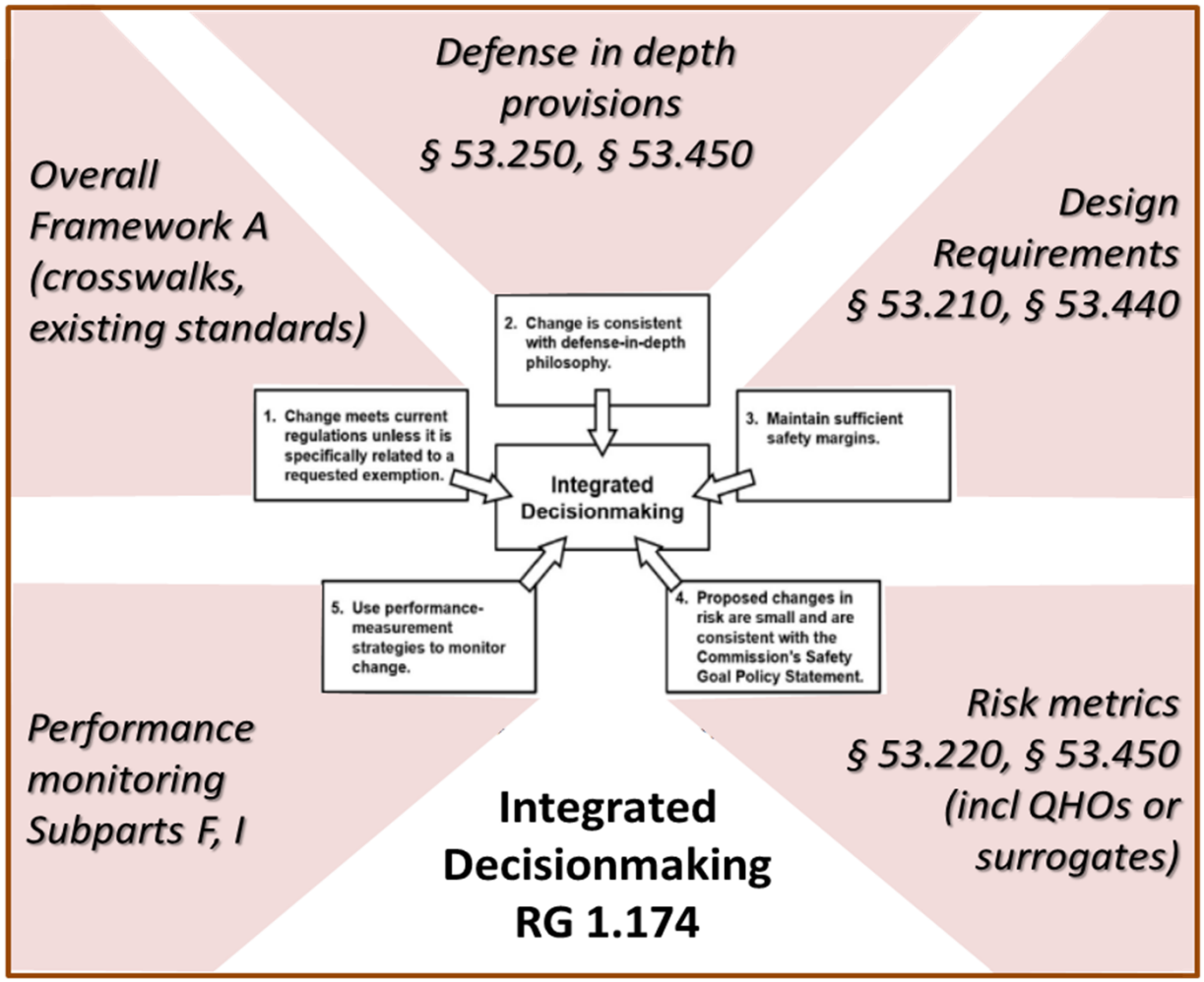
- Common Definitions
  - Commercial Nuclear Plant
  - Manufactured reactor
  - Manufactured reactor module
  - ***Safety function***
- Framework A Definitions
  - Construction, Licensing basis events (LBEs), structure, system, and component (SSC) classifications
- Framework B Definitions
  - Construction, Design basis, Functional containment, Safety-related SSCs, Severe nuclear accident

