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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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REGULATORY RULEMAKING, POLICIES AND PRACTICES:

PART 53 SUBCOMMITTEE

+ + + + +

TUESDAY

OCTOBER 18, 2022

+ + + + +

The Subcommittee met via Video
Teleconference, at 8:30 a.m. EDT, David Petti,
Chairman, presiding.

COMMITTEE MEMBERS:

- DAVID PETTI, Chair
- RONALD G. BALLINGER, Member
- VICKI BIER, Member
- CHARLES H. BROWN, JR., Member
- VESNA DIMITRIJEVIC, Member
- GREGORY HALNON, Member
- JOSE MARCH-LEUBA, Member
- JOY L. REMPE, Member
- MATTHEW SUNSERI, Member

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1 ACRS CONSULTANT:

2 DENNIS BLEY

3 STEPHEN SCHULTZ

4

5 DESIGNATED FEDERAL OFFICIAL:

6 DEREK WIDMAYER

7

8 ALSO PRESENT:

9 BOB BEALL, NMSS

10 MIHAELA BIRO, NRR

11 KEITH COMPTON, RES

12 DAVID DESAULNIERS, NRR

13 ANNE-MARIE GRADY, NRR

14 JORDAN HOELLMAN, NRR

15 WILLIAM JESSUP, NRR

16 WILLIAM RECKLEY, NRR

17 JOHN SEGALA, NRR

18 JESSE SEYMOUR, NRR

19 MOHAMED SHAMS, NRR

20 MARTIN STUTZKE, NRR

21 BOYCE TRAVIS, NRR

22 KATIE WAGNER, NRR

23 JIM XU, RES

24

25

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

8:30 a.m.

CHAIR PETTI: Good morning, everyone, the meeting will now come to order. This is a meeting on the Advisory Committee on Reactor Safeguards Radiological Rulemaking Policies and Procedures Part 53 Subcommittee.

I'm David Petti, Chairman of the Subcommittee. ACRS Members in attendance today are Joy Rempe, Ron Ballinger, Charlie Brown, Vesna Dmitrijevic, Jose March-Leuba, Greg Halnon, Vicki Bier, and Matt Sunseri.

Our consultant, Steve Schultz, is on the line. I do anticipate Dennis Bley will be joining as well. Derek Widmayer of the ACRS Staff is the designated federal official for the meeting.

The purpose of this Subcommittee meeting is to hear from the Staff concerning the preliminary rule language for 10 C.F.R. Part 53 risk-informed technology-inclusive regulatory framework for commercial nuclear plants.

This meeting is the last Subcommittee meeting in a series of meetings on the preliminary rule language for 10 C.F.R. Part 53. The next time the Subcommittee sees the rule, we will be reviewing

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1 proposed rule language prior to it being published for
2 public comment.

3 The Subcommittee will gather information,
4 analyze relevant issues and facts, and formulate
5 proposed positions and actions as appropriate.
6 There's a section scheduled for discussions at the
7 November 2022 full Committee meeting at which these
8 matters will be presented and discussed.

9 And the Committee plans on preparing a
10 letter report on these matters at that meeting. The
11 ACRS was established by statute and is governed by the
12 Federal Advisory Committee Act, FACA.

13 The NRC implements FACA in accordance with
14 its regulations found in Title 10 of the Code of
15 Federal Regulations Part 7. The Committee can only
16 speak through its published letter reports.

17 We hold meetings to gather information and
18 inform preparatory work that will support our
19 deliberations at a full Committee meeting. The rules
20 for participation at all ACRS meetings including
21 today's were announced in the Federal Register on June
22 13, 2019.

23 The ACRS Section of the U.S. NRC website
24 provides our charter, bylaws, agendas, letter reports,
25 and full transcripts of all full and Subcommittee

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1 meetings including slides presented at the meetings.
2 The meeting notice and agenda for this meeting were
3 posted there.

4 As stated in the Federal Register notice
5 and in the public meeting notice posted to the
6 website, members of the public who desire to provide
7 all written or oral input to the Subcommittee may do
8 so and should contact the designated federal official
9 five days prior to the meeting as practicable.

10 Today's meeting is open to public
11 attendance and we have received one request to make an
12 oral statement at the meeting.

13 Time is provided in the agenda after
14 presentations are completed for spontaneous comments
15 for members of the public attending or listening to
16 our meetings.

17 Today's meeting is being held over
18 Microsoft Teams allowing participation of the public
19 over the computer using Teams. A bridge line is also
20 established to allow listening by phone and a
21 transcript of today's meeting is being kept.

22 Therefore, we request that meeting
23 participants on Teams and the bridge lines identify
24 themselves when they speak and to speak with
25 sufficient clarity and volume so they can be readily

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1 heard.

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

6 At this time, I ask the Teams and
7 telephone bridge line attendees make sure that they
8 are muted so that we can commence the meeting.

9 We'll now proceed and I call on Mo Shams,
10 Director of the Division of Advanced Reactors in Non-
11 power Production and Utilization Facilities of the
12 Office of Nuclear Reactor Regulation to make opening
13 remarks. Mo?

14 MR. SEGALA: Hi, this is John Segala, I'm
15 filling in for Mo. I am the Special Assistant in the
16 Division of Advanced Reactors in Non-power Production
17 and Utilization Facilities in the Office of Nuclear
18 Reactor Regulation.

19 I'd like to say good morning to everybody.
20 We are excited to be here today to discuss 10 CFR Part
21 53, which would be a new alternative risk-informed,
22 performance-based, and technology-inclusive framework
23 for the licensing and regulation of commercial nuclear
24 plants.

25 The objective of Part 53 is to continue to

1 provide reasonable assurance of adequate protection of
2 public health and safety in the common defense and
3 security, promote regulatory stability,
4 predictability, and clarity, reduce requests for
5 exemptions from the current requirements in Parts 50
6 and 52, establish new requirements to address non-
7 light water reactor technologies, recognize
8 technological advancements in the reactor design, and
9 credit the possible response of some designs of
10 commercial nuclear plants to postulated accidents,
11 including slower transient response times, and
12 relatively small and slow release of fission products.

13 The NRC Staff previously briefed the ACRS
14 full Committee on Part 53 in July of 2022 and
15 benefitted from the feedback we received during those
16 discussions.

17 On August 2nd, the ACRS issued its fourth
18 interim letter on Part 53 and on September 30th, the
19 NRC Staff issued a response addressing each of the
20 eight ACRS recommendations.

21 Since the July ACRS meeting, the NRC Staff
22 has continued to engage extensively with stakeholders
23 and has had an opportunity to consider verbal and
24 written feedback from stakeholders as part of the
25 Staff's ongoing efforts to enhance the proposed rule

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1 package.

2 To support today's ACRS Subcommittee
3 meeting, the NRC Staff released the draft proposed
4 Part 53 rulemaking package on September 30th, which
5 includes the draft proposed rule language from
6 Framework A and B, the accompanying preamble, or what
7 we used to call the statements of consideration, and
8 five draft guidance documents supporting the draft
9 proposed rule language.

10 Today and tomorrow the NRC Staff plans to
11 provide the ACRS Subcommittee an overview of the
12 enhancements the Staff has made to Part 53 rule
13 language since we last briefed the ACRS in July, which
14 reflect consideration of the input received from the
15 ACRS and stakeholders.

16 The NRC Staff also plans to provide an
17 overview of the five draft guidance documents. We are
18 looking forward to having discussions today and
19 hearing any ACRS Members' thoughts and feedback.

20 This completes my opening remarks and I
21 will now turn it over for the Staff discussions to
22 Jordan Hoellman. Thank you.

23 MR. HOELLMAN: Thanks, John.

24 Good morning, everyone. My name is Jordan
25 Hoellman. I'm a Project Manager in the Advanced

1 Reactor Policy Branch in NRR. I'm happy to be here
2 today to talk you through some of the introduction
3 material for Part 53, give a recap of how we got here,
4 and let's move to the next slide.

5 The next slide just lays out the agenda
6 for today. There is another slide like this later in
7 the package that lays out the agenda for tomorrow.
8 So, I'll begin with an overview of, like I said, the
9 schedule, how we got here, that kind of stuff.

10 I'll turn it over to Bill Reckley to talk
11 about Framework A, and I think Bill Jessup will talk
12 about Framework B. And then we'll talk about the
13 draft proposed language for the QHOs and safety
14 analysis and the differences between Frameworks A and
15 B there.

16 And then this afternoon we'll have a
17 discussion of the proposed rule language for the
18 alternative evaluation for risk insights or AERI
19 methodology and guidance documents for licensing
20 events.

21 Next slide, Billy.

22 As John mentioned and everyone knows I'm
23 pretty sure, we briefed the ACRS a number of times
24 over the past two years so we didn't feel it was
25 necessary to cover everything including the enactment

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1 of the nuclear energy innovation and modernization act
2 in January of 2019 and all the activities leading up
3 to it.

4 But we did think it would be worthwhile to
5 walk through some of the steps we took and direction
6 we've gotten that took us to where we are now.

7 Back in 2020, we issued the rulemaking
8 plan. We proposed to develop a new 10 CFR Part that
9 could address performance requirements, design
10 features, and programmatic controls for a wide variety
11 of advanced reactors through the life of a facility.

12 We said we'd focus the rulemaking on
13 risk-informed functional requirements building on
14 existing NRC requirements, Commission policy
15 statements, and recent and ongoing activities.

16 And then we said we would be seeking
17 extensive interactions with external stakeholders
18 including the ACRS on the content of the rule.

19 The SRM that the Commission issued in the
20 fall of 2020 approved the Staff's proposed approach
21 but the rulemaking directed the Staff to provide a
22 schedule with milestones to provide the draft proposed
23 rule to the Commission by October 2024 to identify key
24 uncertainties impacting publication of the rule, and
25 to provide options for the Commission regarding the

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1 licensing and regulation of fusion energy systems.