Framework A		
Subpart	*Title*	*Topics*
Subpart B	Technology-Inclusive Safety Requirements	Risk Insights (QHOs)
Subpart C	Design and Analysis Requirements	
Subpart D	Siting Requirements	
Subpart E	Construction and Manufacturing Requirements	Fueled Modules
Subpart F	Requirements for Operation	GLROs, Human Factors
Subpart G	Decommissioning Requirements	
Subpart H	Licenses, Certifications and Approvals	
Subpart I	Maintaining and Revising Licensing Basis Information	
Subpart J	Reporting and Other Administrative Requirements	
Subpart K	Quality Assurance Criteria for Commercial Nuclear Plants	

Framework A

Ensuring Comparable Level of Safety

Additional discussion in Preamble on how an integrated assessment like that in Regulatory Guide (RG) 1.174 can be used to support the comparisons to existing requirements and related regulatory findings.



Framework A

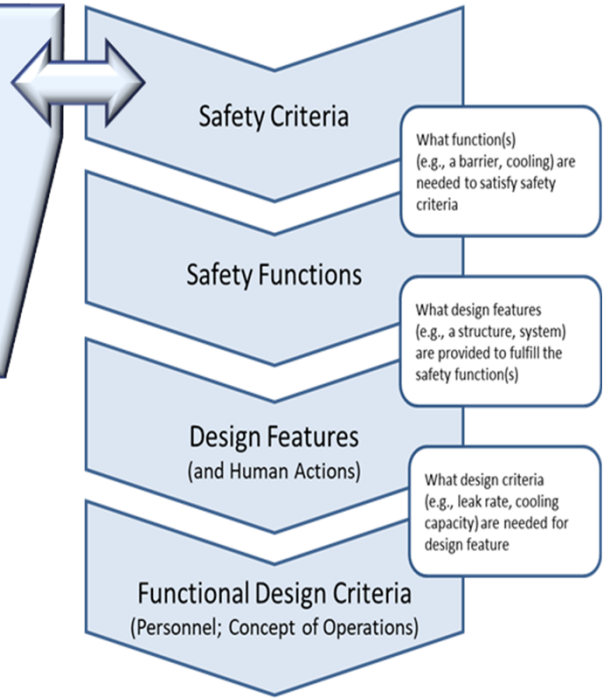
QHOs as one of several performance standards for LBEs

Safety Objectives & Criteria

No immediate threat & consider potential risks

§ 53.210 Safety criteria for DBAs
§ 53.220 Safety criteria for other LBEs
- Address LBEs and provide defense in depth
- Cumulative risks (QHOs)

§ 53.450(e) Evaluation criteria for each LBE or event category



Example § 53.450(e) evaluation criteria

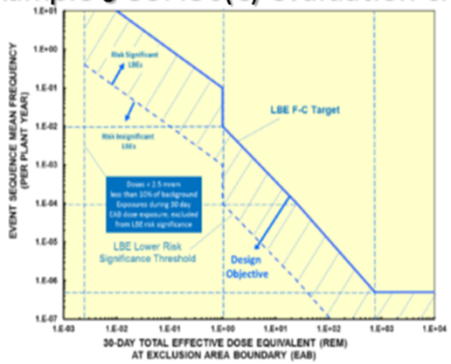


Figure 3-4. Use of the F-C Target to Define Risk-Significant LBEs

Licensing Modernization Project (LMP)

Additional discussion in Preamble on how QHOs are considered as one of several performance measures within Framework A. **Including the QHOs as one of several performance measures does not equate to the QHOs defining adequate protection of public health and safety.***