2 And the SRM also directed the Staff to
3 develop and release preliminary proposed rule language
4 intermittently followed by public outreach and dialog.
5 So, we've been doing that, like I said, for the past
6 two-plus years.

7 In the fall of last year, the Staff
8 requested a schedule extension which was approved by
9 the Commission to do mainly three things, provide
10 additional time for the Staff to continue efforts to
11 reach alignment with external stakeholders on the
12 scope of the rulemaking and to further develop the
13 language to allow additional time for external
14 stakeholders to participate constructively in the
15 rulemaking process, and to ensure better coordination
16 with other NRC advanced reactor readiness activities.

17 So, mainly, over the past year, we really
18 dove into the development of Framework B, which
19 stemmed from what we presented last year on what we
20 called Part 5X, and continued to engage with
21 stakeholders extensively on the progress of the rule
22 and the preliminary proposed rule language.

23 So, we got a number of comments from
24 public stakeholders in the industry throughout the
25 public comment period on the preliminary proposed rule

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1 language, which closed on August 31st of this year.

2 And like John mentioned, on September 30th
3 we issued the draft proposed Part 53 rulemaking
4 package to support these meetings and other
5 stakeholder engagements.

6 Billy, let's move to the next slide.
7 Please feel free to interrupt if you have any
8 questions.

9 MR. BLEY: Jordan, Dennis Bley. On your
10 last slide I didn't see interactions with the
11 Committee showing up. When do you folks expect to be
12 back to the Committee again? Is it going to happen as
13 you develop more guidance documents?

14 Where do you see it happening?

15 MR. HOELLMAN: You're talking about ACRS,
16 correct?

17 MR. BLEY: I am.

18 MR. HOELLMAN: Okay, so at the bottom you
19 see October, November 2022, that's ACRS interactions
20 on the rulemaking package. There are a number of
21 guidance documents that are being developed. We'll
22 talk about that tomorrow afternoon a little bit.

23 A number of them are proceeding separately
24 from the rulemaking package and the strategy or reason
25 for doing that is essentially to be able to issue

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1 guidance to support early applications under the
2 existing regulations to continue to learn lessons from
3 early reviews and gain experience, be able to make
4 modifications, things like that.

5 So, as we came to you with, say, NUREG
6 2246, the fuel qualification guidance for advanced
7 reactors, the endorsement of ASME Section 3 Division
8 5, endorsement of the non-light water reactor PRA
9 standard, we'll continue to engage with the Committee
10 on those.

11 But it would be separate from the
12 rulemaking, this rulemaking package.

13 They will support the rule when the final
14 rule is issued. It's just the timeline we're all in.
15 We're trying to move in parallel to both support the
16 Part 53 rule and support applications under the
17 existing regulations.

18 MR. BLEY: On the rule itself do you see
19 coming back to the Committee before issuance of the
20 draft final rule?

21 MR. HOELLMAN: I may need to rely on our
22 rulemaking Project Manager for this. I know we're
23 coming back next month for full Committee. I'm not
24 sure we plan to have another interaction before the
25 rule goes to the Commission in February of 2023.

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1 Bob, Bill, if I'm wrong please correct me.

2 MR. BEALL: This is Bob Beall. I'm the
3 Project Manager in the NMSS Rulemaking Branch and so
4 this is the formal presentation of the Part 53
5 rulemaking package to the ACRS for the ACMR and the
6 full Committee in November.

7 So, this is the last formal process or
8 presentation of this package to the Committee.

9 As Jordan mentioned, we have other
10 supporting documents that we're removing separately
11 from the package but what you have that's been sent to
12 you and been presented to you today and tomorrow will
13 be the documents that will be moving with the package
14 to the Commission in February of 2023.

15 MR. BLEY: After you receive public
16 comments -- well, go ahead, Dave may have more
17 questions on this later.

18 CHAIR PETTI: Yes, I have the same concern
19 about will there be any interaction on your slide
20 before December 2024? I'm assuming there will be
21 public comment, you'll make some changes?

22 MR. BEALL: Yes, Dave, that's correct,
23 that will be for the final rule and so, yes, we will
24 come back to you, we will have a number of
25 interactions with you at the proposed rules published

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1 and when we come back we'll have public comments and
2 we'll have additional interactions with you as we
3 develop the final rule.

4 CHAIR PETTI: Got it, thanks.

5 MEMBER BROWN: Can I ask a question? This
6 is Charlie Brown.

7 MR. BEALL: Yes, sir.

8 MEMBER BROWN: I wanted to springboard off
9 of Dennis's comment on the supporting documents, the
10 Regulatory Guides or comments. Since we've got
11 Framework A and B, Framework A is kind of the new age,
12 Framework B is roughly kind of like the old stuff with
13 a few enhancements.

14 That's my personal opinion, whether that's
15 accurate or not, I'm not sure.

16 Are these additional guidance documents
17 going to be focused on the Framework A approach to
18 doing business? Are they going to be mixed, or are
19 they going to be separate ones for each framework?

20 MR. HOELLMAN: Thanks for the question,
21 Charlie.

22 The way I think we're envisioning it now,
23 a lot of the documents we're working on, I know we've
24 presented as part of Part 53 on the technology-
25 inclusive content of application project and the

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1 advanced reactor content of the application project,
2 commonly referred to as TCAP and RCAP.

3 Those guidance documents are being
4 developed for Parts 50 and 52 only right now. They're
5 being done that way because if we develop them for
6 Part 53, they can't be used or implemented or issued
7 as official Agency documents and guidance until the
8 Part 53 rule is published as a final rule.

9 And because we know we have applications
10 coming in under the existing regulations, we think
11 it's better to get guidance out there to support early
12 movers to be able to exercise the guidance, learn
13 lessons from doing those reviews, and make
14 modifications.

15 So, in between the proposed and final rule
16 for Part 53, those guidance documents will need to be
17 updated to include applicability to Part 53. And to
18 answer your question more directly, I think for the
19 most part we plan on developing guidance for both
20 approaches.

21 MEMBER BROWN: Excuse me, Jordan, the
22 stuff that's been done under RCap and TCap, Part 50
23 and 52, I understand you want to get those out so they
24 can be used.

25 But you talked about, my inference from

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1 your comment was that to go along with Part 53 there
2 were going to be five or some number you listed types
3 of guidance documents.

4 I thought those were Part 53 documents.
5 I didn't see how they related to the RCap TCap stuff,
6 which is Part 50 and 52.

7 And so on these additional documents, my
8 question fundamentally, I think you answered it right
9 at the end, are going to be segregated or separated
10 however way you want to phrase it, those that would be
11 guidance relative to Framework A and one or two or
12 three guidance we've developed to be exercised with
13 Framework B.

14 Maybe they would be consistent with the
15 Part 50 and 52 stuff or come from those but it would
16 seem to me that your Framework A is pretty much
17 different from the 5052 approach and that you'd need
18 to be able to separate some of the older stuff with
19 whatever you want to do relative to the Framework A.

20 That's why I thought they should be
21 separated but I wasn't quite sure what they were going
22 to do.

23 MR. HOELLMAN: Yes, Charlie, that's
24 correct. The documents moving with the package
25 specifically support rule language and Part 53 that

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1 essentially doesn't exist under the existing
2 regulations, the new stuff for operator licensing, the
3 AERI approach.

4 I guess the one outlier is the draft guide
5 1413, which we'll discuss this afternoon. That
6 guidance document actually has applicability to Part
7 50, Part 52, Part 53 Framework A and Part 53 Framework
8 B.

9 And the reason I think we've tagged that
10 along with the rulemaking package is because there was
11 a number of stakeholder comments, I know the ACRS was
12 interested in having guidance on that systematic
13 identification of licensing and events.

14 We've had a number of discussions.
15 There's been at least some confusion I've heard from
16 external stakeholders about how to choose which
17 framework you're in. And so that guidance is kind of
18 set up to help in that respect.

19 CHAIR PETTI: Keep going, Charlie.

20 MEMBER BROWN: Oh, is that you, Dave? I'm
21 sorry, I didn't mean to interrupt you.

22 CHAIR PETTI: No, keep going.

23 MEMBER BROWN: I guess my concern is,
24 having built lots of stuff, having mixed guidance
25 where you decide to pick a Part 53 Framework B and now

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1 you sort through guidance documents that have mixed
2 guidance, some that applies to A, some that would be
3 applicable to B.

4 How does the industry sort that out unless
5 they're separated? I'm struggling a little bit with
6 mixing guidance for both Framework A and Framework B
7 in the same guidance documents, and then having people
8 sort it out.

9 Because inevitably, they start getting it
10 comingled and then it becomes a problem for the
11 industry and the Applicants to figure out what the
12 heck they're dealing with, which just makes it harder
13 on everybody.

14 MR. HOELLMAN: I understand the concern,
15 Charlie.

16 I think what we'll need to do clearly is
17 identify what's the regulatory basis, which
18 regulations the guidance documents are associated
19 with, and be really clear in the guidance documents.

20 What we're doing in the Part 5052 space,
21 we do that sometimes and we need to depending on
22 what's required for a construction permit application
23 versus a combined license application.

24 And so it's similar to that. We developed
25 a number of guidance documents, obviously Framework A

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1 was essentially based off of the licensing
2 modernization project guidance document in Reg Guide
3 1.233.

4 We used that as the foundation, as a
5 risk-informed performance-based methodology to do the
6 key stuff at the beginning to selection and identify
7 licensing basis events, selecting and classifying your
8 structure's system and components and sharing adequate
9 defense in-depth.

10 So, we used that as the basis for
11 Framework A to develop this performance-based
12 technologically-inclusive approach. The TCap guidance
13 expands upon that a little bit.

14 It does include some guidance that is
15 specific to following the licensing and modernization
16 project methodology but there's other guidance in
17 there that can be used regardless of what methodology
18 you're using.