*Existing Paradigm

- Does not specifically define "adequate protection" but compliance with NRC regulations and guidance may be presumed to assure adequate protection at a minimum
- Additional requirements as necessary or desirable to protect health or to minimize danger to life or property

Subparts E & O

Fuel loading for manufactured reactor modules

§ 53.620(d) / § 53.4120(d) Fuel loading

- A manufacturing license may include authorizing the loading of fuel into a manufactured reactor module
- Specify required protections to prevent criticality
  - At least two independent mechanisms that can prevent criticality should conditions result in the maximum reactivity being attained for the fissile material
- Commission finding that a manufactured reactor module in required configuration is not a utilization facility as defined in the Atomic Energy Act
- Manufactured reactor module becomes a utilization facility in its final place of use after the Commission makes required findings on inspections, tests, analyses and acceptance criteria

Framework B		
Subpart	*Title*	*Topics*
Subpart N	Siting	
Subpart O	Construction and Manufacturing Requirements	
Subpart P	Requirements for Operation	Codes and Standards
Subpart Q	Decommissioning	
Subpart R	Licenses, Certifications and Approvals	Codes and Standards AERI
Subpart S	Maintaining and Revising Licensing Basis Information	
Subpart T	Reporting and Other Administrative Requirements	
Subpart U	Quality Assurance	

Codes and Standards (Clarification)

- **10 CFR 53.4730(a)(2)(ii)(A) would require applicants to provide a description and justification (for codes or standards not previously endorsed or accepted by the NRC) of the codes and standards to be used in the design**

- **Other Framework B requirements related to codes and standards are similar to those in the existing regulations**

  - **10 CFR 53.4360(a) would require boiling-water reactor (BWR) and pressurized-water reactor (PWR) licensees to meet requirements in 10 CFR 50.55a for inservice inspection and inservice testing programs**

  - **10 CFR 53.4730(a)(37)(ii) would require applicants for BWRs and PWRs to describe how they will comply with ASME Boiler and Pressure Vessel Code and ASME Operation and Maintenance Code requirements in 10 CFR 50.55a**

  - **Conforming changes proposed for 10 CFR 50.55a would support use of existing requirements by applicants and licensees with BWRs or PWRs under Framework B**

Subpart R – AERI

- **The AERI approach is consistent with Commission policy.**
- **The AERI entry conditions in § 53.4730(a)(34)(ii) were revised after the ACRS Part 53 subcommittee meeting (October 18-19, 2022) to address stakeholder comments and reflect insights from the scoping MELCOR Accident Consequence Calculation System (MACCS) calculations.**
- **Other provisions in Part 53 reference make use of the AERI entry conditions.**
- **Two draft regulatory guides (DGs) developed:**
  - **DG-1413: Technology-Inclusive Identification of Licensing Events for Commercial Nuclear Plants (proposed new RG 1.254)**
  - **DG-1414: Alternative Evaluation for Risk Insights Methodology (proposed new RG 1.255)**

Regulatory Basis for the AERI Approach

Policy Statement on the Regulation of Advanced Reactors
73 FR 60612; October 14, 2008

73 FR 60616, left column: "The Commission also expects that advanced reactor designs will comply with the Commission's safety goal policy statement (51 FR 28044; August 4, 1986, as corrected and republished at 51 FR 30028; August 21, 1986),…"

73 FR 60614, left column: "…the Commission has also issued policy statements on the use of PRA in regulatory activities (60 FR 42622; August 16, 1995), and severe accidents regarding future designs and existing plants (50 FR 32138; August 8, 1985). The use of PRA as a design tool is implied by the policy statement on the use of PRA and the NRC believes that the current regulations and policy statements provide sufficient guidance to designers."