19 So, we're getting ready to issue that for
20 public comment.

21 I know we've briefed you all a few times
22 on that, I'm looking forward to having the opportunity
23 to brief you guys before we issued that final. So,
24 hopefully maybe that will clear up some of the
25 concerns related to how that is done.

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1 But obviously, under Parts 50 and 52 and
2 Framework B, we require principal design criteria.

3 In Framework A, we don't really do that,
4 so we're definitely going to need to make some
5 modifications to the TCap draft guide and some of the
6 RCap ISGs to appropriately clarify how it works within
7 Framework A.

8 I know I talked a lot there, I hope I
9 helped.

10 MEMBER BROWN: Fundamentally, it sounds to
11 me like it's a wait and see.

12 I just think you ought to be able to
13 address that be able to explain to us at our next
14 time, whenever we get through the public comment and
15 we're into the preparation of the final rule
16 processes, to make sure that's explained as to how
17 this additional guidance for the Reg Guides are going
18 to be able to be used and not get tied between each
19 other.

20 I won't beat on this anymore. I'll let
21 you go on unless Dave has --

22 CHAIR PETTI: I had a question.

23 MR. HOELLMAN: I was just going to say
24 quickly, Dave, we can talk about it more tomorrow. We
25 have a whole discussion on the various guidance

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1 documents. So, maybe that will be another chance to
2 recap and hopefully clarify things a little bit.

3 CHAIR PETTI: I wasn't going to ask this
4 now, I was going to ask this question later, but you
5 talked about this idea of issuing some of these guides
6 in parallel with the rule and outside the rule so that
7 early movers could have access to that.

8 And the question that has always been in
9 my mind is AERI and why wouldn't AERI be useful in 52
10 given there will be micro-reactor applications coming
11 in well before 53 becomes a rule and that guidance
12 might be useful.

13 I don't necessarily need an answer now but
14 it's in the back of at least my mind about whether or
15 not there is some value there.

16 MR. HOELLMAN: I appreciate the question.
17 I think we'll get into it more as we get into the AERI
18 discussions this afternoon but I think fundamentally,
19 it's because Part 52 requires a PRA and Part 50, it's
20 Commission policy and expectation to do a PRA.

21 So, I think that's the fundamental reason
22 why in Part 53 we're introducing this methodology to
23 get out of having to do a PRA upfront and I think
24 under the existing regulations, you'd need to request
25 an exemption to do that.

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1 Does that help? Marty --

2 CHAIR PETTI: We'll come back to it
3 because I think it's a natural question. The other
4 one, the event selection Reg Guide, obviously has
5 great value so it's just a natural question to ask.
6 Let's just keep going.

7 MR. HOELLMAN: I would assume that we
8 could in pre-application discussions and various other
9 forums and conversations with the Applicants, I think
10 as we put things out, even if it's not a formal
11 guidance document, it could be used to have a
12 conversation in pre-application space and during early
13 parts of the application to figure that out.

14 I'm sorry if I overtalked someone.

15 MEMBER HALNON: This is Greg. I want to
16 get back to this slide if we can. The draft guidance
17 for public comment, 60-day public comment period, I've
18 seen a lot smaller rules get requested extensions well
19 past 90 days, if not 120.

20 Are you prepared to be able to extend this
21 if the industry and public come back and say the size
22 of this rule, the amount of guidance, 60-day comment
23 period is just not enough?

24 MR. BEALL: Hi, Greg, this is Bob Beall
25 with Rulemaking again. Yes, we will take those

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1 considerations and requests if we get them from the
2 public for extents of the comment period.

3 We would have discussions with our
4 management and we would seriously consider whether or
5 not we should grant those extensions based on the
6 input we get from those extension requests.

7 MEMBER HALNON: Have you guys encouraged
8 the industry to start working on it now relative to
9 their formal comments given the fact that the rule
10 language is public at this point?

11 MR. SHAMS: Bob, I can help with that.
12 Mr. Halnon, this is Mo Shams with the Staff.

13 Yes, the answer to that is yes, in our
14 interactions with the industry we've started to
15 indicate that the rule is already out now and the
16 package that we're sending to you all is out.

17 The changes that we would anticipate is
18 not likely to be significant or very fundamental so
19 there's an opportunity to start assembling comments
20 now and leveraging the timeframe until the actual
21 comment period.

22 MEMBER HALNON: Very good, thanks a lot,
23 I appreciate that.

24 MR. SHAMS: Always.

25 MR. HOELLMAN: Any other questions before

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1 we move on? Billy, let's move to Slide 4. Here are
2 the layouts of the two frameworks we've been
3 discussing for a couple meetings now. This is
4 intended to give a broad overview of Part 53.

5 It's a series of subparts A through U.
6 Subpart A is common to both frameworks. It provides
7 the general provisions and definitions, both common
8 and framework-specific.

9 Subparts B through k are the technical
10 application requirements for Framework A as I noted
11 before. And in the rulemaking plan, Framework A was
12 intended to align with the licensing and modernization
13 project, a PRA-led approach.

14 It's a top-down approach starting with
15 high level of safety objectives, technology-inclusive
16 safety requirements, and high-level performance
17 standards. Subparts N through U are the technical and
18 application requirements for Framework B.

19 The genesis of Framework B was really in
20 response to stakeholder feedback requesting that a
21 technology-inclusive traditional licensing option that
22 aligns more with international guidance and
23 approaches. It uses a traditional use of risk insight
24 and specific design rules.

25 And it requires the Applicant to design

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1 principal design criteria, and it includes the
2 alternative evaluation for risk insights, or AERI,
3 approach, which would not require a PRA if certain
4 entry conditions are met.

5 As mentioned in previous meetings, while
6 some of the subparts in each framework are reproduced,
7 you'll see that with a number of them, the classic
8 example we've been giving is Subparts G and Q on
9 decommissioning.

10 The internal cross-references within the
11 subpart started to cause some confusion and were a
12 little bit more trouble for us as the staff then just
13 reproduced it in the new framework.

14 So, from our perspective, we thought it
15 provided some clarity to make two distinct frameworks
16 with their own set of consolidated requirements. And
17 so that's how we ended up with Framework A and B.

18 Like I mentioned, some of the subparts are
19 equivalent between the two frameworks and we've tried
20 to increase clarity in the preamble discussion by
21 having a common preamble for those subparts.

22 So, you'll see like I said, Subpart G and
23 Q will have a common write-up in the preamble
24 discussion. I'm ready to move to Slide 5 --

25 MEMBER DIMITRIJEVIC: This is Vesna.

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1 It's true that we have discussion with you
2 this many times but we have been discussing -- so, you
3 are set on this organization, you are set on that
4 horizontal route, this is an easy part of calling it
5 Framework A and B, renaming it to alpha, beta, or
6 giving it some different name, not to be confused with
7 Subparts B and A.

8 That's my first question.

9 My second question is in these parts which
10 are common you are definitely set to have them as a
11 part, you don't want to keep them not to have
12 repetition. You don't want to keep them as common as
13 you are keeping Subpart A common to the A and B.

14 This is where the confusion starts, or
15 common to that. So, to reduce the pages of the
16 repetition.

17 And my third question was to this Subpart
18 B and C, should they have versions for Framework B if
19 you want to keep those frameworks if your main idea is
20 they can standalone.

21 So, those are my three questions. Those
22 are easy questions actually, compared to what you just
23 had on the previous slide.

24 MR. HOELLMAN: I think the titles of
25 Framework A and B, that's something we've talked about

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1 a number of times as we've gone along here. That's
2 sort of just where we ended up.

3 I think there's still opportunity to make
4 them Framework I and II if we wanted to do that, and
5 that continues to cause confusion.

6 Hopefully that answers your question, it
7 was just sort of to distinguish they're two and
8 separate and distinct. But I understand the comment.

9 With respect to having Subpart A be common
10 and direct you into the frameworks, we did add some
11 front matter material in 5300 and 53010, which were
12 intended to provide some additional clarity in how it
13 works.

14 I guess we could have done general
15 provision section for each framework but with a number
16 of the comments we got about trying to align the
17 frameworks and with the common definitions, I think we
18 thought that added some -- there was some benefit to
19 aligning where we could.

20 And then with respect to your last
21 question on Subparts B and C and why they're not in
22 Framework B, that's just based on the traditional
23 licensing frameworks where the technical requirements
24 are in the content of application section.

25 So, the technical requirements in

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1 Framework B would be found in Subpart R and Billy,
2 Jessup, and Boyce will discuss that later. Mo, I see
3 a hand up, I don't know who to go to.

4 MR. JESSUP: Hey, Jordan, this is Bill
5 Jessup from the NRC Staff.

6 I just wanted to add some comments to
7 Jordan's responses to your questions, the first one,
8 that's correct but this is the formula we've settled
9 on in the preliminary proposed rule text welded to the
10 second question in consolidation with requirements.

11 But from the last iteration, we did find
12 some opportunities for consolidation particularly in
13 the area of operator licensing and staffing and
14 qualifications. You'll see those requirements are now
15 consolidated in Subpart F.

16 So, to your point, that was an
17 opportunity, a unique place, where we could
18 consolidate the requirements and reduce the page
19 counts so-called.

20 But other areas, as Jordan mentioned, it
21 does become a challenge if you start trying to force
22 consolidation.

23 Jordan brought up the example of the
24 decommissioning requirements in Subparts G and Q. You
25 could consolidate them but the usability I think

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1 decreases.

2 We experimented with several options for
3 that consolidation early in the development of
4 Framework B and we've ended up with what's been
5 conveyed here in the preliminary proposed rule
6 package.

7 And on your last question, again, Jordan,
8 you captured it correctly.

9 The safety and design requirements in
10 Framework B, they are captured in Subpart R as
11 technical content of application or requirements in
12 the same way that they are today in the existing
13 framework under 50 and 52.

14 And since Framework B, it does operate
15 more like Parts 50 and 52. We had elected to preserve
16 that format and so those safety and design
17 requirements, again they show up in Subpart R not as
18 separate subparts.

19 So, I just wanted to add that, Jordan.

20 MEMBER DIMITRIJEVIC: Thank you. I was
21 aware of all of these things. I'm just wondering, did
22 you think about the possibility of those changes?
23 Because this is what we saw from the beginning when
24 you introduced Framework B.

25 So, I was just wondering did you consider

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1 the improvements in the realization there? But thanks
2 for your response.

3 MR. HOELLMAN: Mo, did you want to say
4 something?

5 MR. SHAMS: Nothing in addition to what
6 you and Billy said. So, thanks.

7 MR. HOELLMAN: All right, just wanted to
8 make sure.

9 Vesna, we did align the language between
10 the subparts so that for the most part, the language
11 is the same so there should be less confusion. But
12 you're right, we didn't elect to consolidate specific
13 subparts together more.

14 MEMBER DIMITRIJEVIC: Okay, thanks.

15 MR. HOELLMAN: 5, Billy?

16 This slide, you've seen this I'm sure,
17 this is just the rule package or the draft proposed
18 rulemaking package that we provided to the Committee
19 to support this meeting.

20 We did separate the Federal Register
21 notice into four enclosures, that was intended to help
22 you and stakeholders be able to review the package
23 more effectively, so for example, you could have the
24 preamble discussion up and the actual rule text for
25 either framework at the same time and not have to

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1 scroll up and down the page to figure out what we said
2 about it in the preamble.

3 And then the five guidance documents that
4 we'll talk about later today and tomorrow. I think
5 that's all I really wanted to talk about.

6 Tomorrow we'll talk about other guidance
7 develop to support advanced reactor readiness more
8 generally, so we'll get there tomorrow and I think we
9 can move on.

10 This is pretty generic.

11 CHAIR PETTI: Jordan, just a question
12 administratively.

13 All of them together get their own ML
14 number under the rule package but then each individual
15 gets their own ML number, so you can find it in more
16 than one way I guess?

17 MR. HOELLMAN: If I understand the
18 question correctly, the package is on the left side,
19 that package includes all these documents on the
20 right. They do have different numbers, though.

21 CHAIR PETTI: And the package itself gets
22 a number?

23 MR. HOELLMAN: Yes. So, the package
24 itself, if you go to that link it will pull up a list
25 with all these documents in it. If you pull up, say,

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1 Enclosure 1A, you'll only get the preamble.

2 CHAIR PETTI: Got it, thanks.

3 MR. HOELLMAN: Let's move on.

4 I alluded to the front matter sections
5 before, these are things that had not previously been
6 issued in the preliminary form but we've been
7 discussing the layout and purpose of the frameworks
8 the past couple of meetings.

9 Hopefully, these sections provides some
10 additional clarity on how the proposed rule is set up
11 and that each framework is distinct with their own set
12 of consolidated requirements.

13 We do know that we've received a common
14 comment from external stakeholders that the rule
15 should consist of only one framework that can
16 accommodate any licensing approach and use of PRA.

17 We agree that streamlined and efficient
18 regulatory frameworks are desirable and that guidance
19 should be used where practicable to reduce the size of
20 the rule. And like I said, each framework must be
21 viewed independently with some exceptions.

22 The methodologies between the two
23 frameworks were just too distinct for us to make
24 further consolidations, at least at this point in the
25 rulemaking process. That's where we are.

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1 Next slide, we'll talk about Framework A,
2 this is the common subpart. This covers general
3 provisions that are largely equivalent to the general
4 requirements in Part 50.

5 The scope, written communications,
6 employee protections, standards for review, exemptions
7 and definitions, the definition sections where we
8 wanted to focus our time this morning.

9 So, 53020 is the common definitions for
10 both Framework A and B, most of these terms are
11 equivalent to the corresponding terms defined in
12 either 50.2, 52.1, and other existing regulatory
13 definitions.

14 Their use would be consistent with how the
15 terms are used under the existing regulations. I see
16 a hand up. Do you want me to take the question now?

17 MEMBER REMPE: Go ahead and finish what
18 you wanted say. This is Joy.

19 I know you have another slide on safety
20 function but I had a comment about your definition for
21 a commercial nuclear power-plant and I don't know when
22 the best time is to do it but I assume it's after you
23 finish discussing this slide.

24 MR. HOELLMAN: That's fine. I was going
25 to talk about commercial nuclear plant now.

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1 MEMBER REMPE: That's fine, go ahead.

2 MR. HOELLMAN: If there's a better time,
3 just chime in, please.

4 You may recall that we initially started
5 with the use of advanced nuclear plant which was
6 intended to be consistent with the Nuclear Energy
7 Innovation and Modernization Act's use.

8 This caused some confusion with the public
9 and external stakeholders and so we modified the term
10 about a year ago to recognize that feedback we were
11 receiving. Essentially, it related it to just because
12 you call something a dance doesn't mean it's safer.

13 And so we recognize we've been using that
14 term a lot I think and like I said, Congress used the
15 term in NEIMA so that's why we were trying to
16 consistent with it.

17 We used the word plant versus reactor to
18 recognize that co-located support facilities and
19 radionuclide sources need to be considered in the
20 licensing of a facility in that some of those
21 radionuclides may be outside of the reactor vessel or
22 coolant system.

23 So, it was intended to cover the facility
24 and all hazards I guess. We used the phrase other
25 commercial purposes to recognize that new plant

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1 designs may be used for purposes other than electric
2 power, which was intended to be consistent with
3 NEIMA's definition.

4 And the definition of commercial nuclear
5 plant refers to the commercial nuclear reactor, which
6 comes from 50.2 with some modifications, to not
7 preclude Part 53's applicability to potential of
8 accelerated driven systems.

9 Joy, I don't know, do you want to ask a
10 question now I guess?

11 MEMBER REMPE: Yes, please. I think it's
12 wise that you did this but I also have seen some
13 reports issued from stakeholders who believe that
14 anything that -- a dance in going through Part 53 has
15 got to be safer.

16 Your new definition would allow a large
17 light water reactor to come through Part 53, right?

18 MR. HOELLMAN: It's not precluded
19 specifically.

20 MEMBER REMPE: Right, and so I would
21 emphasize the need to make sure it's recognized that
22 this could happen in the new ISGs that are documented,
23 who claim that the reactors coming through Part 53 are
24 going to be safer and should have some better
25 responses, et cetera.

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1 Because I really do think that some of the
2 stakeholder comments and reports that are coming
3 through are talking past what the Staff is talking
4 past and so it's very important.

5 And I think your text in the preamble is
6 very good on this point but I just would caution you,
7 you need to make sure it's in the draft text for other
8 documents that are a part of this package.

9 And I can give you specific examples when
10 we talk about the ISGs tomorrow.

11 MR. HOELLMAN: I appreciate that, Joy. As
12 I've worked on different guidance documents, I know
13 that we've been questioned by you guys a couple times
14 on the use of terms like for non-light water reactors
15 and things like that.

16 So, there are specific guidance documents
17 that are written that way and we'll need to take
18 another look at them in the next revisions. A lot of
19 times that was done for efficiency in getting the
20 document issued and in preparation for the types of
21 applications we were expecting.

22 But I understand the point that the rule
23 is intended to be technology-inclusive and the
24 guidance should be also be.

25 MEMBER REMPE: There's really not any

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1 gate, except if you go through the AERI approach,
2 that's the only gate where it might be questionable
3 whether a large light water reactor could use that
4 option within this Part 53, correct?

5 MR. HOELLMAN: That's true I think.

6 MEMBER REMPE: I think that needs to be
7 emphasized.

8 It's fine, I've seen some optimism in some
9 of the new ISGs and I'm pretty sure it's been around
10 in some of the other documents and we just need to
11 make sure so that stakeholders won't be asking for a
12 lot of things with Part 53 that wouldn't apply to a
13 large light water reactor, which is now eligible to go
14 through Part 53.

15 MR. HOELLMAN: Understood. Thanks, Dr.
16 Rempe.

17 So, some of the other terms I wanted to
18 talk about in Subpart A include manufactured reactor
19 and manufactured reactor module.

20 These are defined to recognize the
21 potential for manufacturing a nuclear reactor under a
22 manufacturing license and transporting and
23 incorporating that reactor into a commercial nuclear
24 plant under a combined license.

25 So, these are the micro-reactors that

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1 folks talk about.

2 The term module distinguishes a reactor
3 that's loaded with fuel prior to transport and we'll
4 talk about this more when we get into the requirements
5 in Subparts E and O related to fuel-loading, which
6 Bill Reckley will cover in a few slides.

7 The framework-specific definitions, in
8 Framework A, I know there's been some discussion about
9 this in the past so things like licensing basis
10 events, anticipated, unlikely, very unlikely event
11 sequences, we moved them all to Framework A-specific
12 definitions and tried to use new terms that didn't
13 conflict with how terms are traditionally used under
14 the existing regulations.

15 And then we have definitions for
16 functional design criteria and the different
17 classifications of structures, systems, and components
18 and special treatment.

19 In Framework B if you remember, a lot of
20 the definitions supporting Framework B we're
21 previously in Subpart N. We'd move those definitions
22 from Subpart N to 53028, which is the Framework
23 B-specific definitions. And Subpart N is now for
24 citing.

25 So, some of the Framework B-specific

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1 definitions include anticipated operational
2 occurrences, functional containment, reactor coolant,
3 pressure boundary, design basis, safety-related
4 structures, systems, and components, and severe
5 nuclear accident.

6 A number of these terms were taken or
7 modified from the existing Part 50 regulations but
8 made technology-inclusive. So, you'll see things
9 like, for light water reactors a safety-related SSC
10 means this, reactor coolant pressure boundary means
11 this.