Policy Statement: Use of PRA Methods in Nuclear Regulatory Activities
60 FR 42622; August 16, 1995

60 FR 42628, middle column: "It is important to note that not all of the Commission's regulatory activities lend themselves to a risk analysis approach that utilizes fault tree methods. In general, a fault tree method is best suited for power reactor events that typically involve complex systems…the Commission recognizes that a single approach for incorporating risk analyses into the regulatory process is not appropriate."

use PRA or an alternative risk-informed approach as a design tool

AERI Elements

- Identify and characterize the postulated bounding event
- Demonstrate that the AERI entry conditions are met
- Develop a demonstrably conservative risk estimate
- Search for severe accident vulnerabilities
- Identify risk insights
- Evaluate defense in depth (DID) adequacy

Why Revise the AERI Entry Conditions?

- Some stakeholders have commented that the current proposed AERI entry conditions are overly conservative.
- MACCS scoping calculations indicate that dose at 100 meters is an inadequate predictor of conditional risk. Depending on the assumptions (e.g., plume elevation or buoyancy), some conditional risks may be below the QHOs while others may be above the QHOs even though the current AERI entry condition is met.
- Provide increased flexibility when determining if the AERI entry conditions are met.

Revised AERI Entry Conditions

§ 53.4730(a)(34) *Description of risk evaluation.* A description of the risk evaluation developed for the commercial nuclear plant and its results. The risk evaluation must be based on:

i. A probabilistic risk assessment (PRA); or

ii. An alternative evaluation for risk insights (AERI), provided that:

(A) The analysis of a postulated bounding event demonstrates that the consequence evaluated within the area between the commercial nuclear plant's exclusion area boundary (EAB) and 16.1 kilometers (10 miles) from the EAB is less than 25 mSv (2.5 rem) TEDE in the first year; and

(B) The identification of the postulated bounding event is informed by a systematic and comprehensive search for severe nuclear accident scenarios that considers:

(*1*) All radiological sources at the commercial nuclear plant;

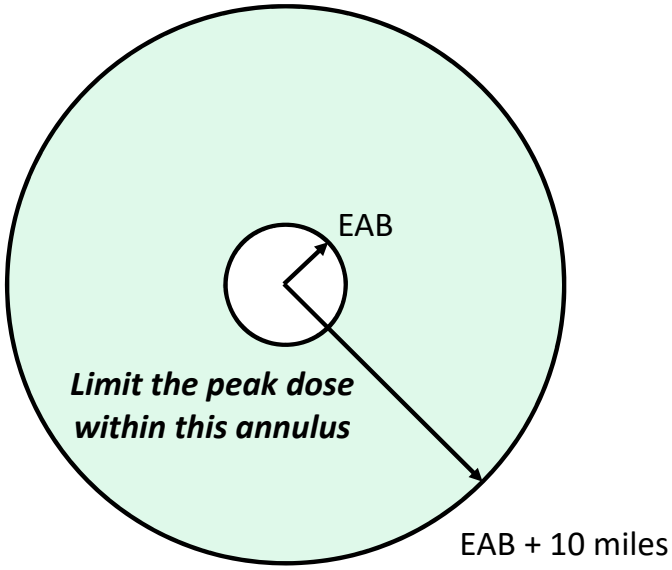
(*2*) Relevant internal and external hazards;