12 For non-light water reactors it's modified
13 slightly.

14 Construction is one that we did put a
15 separate definition in each framework.

16 It is defined framework-specific but it
17 would cover the same concept but be applied to a
18 slightly different scope of activities based on how
19 structures, systems, and components are classified
20 under each framework.

21 So, in Framework A, it's based on 50.10,
22 the definition of construction but modified to apply
23 to safety-related and non-safety-related but safety-
24 significant SSEs based on the analysis requirements in
25 Subpart C.

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1 And Framework B is essentially equivalent
2 to 50.10.

3 Slide 8 will talk about safety function.
4 Safety function was included as a common definition in
5 response to feedback we received from both ACRS and
6 external stakeholders. It was noted in your guys'
7 fourth interim letter.

8 We originally did not include a definition
9 of safety function in Framework A because there were
10 requirements to establish safety functions in Subpart
11 B. See, Vesna, I'm doing what you told me about.

12 In Framework B we did not originally
13 include a definition either because safety functions
14 are implicitly captured through the requirements for
15 PDC. So, we received feedback to better align the
16 frameworks and feedback that safety functions are
17 technology-inclusive requirements that should apply to
18 both frameworks.

19 The definition, as you can see on the
20 screen, which is just reproduced from the rule text,
21 has generic elements but it's bifurcated to
22 acknowledge the fundamental differences between the
23 frameworks.

24 Defining critical safety function remains
25 an explicit requirement in Framework A and there's

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1 requirement for primary and additional safety
2 functions.

3 There, in Framework B, the safety
4 functions are addressed implicitly through the
5 requirements to define principle design criteria and
6 that's consistent with the current approach in the
7 existing regulations.

8 MEMBER BROWN: This is the question,
9 Jordan. They exist, like Parts 50 and 52 had, you
10 know, Appendix A is fundamentally a bunch of principle
11 design criteria when you really get down to it. And,
12 this does not have any of that at all.

13 So they're not, you don't, you don't have
14 a listing. They still have to be developed from what
15 I can see the way this is written.

16 Is that correct?

17 MR. HOELLMAN: Are you talking about
18 principle design criteria?

19 MEMBER BROWN: Yes.

20 MR. HOELLMAN: In Framework B, yes.

21 MEMBER BROWN: So they would have to be
22 developed independently, even though there's no
23 Appendix A, per se? Like there is in 50 and 52.

24 MR. HOELLMAN: Correct. Correct.

25 I mean we have guidance for, for well, the

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1 GDC in Appendix A. I assume we would rely on that as,
2 as sort of guidance for, for future light water
3 reactor designs.

4 For non-light water reactor designs, we
5 have Reg Guide 1.232, which lays out how principle
6 design criteria can be developed and defined, for
7 certain non-light water reactor designs.

8 MEMBER BROWN: Well, this can apply to a
9 light water, as well as non. I mean 53 is not
10 restricted to a non-light water design. At all.

11 MR. HOELLMAN: That's true, that's true.

12 MEMBER BROWN: So, your comment is that I
13 guess your thought would be that even though there's
14 no GDCs, somebody's going to have to develop them
15 because you asked for them to be developed. They're
16 going to have to go somewhere.

17 MR. HOELLMAN: Yes.

18 MEMBER BROWN: And reinvent the wheel?

19 MR. HOELLMAN: Yes, yes, Charlie, so --

20 (Simultaneous speaking.)

21 MEMBER BROWN: We've had this discussion
22 before, unsuccessfully.

23 MR. HOELLMAN: Yes, no, I understand. I
24 think this goes back to something we were discussing
25 earlier with the, with the guidance.

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1 And at least from my perspective, I see us
2 capturing this when we go to update Reg Guide 1.232,
3 to include the applicability to Part 53.

4 I see that as a place where that, that
5 gives up an opportunity to really clarify how, how
6 PDCs can be developed for Part 53, Framework B.

7 And it gives us another opportunity to, to
8 learn from the work ongoing with applications under
9 Parts 50 and 52.

10 I know it's maybe not the most
11 satisfactory answer to your question, but these are
12 things that, that we are considering.

13 It's just that a matter of the time line
14 we were on for Part 53, and, you know, the work that
15 we were expecting and have ongoing under the existing
16 regulations.

17 We're trying to make sure we have robust,
18 you know, clear guidance to support applications under
19 Parts 50 and 52. And, so we didn't under Part 53,
20 undertake trying to revise those guidance documents.

21 And, I think the Commission to
22 acknowledge, you know, that we're going to learn from
23 early applications and their SRM, I think they've
24 reinforced it in, in a number of SRMs they've issued.

25 That, that those interactions and the

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1 experience we gained from, from those application
2 reviews, will continue to inform the Part 53
3 rulemaking as we move to the, you know, next stage
4 and, you know, the draft final rule stage, I guess in
5 2024.

6 But you'll see them all again. So you'll
7 have a chance to question us when we say --

8 (Simultaneous speaking.)

9 MEMBER BROWN: Well, the --

10 MR. HOELLMAN: -- here's the revision to
11 Reg Guide 1.232.

12 MEMBER BROWN: Yes, but is it going to,
13 it's not going to have, 1.232 it's it just seems like
14 we're throwing the -- I've made the comment before,
15 throwing the baby out with the bath water.

16 We've learned how to build light water
17 reactors. We know what the problems are. And now
18 we're saying we're going to go, go to Part 53.

19 We've got to redevelop that or dictate it
20 somehow. I just don't know how that's going to work.

21 I'll let you go on. That's been my
22 concern from the beginning.

23 MR. HOELLMAN: Yes, I understand the
24 concern, Charlie. I think hopefully in guidance space
25 I guess, you know, we'll for, you know, we have to do

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1 things like that for light water reactors.

2 You know, Appendix A to Part 50 is the
3 general design criteria, that I think we would expect
4 to be defined as the principle design criteria in
5 Framework B.

6 Or at least we'd be asking --

7 (Simultaneous speaking.)

8 MEMBER BROWN: I would agree with that but
9 --

10 MR. HOELLMAN: We would be asking questions
11 to, to say why not. And, it would be the applicant's
12 you know, job to defend if they didn't want to, to do
13 that. So.

14 There may be where, you know, that could
15 happen, but we'll see when we get there, I guess. I'm
16 not familiar enough with some of the light water
17 reactor applications, NuScale and such, and I'm not
18 sure if there's any exceptions there, but.

19 MR. SEGALA: Hey Jordan, this is John
20 Segala. Just wanted to add that Framework B for light
21 water reactors still has the general design criteria
22 as requirements.

23 And then the guidance in Reg Guide 1.232
24 lists, has advance reactor design criteria, has high
25 temperature gas cooled reactor criteria, has sodium

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1 cooled fast reactor criteria.

2 And then says that the general design
3 criteria can be used as guidance for establishing PDCs
4 for, for non-light water reactors.

5 But we included that in guidance and then
6 made it a requirement that, that PDCs have to be
7 established in Framework B.

8 MEMBER BROWN: Yes, but it's not in the
9 Rules part of it. It's I guess it's in the guidance,
10 not in the Rule the way it is in Part 50 and 52.

11 That's the way I read your comment, your
12 response.

13 MR. SEGALA: Yes. Yes, and when it comes
14 down to it, it's going to be highly dependent on the
15 technology, and on the actual reactor design.

16 And for, you know, reactors such as the
17 Kairos Hermes test reactor, you know, they, we've
18 worked with them and they submitted reports, on what
19 their principle design criteria are going to be.

20 Mo, did you want to add something?

21 MR. SHAMS: I want, I want actually to
22 respond to Charlie specifically.

23 Charlie, you're 100 percent right. We are
24 putting the principle design criteria, and the GDCs
25 outside of the requirements.

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1 And part of that is, is that as a fresh
2 look on things, optimization of how much regulations
3 and requirements we have in the Regulations versus
4 areas that we can handle effectively through guidance.

5 And, that was an area that was candidate
6 for that.

7 So, so we often get the comments about,
8 you know, how much of this Rule that you could, or
9 should put a guidance.

10 So these are just examples of where we
11 found opportunities to leverage in that regard.

12 MEMBER BROWN: To me, it just generates
13 churn in some areas that you rehash what we've learned
14 over what is it now, 60 years of building reactor
15 plants.

16 An awful lot of that is perfectly germane
17 to anything new. We're not going to melt reactors,
18 regardless of what type of reactors they are. So.

19 MR. SHAMS: I'd like to associate myself
20 definitely with that comment, that we're not melting
21 reactors.

22 But no, your point is well taken. It does
23 create its own set of opportunities and challenges.
24 You know, having them in the rule, you know, having
25 them in the Regulation.

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1 Had opportunities and challenges. Having
2 them outside of the Regulation will offer a different
3 set.

4 But the technical content, the regulatory
5 content, is still there. So we're hoping that that
6 would offer the value that we're looking for.

7 MEMBER BROWN: Okay.

8 MEMBER HALNON: This is Greg. I got a
9 quick question on the safety function definition.

10 Yes, as you may be aware, there's always
11 been an ongoing issue with the definition in the large
12 light water reactor world, relative to the reporting.
13 And I noticed the reporting language is pretty much
14 the same.

15 Have you guys table topped this definition
16 in 53.230 to make sure that we haven't created the
17 same decades long argument we've been having with the
18 operating reactors, on reporting of loss of safety
19 function?

20 (No audible response.)

21 MEMBER HALNON: I'll take that as maybe we
22 need to look at it.

23 MR. SHAMS: Yes, I've got to go back to the
24 staff. Yes, maybe Bill Reckley knows or others --

25 (Simultaneous speaking.)

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1 MEMBER HALNON: And, maybe it will come
2 out in the comments, and maybe we should encourage
3 industry to table top it as well.

4 But I know that we've always had that
5 conflict of, you know, what the industry thought the
6 definition is. What the NRC decided it was. What the
7 reporting criteria really meant.

8 And I didn't want to see the same, same
9 argument come out with this. And we've got an
10 opportunity to make sure we table top it and don't
11 create that confusion.