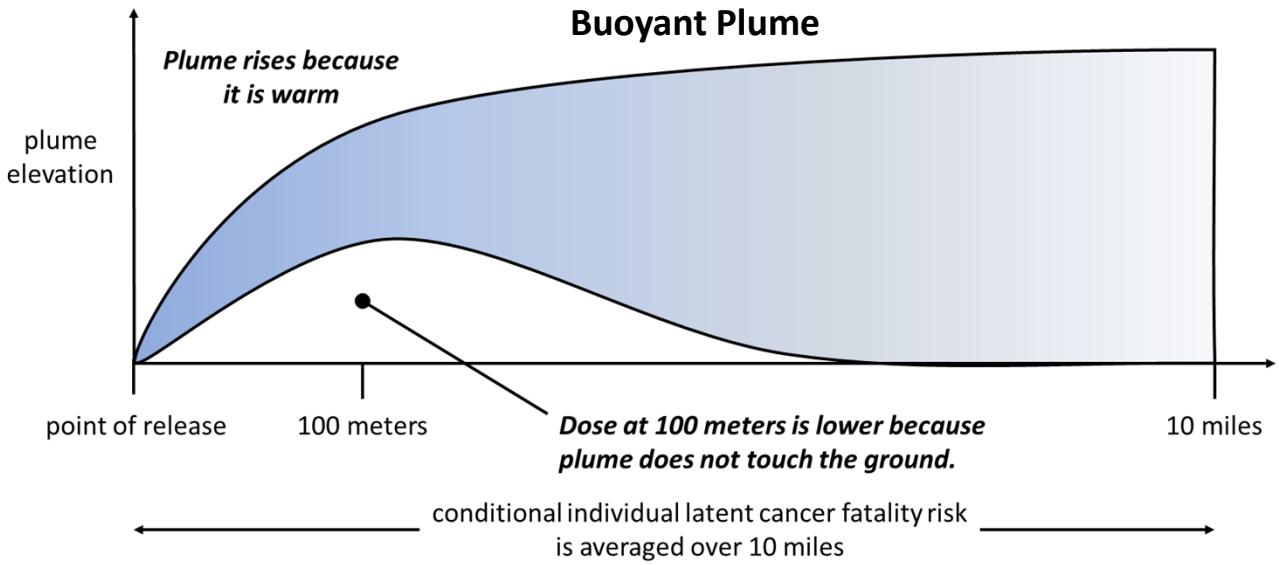
(*3*) Combinations of plant equipment failures including common-cause failures, hazard-induced equipment failures, and equipment failures caused by severe nuclear accident phenomena; and

(*4*) Credible human errors of commission and omission.

Rationale for the Revised AERI Entry Conditions

- The change from dose at 100 meters to the peak dose within the 10-mile annulus addresses concerns about elevated releases and plume buoyancy.





Rationale for the Revised AERI Entry Conditions (Con't.)

- The 2.5-rem criterion is consistent with MACCS scoping calculations:
  - A 25-rem lifetime (50-year) dose generally corresponds to a 10-mile population-weighted lifetime individual latent cancer fatality risk less than 2E-6 per event.
  - A first-year dose of 2.5 rem generally corresponds to a 50-year dose less than 25 rem, probably due to radioactive decay and the effect of weathering on groundshine and resuspension.
- The 2.5-rem criterion is a small fraction (10%) of the traditional reference value (25 rem) used in Part 100 and § 50.34.
  - For example, see the Standard Review Plan (NUREG-0800), Section 15.0.3, Rev. 0: "A small fraction is defined as less than 10% of the 10 CFR 50.34(a)(1) reference values, or 2.5 rem TEDE."

Proposed Uses of the AERI Entry Conditions

- Would be used to determine:
  - Which applicants could develop an AERI in lieu of a PRA to demonstrate compliance with the proposed risk evaluation requirement in § 53.4730(a)(34)
  - When the requirements to address the mitigation of beyond-design-basis events in § 53.4420 must be met
  - When the requirements to address combustible gas control in § 53.4730(a)(7) must be met
- In addition, the proposed AERI entry conditions would be used in combination with other conditions to determine when a commercial nuclear plant is a self-reliant mitigation facility, as provided in § 53.800(a)(2)
  - A self-reliant mitigation facility must have GLROs in lieu of senior reactor operators and reactor operators

    - **All other applicable Framework B requirements must be met (AERI or PRA).**
    - **Applicants may elect to develop a PRA even if the AERI entry conditions are met.**

DG-1413: Technology-Inclusive Identification of Licensing Events for Commercial Nuclear Plants (proposed new RG 1.254)

- Section A: Applies to light-water reactors (LWRs) and non-LWRs licensed under Parts 50, 52, and 53 (Frameworks A and B)
- Section B (Discussion):
  - Identifies licensing events for each licensing framework
  - Provides historical perspectives (early licensing, development of the standard review plan)
  - Addresses ACRS recommendations to “start with a blank sheet of paper” (10/7/2019, 10/21/2020, 5/30/2021, and 10/26/2021)
- Section C (Staff Guidance) provides an integrated approach for:
  - Conducting a systematic and comprehensive search for initiating events
  - Delineating a systematic and comprehensive sets of event sequences
  - Grouping the lists of initiating events and event sequences into licensing events
- Appendix A (Comprehensive Search for Initiating Events):
  - Reviews techniques for searching for initiating events and points the user to helpful references
  - Does not endorse or recommend any specific technique

DG-1414: Alternative Evaluation for Risk Insights Methodology (proposed new RG 1.255)

- This RG provides the NRC staff's guidance on the use of an AERI methodology to inform the content of applications and licensing basis for LWRs and non-LWRs.
- 10 CFR 53.4730(a)(34)(ii) establishes AERI as an alternative to a PRA for a risk evaluation if the entry conditions A and B for an AERI are met.
- The title of this DG-1414 is now "AERI Methodology," to distinguish it from Part 53 Frameworks A and B. This new title does not signal any change in approach.

Applicants who meet the AERI entry conditions may elect to develop an AERI in lieu of a PRA. However, PRA confers additional benefits such as:

- A means to optimize the design, and
- The ability to take advantage of various risk-informed initiatives, for example risk-informed completion times, risk-informed categorization of SSCs.

Subparts F and P Staffing, HFE, Operator Licensing, and Training

- During the 10/19/22 subcommittee meeting, the staff provided an update on the rule language, as well an overview of key guidance
- Updates on the rule language status had included:
  - Consolidating Frameworks A & B requirements using a common set of language under Subpart F
  - Extending provisions for GLROs to Framework B, to include facilities using an AERI approach
  - Retaining previous engineering expertise provisions (i.e., degreed individuals with plant familiarity)
- Important points of ISG presentations included:
  - Review guidance for tailored exam programs
  - Staffing review guidance for custom staffing plans
  - Guidance for conducting scalable human factors engineering (HFE) reviews

Follow-on Discussion of Operator Licensing Topics

- Regarding Operator Licensing, the members asked that the staff discuss several areas further, including:
  - Lack of approval preceding licensing of GLROs
    - NRC approved program with inspections
  - How changes to operator tasks from plant mods translate into adjustments to exam program knowledge and abilities lists and change control process burdens
    - Balances adaptability and program assurance
  - How the GLRO criteria interrelate with the AERI criteria and whether AERI is too restrictive
    - The following slide provides an overview that builds on earlier AERI discussions…

Follow-on Discussion of GLRO Criteria

Underlying Principle from Paper	GLRO Criteria for Framework A	GLRO Criteria for Framework B (PRA)	GLRO Criteria for Framework B (AERI)
Radiological consequence criteria met without human action	Safety criteria (53.210 and 53.220 or 53.470) met without human actions for credited event mitigation	Safety assessment (53.4730(a)(1)(vi)) demonstrates requirements met without credited human action	Qualification for AERI (53.4730(a)(34)(ii)) must be demonstrated to be met
Licensing basis events addressed without human action	Analysis of LBEs and DBAs (53.450(e & f)) demonstrates criteria met without human actions for credited mitigation	PRA (53.4730(a)(34)) demonstrates event sequences met without human actions for credited mitigation	
Safety functions not allocated to human action	Safety functions (53.230) achieved without reliance on human actions for credited event mitigation	FRA/FA (53.730(d)) demonstrates functions required for safety do not rely on credited human action	
Reliance on inherent or robust passive features	Plant response to licensing basis events does not credibly rely on human actions to assure the performance of SSCs (e.g., SSCs function through inherent characteristics or have engineered protections against human failures)		
Adequate DID without human action	DID requirements (53.250) met without human actions for the purposes of credited DID	Plant design must provide for layered DID without dependence upon any single barrier or reliance upon credited human action.	