12 MR. SHAMS: We'll take that and reflect on
13 it, Greg. Thank you.

14 MEMBER HALNON: Great, thanks.

15 MR. SHAMS: Joy, you have your hands up?

16 MEMBER REMPE: I do. I think Boyce had his
17 up though before me. Did he want to make a comment?
18 Or it disappeared.

19 Okay, so I'll make my comment.

20 This is a theoretical one. When I look at
21 Part 50, 52, and 53, I think even, severe accidents
22 are part of that framework. We don't regulate severe
23 accidents, but they're there in Part 50 and 52.

24 And I'm seeing you shake your head up,
25 down, you agree with me Mo. And I, in fact with

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1 Framework A, the staff has a sort of cut off
2 frequency, which is nice because there wasn't with
3 Part 50 and 52.

4 So, I just wanted to get that out there in
5 the open so if somebody, a stakeholder were to come in
6 and say well now you're going down to lower
7 frequencies, I think the answer is no, there's
8 guidance and it's part of the Framework as it has been
9 since TMI occurred.

10 But it's not something we're regulating.
11 We still have design basis accidents.

12 Is that a good way to answer that? Or are
13 there some other insights that we could use to help
14 clarify what's being done with Part 53?

15 MR. SHAMS: I think I associate 100 percent
16 with the awards Joy, in the sense that we're not
17 regulating in a way that's setting a bar any higher.

18 It's the intent was to offer again, a
19 coherent set of requirements that capture what was in
20 policy, what was in, what was in guidance, what's in
21 practice.

22 And to your point, infusing their
23 opportunities for cut off frequency that perhaps
24 wasn't there before, or at least was done
25 deterministically.

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1 So, but the end of the day is that the bar
2 is not being set higher, you know, in terms of what
3 we're regulating versus now.

4 MEMBER REMPE: Good, thank you.

5 MR. SHAMS: Sure.

6 MEMBER PETTI: Let's keep going.

7 MR. HOELLMAN: Okay. I think we're moving
8 into Framework A, and I think I'm turning it over to
9 Bill Reckley.

10 MEMBER PETTI: I just wanted to say that I
11 do think that the preamble helped a lot. It put
12 things in more context.

13 I think you know, seeing, seeing it more
14 in holistically with, with the preamble I think helps,
15 you know, as opposed to getting it in pieces. I
16 wouldn't call them bite sized pieces, but pieces. So.

17 MR. HOELLMAN: I appreciate that. Go
18 ahead, Bill.

19 MR. RECKLEY: Thanks, Jordan, this is Bill
20 Reckley.

21 Just one clarification from the previous
22 discussion, and Bill Jessup and Boyce Travis might get
23 into this as we talk about Framework B.

24 For light water reactors, the rule
25 requires them to follow the GDC. And, so there is no

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1 gap there, Charlie.

2 For as Jordan was saying, for non-light
3 water reactors, they would build their PDC with the
4 expectation that they start with the GDC.

5 So that, that really hasn't changed from
6 the current requirements in Parts 50 and 52.

7 But that's Framework B, and I'm here to
8 talk about Framework A. Dave, I think some of this
9 will naturally also be what we were going to talk
10 about in the next session.

11 And, so I'm going to try to quickly go
12 through these. I know we're a little behind already,
13 but I think we can catch up in the session that
14 follows this.

15 Because there's a fair amount of topics
16 we've already talked about, or will have already
17 talked about by then.

18 So, Billy, if we can go to the next slide.

19 We've laid this out, we've laid this out
20 in this presentation to go through each Subpart. But
21 I do not plan to talk about each Subpart because we've
22 gone through this many, many times before, for each of
23 the Frameworks.

24 I'll point out where we're going to have
25 additional discussions, and either in the following

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1 session or tomorrow.

2 So in Subpart B again, Subpart B is
3 critical to Framework A. It lays out the safety
4 objectives and the safety criteria.

5 These are the basic performance measures.
6 We've tried to make this a performance based approach,
7 and these are where you need to start.

8 You need to have performance standards in
9 order to have that kind of a structure. So the safety
10 objectives, highest level limit, immediate threats to
11 public health and safety, and take additional measures
12 as appropriate considering the risk to the public
13 health and safety.

14 And, then the safety criteria are laid out
15 for design basis accidents, for event sequences other
16 than design basis accidents.

17 And this is where we introduce the, the
18 use of the QHOs as one of the performance measures.
19 And, we'll talk about that following this morning's
20 presentation.

21 And then the other items, defense in
22 depth, normal operations, et cetera. So, that is
23 Subpart B.

24 Subpart C if we go to the next slide,
25 Billy, is laying out the design and analysis

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1 requirements.

2 Again, this, this feeds into the general
3 construct of Framework A where you have safety
4 criteria.

5 From those, you identify the needed safety
6 functions. From the safety functions, a designer is
7 able to pick what design features they, they are going
8 to use in order to perform the safety function.

9 And, then from there, once you get into
10 the event analysis and other design requirements,
11 you're going to define the functional design criteria
12 for the equipment that is either safety related, or
13 non-safety related, but safety significant.

14 So that gets into the bolded text, the
15 safety categorization. We're going to talk about
16 that.

17 There's some discussion about whether you
18 need to have safety related, non-safety related but
19 safety significant, and non-safety significant.

20 Or under Framework B, we also continue to
21 have basically three categories. Safety related,
22 important to safety but not safety related.

23 So we'll get into that discussion and why
24 we think it's appropriate to have at least three
25 categories.

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1 So that in comparison to what we have
2 provided you most recently, and what we provided you
3 in the previous meetings including back in the summer
4 when we went through all of Framework A, not really
5 many changes to Subpart C.

6 But if as I'm going through these and
7 you've looked at the changes that were made, or the,
8 or the preamble if you have questions, obviously
9 interrupt me.

10 Otherwise, I just have one or two items in
11 Framework A that we were going to talk about as being
12 kind of new, and significant. So that's really
13 Subpart C.

14 Billy, if you want to go to the next
15 slide. Slide 12 for Subpart D. This is the siting.

16 Again, really not any changes from what we
17 had given you previously. Siting requirements remain
18 there to basically answer the fundamental question:
19 what can the site do to the plant, and what can the
20 plant do to the site?

21 And, so you have the same things in terms
22 of external hazards that need to be considered in the
23 plant design.

24 And then things like population related
25 considerations, for what might be the consequence of

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1 plant events to nearby populations.

2 Note again, no significant changes in the
3 most recently released text compared to what we had
4 released in the, in the summer.

5 So Billy, if you want to go to slide 14.

6 This is construction and manufacturing.
7 This is an item that, that we want to have a
8 conversation about.

9 In the construction arena, really no
10 significant changes from what we released in the
11 summer.

12 And, those were largely taken from the
13 construction requirements, the need for programs. The
14 need for quality assurance and so forth, during
15 construction.

16 The same is true for manufacturing. Much
17 of the manufacturing section within Subparts E and O
18 are related to those same things. The quality
19 assurance, the need to have programs in place, and so
20 forth.

21 I should have mentioned, this is the
22 first, the first one we're going to have but this is
23 as Jordan mentioned, a place where we have a common
24 preamble.

25 Because the Subparts in E and O are very

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1 similar, again you just have differences in some
2 terminology. And, some differences in internal
3 references.

4 And as Jordan mentioned, you really are
5 faced with the choice of having repetition, which
6 might make it longer versus within the Subparts,
7 having multiple discussions of how it's applicable to
8 one Framework or another Framework.

9 How it, how references are to here to
10 there, and to answer the previous question, we did
11 look at this a lot and made a conscious choice that
12 repetition has its downsides, but it was preferable
13 over having relatively complicated language.

14 Because you were pointing back and forth
15 between, between the frameworks and having multiple
16 references.

17 Because we were trying to reinforce what
18 Jordan mentioned earlier. These are distinct
19 Frameworks.

20 And, so this is just another way to, to
21 reinforce that once you're in, or once you've elected
22 to use Framework A, then those Subparts are the ones
23 that you're going to be referring to.

24 Likewise, if you're in Framework B, you're
25 going to be in, in this second set of Subparts.

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1 The one thing that --

2 (Simultaneous speaking.)

3 MEMBER PETTI: Hey Bill?

4 MR. RECKLEY: Yes, go ahead, Dave, sorry.

5 MEMBER PETTI: Just a comment. You know,
6 we had commented on the length of the Rule, and you
7 know, we've seen your reconciliation, your response,
8 if you will.

9 I'm beginning to believe that this is a
10 case where you're stuck between, the staff is stuck
11 between a rock and a hard place.

12 There's no easy way. And it, yes it's
13 shorter, I'll agree with that. But it just may not be
14 short enough for some stakeholders.

15 And, that's, you know, that's sort of
16 where you are. So.

17 MR. RECKLEY: Yes, no, I agree with you
18 that there's, I mean there's tradeoffs. There's, we
19 don't disagree with people when they make a comment,
20 but there are tradeoffs.

21 And, we were forced to make some. And
22 make some choices. And, so we picked what we thought
23 was, was best.

24 And for example, in regards to rather have
25 repetition or multiple internal pointers. And, so.

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1 The other thing I would suggest to people
2 is Rules. When we're looking at it now, it's kind of
3 like a novel.

4 But once things are in place, people don't
5 read the Rule anymore from beginning to end. They go
6 to its section and they want to know, what is the
7 requirement for the activity that I'm working on
8 today.

9 So if you look down the road, you know, 10
10 or 15 years, that was another thing that we had had in
11 mind was that the length is a secondary thing to
12 clarity, when you look at it in that respect.

13 So, but again, it's not a right/wrong
14 answer, this is just, you know, we were faced with a
15 problem and we, we made a selection as to which way we
16 were going to go.