Follow-on Discussion of Staffing Topics

- Regarding operational staffing, the members asked that the staff discuss several areas further, including:
  - Potential for allowing plants with no operators
    - There is no allowance for zero operator staffing
  - Engineering expertise degree requirement
    - Complements/augments plant ops experience
  - Training requirements for engineering expertise role
    - Systems approach to training required by § 53.830; topics covered by ISG
  - Availability of remote engineering expertise
    - Not credited in event mitigation; supports crew
  - Requirements might allow remote operation
    - Framework for staffing, HFE, operator licensing, and training is designed to adapt to future concept of operations; remote operations is a broader issue

Key Guidance Development

Under Development

Existing

- LMP (RG 1.233)
- Siting Criteria (RG 4.7)
- Fuel Qualification Framework (NUREG-2246)
- Developing Principal Design Criteria for Non-LWR (RG 1.232)

Near-Term

- TICAP (NEI 21-07) / ARCAP ISGs
- ASME/ANS Non-LWR PRA Standard
- Non-LWR PRA Standard Applicability ISG
- High Temp Materials (ASME III-5)
- Reliability & Integrity Mgt (ASME XI-2)
- Molten Salt Reactor Fuel Qualification
- Seismic Design / Isolators
- Emergency Planning (50.160)
- Change Evaluation (SNC-led)
- QA Alternatives (NEI-led)
- Facility Training Programs ISG
- Materials Compatibility ISG
- Treatment of Consequence Uncertainty

Part 53

- *DG-1413, Identification of Licensing Events*
- *DG-1414, AERI Methodology*
- *DRO-ISG-2023-01, Operator Licensing Program Review ISG*
- *DRO-ISG-2023-02, Staffing Plan Review ISG Augmenting NUREG-1791*
- *DRO-ISG-2023-03, Scalable Human Factors Engineering Review ISG*
- Part 26, Fitness for Duty
- Part 26, Fatigue Management
- Part 73, Access Authorization
- Part 73, Cyber Security
- Part 73, Security Programs

Future

- Analytical Margin
- Chemical Hazards
- Manufacturing
- Technical Specifications
- Facility Safety Program
- Framework B Content of Applications

Discussion

Additional Information

- Additional information on the 10 CFR Part 53 rulemaking is available at https://www.nrc.gov/reactors/new-reactors/advanced/rulemaking-and-guidance/part-53.html
- For information on how to submit comments go to https://www.regulations.gov and search for Docket ID NRC-2019-0062
- For further information, contact Robert Beall, Office of Nuclear Material Safety and Safeguards, telephone: 301-415-3874; email: Robert.Beall@nrc.gov

Acronyms

ACRS	Advisory Committee on Reactor Safeguards
AERI	Alternative evaluation for risk insights
ANS	American Nuclear Society
ARCAP	Advanced Reactor Content of Application Project
ASME	American Society of Mechanical Engineers
BWR	boiling-water reactor
CFR	Code of Federal Regulations
DBA	design-basis accident
DG	draft regulatory guidance
DID	defense-in-depth
DRO	Division of Reactor Oversight
EAB	exclusion area boundary
EDO	Executive Director for Operations
FA	function allocation
FR	*Federal Register*
FRA	functional requirements analysis
GLRO	generally licensed reactor operator
HFE	human factors engineering
ISG	interim staff guidance
LBE	licensing basis events
LMP	Licensing Modernization Project
LWR	light-water reactor
MACCS	MELCOR accident consequence code system
mSv	millisievert

Acronyms

NEI	Nuclear Energy Institute
non-LWR	non-light-water reactor
NRC	U.S. Nuclear Regulatory Commission
NUREG	U.S. Nuclear Regulatory Commission technical report designation
PRA	probabilistic risk assessment
PWR	pressurized-water reactor
QA	quality assurance
QHO	quantitative health objective
rem	Roentgen equivalent man
RG	regulatory guide
SNC	Southern Nuclear Operating Company
SSCs	structures, systems, and components
TEDE	total effective dose equivalent
TICAP	Technology Inclusive Content of Application Project