17 The one thing that is different in
18 manufacturing from the summer to, to this most recent
19 revision, is we always had placeholders in place to
20 talk about how we would address the loading of fuel in
21 a manufacturing facility, and then the transport of
22 the reactor module loaded with fuel, to a site.

23 And so we put effort into that, and this
24 most recent revision and both Subparts E and O address
25 that.

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1 So if we go to the next slide, Billy.

2 MEMBER PETTI: I'm not sure. Did we go to
3 slide -- there we go.

4 So, the requirements in Framework A are
5 620D or delta, and in Framework B it's 5341.20D. And
6 it lays out the requirements for the loading of fuel
7 into a manufactured reactor module.

8 And, the dilemma that we faced, and I
9 think we might have talked about this before, was you
10 basically have a reactor at that, at that point.

11 And we have requirements both in our
12 Regulations and history, and also within the Atomic
13 Energy Act, of what makes a utilization facility.

14 And if you call it a utilization facility,
15 what other things come into play?

16 And so for example, if the loading of fuel
17 by itself into the manufactured reactor module was
18 deemed to make that module a utilization facility,
19 then we're going to have to have a combined license to
20 support that operation, just like you need a combined
21 license or an operating license under Part 50, to load
22 fuel into a reactor.

23 So, after a lot of thought and a lot of
24 work, we put in place a technical requirement, which
25 is that in the manufacturing facility you would have

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1 at least two independent mechanisms that can prevent
2 criticality, should optimum conditions be, should you
3 have an event that, that gives maximum moderation, for
4 example, or maximum reactivity.

5 So two independent systems to keep you
6 subcritical. This is generally consistent with the
7 double contingency in Part 70.

8 But if that is in place, then what we're
9 saying here is the Commission is finding, and this is
10 relatively important and we'll point out in the paper,
11 this is an area where the Commission is making a
12 finding as part of this rulemaking, that that
13 manufactured reactor module is not a utilization
14 facility.

15 That means we can address it through
16 largely the Part 70 requirements that, that are in
17 place.

18 The manufactured reactor module becomes a
19 utilization facility when it's delivered to the site,
20 and the Commission makes all of the ITAAC related
21 findings associated with the manufacturing license,
22 and the combined license at the, at the site to which
23 the module is being delivered.

24 And, then that allows at the site, once we
25 make the ITAAC findings for the license, the COL

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1 licensee to undo these protections, such that the
2 module, excuse me. Such that the module can be
3 operated.

4 So I know this is a, you know, it's a
5 combination of both technical and legal hoops that
6 we're defining but again, it's a relatively important
7 thing.

8 Because this is a new thing we're adding
9 to Part 53, both Frameworks, in order to support what
10 we've learned is a possible deployment model for
11 smaller reactors, for the micro reactors, that Jordan
12 mentioned earlier. Or, Joy, someone mentioned.

13 So this is what one of the just a couple
14 things I want to do. One of the ones that is new from
15 what we released in the summer.

16 MEMBER REMPE: So, Bill? This is --

17 (Simultaneous speaking.)

18 MR. RECKLEY: Yes, go ahead. Joy?

19 MEMBER REMPE: Oh, okay. First of all, I
20 think I'm going to paraphrase your words. The reason
21 why you have this prevention of criticality is to
22 avoid having to have licenses for operators at that
23 facility, and so it doesn't become a utilization
24 facility.

25 Is that what I'm paraphrasing and taking

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1 away from this discussion?

2 MR. RECKLEY: Oh, it would not only be
3 operators, but if it is a utilization facility, then
4 the Atomic Energy Act would, would bring into play a
5 number of provisions under the Act.

6 Operators, but we'll talk about operators,
7 given that we're introducing another transformational
8 thought through the generally licensed reactor
9 operator.

10 But we were able here to just limit it to
11 a fuel handler requirement. And, it's more --

12 (Simultaneous speaking.)

13 MEMBER REMPE: -- subcriticality testing?

14 MR. RECKLEY: We are working on that
15 element, and it's we're going to have some, at least
16 some questions in, in the rule package to try to
17 enable us to perhaps expand it to allow that.

18 But that's another hurdle. And, so every
19 time you introduce a complicated again, both
20 technically and legally, it's a challenge. And, we
21 just weren't able to do that within the time frame.

22 So, but we recognized that is a potential
23 interest and we'll have some questions, at least we'll
24 have some questions within the, in the Rule package.

25 MEMBER REMPE: Thank you.

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1 MR. RECKLEY: Okay, Billy, if, or Derek, or
2 someone, did somebody else have a question?

3 MR. WIDMAYER: Yes, Bill, it's Derek.

4 And I think that you answered partially,
5 because you said you were going to have some questions
6 in the rulemaking package.

7 But I was kind of surprised to see the
8 word mechanism. You know, I was sort of kind of
9 expecting functions.

10 I don't know if you were thinking about
11 something other than functions, as far as how to
12 prevent criticality.

13 MR. RECKLEY: Yes, we just wanted two
14 independent and diverse means to do that. I won't get
15 into.

16 If there, there might have been better
17 ways to word it, but that was the thought that we were
18 going after.

19 MEMBER PETTI: Yes, I expected to see two
20 independent and diverse means, because that seems to
21 align with criticality, the thought process.

22 MR. RECKLEY: Okay.

23 Yes, okay, we'll take a look to see. And
24 I'll be honest, I don't remember if I was pulling that
25 out of somewhere else or not, for consistency.

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1 But we would want to be as consistent as
2 we can with requirements in Part 70, and elsewhere.
3 So, we'll take a look at that language.

4 I think technically, we're all on the same
5 page, but we'll take, we'll take a look at the
6 language.

7 MEMBER REMPE: And is --

8 (Simultaneous speaking.)

9 MEMBER REMPE: Go ahead, Dave.

10 MEMBER PETTI: I just, you know, in your
11 preamble you're asking a lot of input from the public
12 on, on this area in particular.

13 MR. RECKLEY: Right.

14 MEMBER PETTI: And, you know, my view is
15 prudence is best. This is a really new area, not a
16 lot of experience.

17 Going slow is I think the right thing at
18 this point. So just one member's thoughts.

19 MR. RECKLEY: Okay, thanks, Dave.

20 MEMBER REMPE: And along those lines, one
21 of the areas that I don't think you've still decided,
22 are what to do about bringing back the module.

23 And again, sometimes we've heard oh, the
24 requirements are all there in Part 70 or wherever, but
25 it sounds like there are some issues still as

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1 evidenced from this addition into Part 53, right?

2 MR. RECKLEY: Right. We say that we didn't
3 look at the back end. It has to be basically
4 addressed, but Part 53 addresses the decommissioning
5 of the site, but it does not address the potential
6 refurbishment of modules, or the use of the module as
7 a waste container itself.

8 So, there are rules in place that would
9 need to be addressed, and we think we could handle
10 that within the existing rules, should it come up
11 before we're able to make the adjustments ahead of
12 time.

13 MEMBER REMPE: And as I recall, one of the
14 issues that we raised was well how many modules are
15 allowed, and where would the guidance be for that so
16 you don't have a parking lot of spent modules when you
17 don't have a place to ship it back to.

18 And, the staff actually had a good answer
19 in the response to our letter, but that's not probably
20 the best place to have guidance on how to address that
21 topic.

22 And, is there going to be an effort to try
23 and maybe develop some guidance for these modules, for
24 manufactured reactors that helps --

25 (Simultaneous speaking.)

1 MR. RECKLEY: Yes, I do --

2 MEMBER REMPE: -- all these requirements?

3 MR. RECKLEY: I do think this would be an
4 area where future guidance, once we're a little more
5 clear what direction things are going to go, that this
6 would be a logical place to develop some more
7 guidance.

8 MEMBER REMPE: I agree. Thank you.

9 MR. RECKLEY: All right, slide 15, Billy.

10 So Subpart F addresses basically like
11 configuration control and maintenance for equipment,
12 and then it has requirements for operational programs.
13 Those we really did not change very much.

14 We shortened up facility safety program,
15 but by and large, it remains the same kind of a
16 concept.

17 We had given it some thought, and took out
18 some of the detail that might be addressed in guidance
19 and sharpened up the criteria. But again, high level
20 and very similar to what we provided before.

21 The bolded text here, and we're going to
22 talk all of tomorrow morning about staffing and
23 operator licensing, and the, and the thought of a
24 generally licensed reactor operator, and human factors
25 engineering, and all of that will be talked about in

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1 the morning.

2 So by and large, Subpart F other than the
3 staffing and human factors didn't change much.

4 MEMBER PETTI: Bill?

5 MR. RECKLEY: Yes?

6 MEMBER PETTI: Just another question.

7 There are some who are arguing that
8 there's an increased level of regulation here, through
9 the programs.

10 I always understood them as compensation
11 in some cases for lack of operating experience, for
12 some technologies that have never been built.

13 And, I know you're asking in the preamble
14 for feedback in some of these specific areas, like
15 facility safety and the integrity assessment.

16 Is that, you know, as I just captured it,
17 is that a fair characterization?

18 MR. RECKLEY: Yes, I think we've gotten
19 that feedback. The actual if you look at the list,
20 the only thing you won't find in Parts 50 and 52 are
21 integrity assessment, and facility safety programs.

22 MEMBER PETTI: Right.

23 MR. RECKLEY: And integrity assessment, you
24 just sometimes you need to be a little careful as to
25 say what, what are the regulatory requirements.

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1 Will you find the need for integrity
2 assessment programs in Parts 50 and 52? No.

3 Do licensees have the equivalent of
4 integrity assessment programs through things like the
5 BWR vessel internal programs? The PWR materials
6 programs that were put in place to meet other
7 regulatory requirements?

8 Or to address issues that had come up
9 during the operating lifetime, like intergranular
10 stress corrosion cracking? Yes, they do.

11 So, is it a new program in the Rule? One
12 might argue. Is it a new program that, that would be
13 foreign to licensees? You know, my own personal
14 opinion is no, they have these things. So.

15 MEMBER PETTI: My opinion, I mean you're
16 asking in the preamble for comments from the public,
17 and we're going to take if I get my way with the rest
18 of the committee, we're going to give you some
19 comments on these, as well, figuring that you probably
20 want to hear.

21 And in this area, this makes a lot of
22 sense. I mean we are using corrosive, some coolants
23 that are very aggressive.

24 And, if we don't take advantage of what
25 we've learned from the existing fleet, it just seems

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1 to not, you know, it just seems almost, just
2 uninformed engineering to not do this given, you know,
3 water had problems, what do you think some of these
4 chemicals are going to be like?

5 This is the, you know, very smart thing to
6 do for the advanced systems, I think.

7 MR. RECKLEY: Well, the other area going
8 back, you know, to what I mentioned before of a
9 performance based approach. Performance based
10 approach always has a monitoring function.

11 And, so I just look at this as a, as the
12 performance monitoring function of what was put in
13 place in, in the design section.

14 So anyway, but like you say, to some
15 degree, it's, it might be the way it's organized but
16 we, we did ask for comments and so we'll see.

17 And to your point, we would certainly
18 appreciate ACRS observations on this, and in every
19 other area, so.

20 MEMBER BALLINGER: This is Ron Ballinger.
21 Doesn't Section 11, Division 2, pretty much require
22 this?

23 MR. RECKLEY: That's a new addition and
24 we've looked. I'm not an expert on the REM.

25 MEMBER BALLINGER: Yes, yes, I mean that's.

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1 MR. RECKLEY: But it does, we were aware of
2 it and as we were building this, we were looking at
3 REM and saying hey, that would be a vehicle to address
4 this type of a requirement. So, yes.

5 MEMBER BALLINGER: But it's not a, it's a
6 -- if you're using Section 11, Division 2, it's a
7 requirement.

8 MR. RECKLEY: Right. But it would be, yes,
9 but by following that code and standard, that would be
10 a way to meet this regulatory requirement.

11 We don't, Part 53 and especially Framework
12 A, we don't call out specific consensus codes and
13 standards to use.

14 We encourage their use, but you're exactly
15 right. By using that, that might very well be a way
16 to meet this technical requirement.

17 Okay, Billy if we can go on to.

18 MEMBER PETTI: Hey Bill, just want to let
19 the members know that I'm hoping Bill can get through
20 his part before our break.

21 I know we're running, we've been going
22 here for a little bit. So, keep going.

23 MR. RECKLEY: I think we can get through
24 Framework A and then we can take a break, Dave.

25 So, especially since most of these are in

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1 areas that we didn't change very much. So, G and Q
2 were the decommissioning requirements.

3 Again, this comes out of 50.75 on
4 decommissioning, and 50.82 on the termination of
5 license. Nothing really changed from what we had
6 released in the summer.

7 So if you want to go to slide 17, Bill.
8 Subpart H.

9 Again, in Framework A, we didn't change
10 much in Subpart H. And, just we highlighted here just
11 to reinforce that the way Subpart H is laid out, the
12 siting related information that would be in
13 applications, is defined under the early site permit
14 section.

15 And, then construction permit, operating
16 license, combined license requirements refer back to
17 the early site permit, for the information to be
18 provided.

19 And likewise, on the plant design, we used
20 the standard design certification as kind of the base,
21 or starting point for what information would be
22 provided on the design.

23 And, then within the other sections would
24 make slight adjustments to it. For example, under
25 construction permits, just recognizing that you would

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1 not need to have, but just the recognition that you're
2 in a different place when you apply for a construction
3 permit, than under a standard design certification.

4 You might still have research and
5 development going on to prove the performance of a
6 particular system, for example.

7 But the information and the need to
8 describe the systems, refers back to the standard
9 design certification as the base.

10 But we also as I mentioned, we really made
11 no major changes to Subpart H, from the summer to this
12 most recently released version.

13 So, Billy, if you want to go to 18.

14 Subparts I and S, likewise, some changes
15 if we, for consistency between I and S, which are the
16 two Subparts in the two Frameworks for maintaining
17 licensing basis information.

18 All of the processes for doing license
19 amendments and so forth were taken out of Parts 50 and
20 52.

21 Some changes in the equivalent, for
22 example, to 5059, and that's an area that we continue
23 to interact with stakeholders.

24 And in particular, there's a DOE industry
25 cost-shared activity looking at some of this change

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1 control mechanism, along with the content of
2 applications guidance that Jordan mentioned.

3 But no significant changes from what was
4 released in the summer.

5 So, if we want to go to J and T, Billy,
6 next slide.

7 Subparts J and T reporting administrative
8 requirements, such as financial requirements,
9 reporting unfettered access, and so forth.

10 These were basically just a collection of
11 various requirements taking from Parts 50 and 52.
12 Greg, you had mentioned the immediate notifications
13 and licensee event reports.

14 We took those primarily. We know there's
15 another rulemaking being contemplated in response to
16 a petition for rulemaking.

17 Just like in some other areas ongoing
18 rulemakings, we will have to see where they go, and
19 what impact they have on Part 53.

20 By and large, our approach was to take
21 from, where we were trying to provide a comparable
22 requirement from 50 or 52, we took it from, from 50
23 and 52 and acknowledged that another rulemaking may be
24 in play.

25 And, you know, another thing that we can

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1 do in that area, is to put in a request for comment or
2 a question in the FRN in section 7. And, we do have
3 one of those for reporting requirements.

4 And, that brings us to the last one,
5 Billy, if you want to go to slide 20. This is the
6 quality assurance requirements in Subparts K and U.

7 And, so that slide basically has the
8 column going down the other side showing that except
9 for some minor wording changes to address terminology
10 for example, in Framework A, we don't use the term
11 important to safety.

12 They are the equivalent to the Appendix V
13 criteria, and so we maintained that close relationship
14 in both, both Frameworks, and Subparts K and U.

15 So, and no changes from what was released
16 in the previous versions for either Framework in that,
17 in that area.

18 So, that brings us to the end of Framework
19 A, in terms of a summary and where we introduce some
20 changes. Again, just a couple changes since what we
21 had released in the, in the previous iterations in the
22 summer.

23 So Dave, I think if you wanted, we could
24 take a break here, and the Bill Jessup can pick up
25 Framework B. And, then we can finish out the

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1 discussion.

2 MEMBER PETTI: Okay.

3 Joy has a question.

4 MEMBER REMPE: Yes, and I apologize I
5 didn't get this earlier, but I, when I was looking at
6 the preamble, I got a little bit confused. And, help
7 me understand.

8 Is anything changing with respect to what
9 the requirements are for a standard design approval,
10 with Part 53 and finality of it?

11 And, it was a little confusing to me when
12 it was referencing the NIA report. Could you help me
13 out a little bit in understanding what you're trying
14 to get to here?

15 MR. RECKLEY: We're not proposing to really
16 change the standard design approval from what's
17 available in 50 and 52.

18 We tried and the reason to reference the
19 Nuclear Innovation Alliance report, was that the use
20 of the standard design approval for a major portion,
21 remains somewhat of a, of a new concept.

22 It's in there now, it just hasn't been
23 used. We've only done a couple standard design
24 approvals, and by and large, they've been for the
25 complete design, not for a major portion.

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1 That report even under 50 and 52, tried to
2 clarify how it might be used for a major portion.
3 And, we were just trying to carry that forward in the
4 progress that we had made in that area.

5 But it's not really any different than
6 under 50 and 52.

7 MEMBER REMPE: So if someone has an
8 application for an SDA, and then they were to come in
9 subsequently with a Part 52, or a Part 53, there would
10 still need to be some additional review that's more
11 than the site specific characteristics.

12 And there's no reason to assume that the
13 process, that just because you have, I mean there's no
14 finality with an SDA, and so --

15 (Simultaneous speaking.)

16 MR. RECKLEY: Well, the finality with the
17 SDA is limited to you, and us, ACRS and the staff.
18 The Commission doesn't weigh in on a standard design
19 approval.

20 But the finality afforded is that those of
21 us looking at the technical requirements should stick
22 to our previous finding unless new information is
23 provided.

24 Unless they change something with which
25 obviously would kind of call into question the value

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1 of the standard design approval.

2 Or if we change our minds, in which case
3 we need to go to the EDO, the Executive Director of
4 Operations, and explain why we don't want to abide by
5 our previous finding in this, in the approval.

6 MEMBER REMPE: Okay.

7 And, okay, this helps in understanding
8 what you're trying to get to here. And, thank you.

9 MR. RECKLEY: Okay.

10 MEMBER PETTI: Hey Bill, just one more
11 comment.

12 You know, we've heard a couple questions
13 today from members responding to some other comments
14 out there about, you know, this changing the bar.

15 You know, it's more restrictive
16 regulation, or more, you know, over-regulation. This,
17 the comment relative to the programs.

18 It just seems like maybe a few more
19 sentences in the preamble to try to head this off so
20 that it's out there in the preamble, might be worth
21 thinking about to be more explicit.

22 MR. RECKLEY: Right, okay.

23 MEMBER PETTI: Okay.

24 MR. RECKLEY: Point taken, point taken.

25 MEMBER PETTI: Thanks.

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1 Okay, let's break. We've been going at
2 it. Let's go till ten minutes to the top of the hour.

3 So, at 10:50 Eastern we'll be on break.

4 (Whereupon, the above-entitled matter went
5 off the record at 10:27 a.m. and resumed at 10:50
6 a.m.)

7 CHAIR PETTI: Okay, we should all be back.

8 Bill, are you ready to go with Framework
9 B?

10 MR. JESSUP: Great. Thank you, Dave.

11 Yes, this is Bill Jessup from the NRC
12 staff, and I am ready to go.

13 So, good morning, everyone, again.
14 Welcome back.

15 Like I said, my name is Bill Jessup. I'm
16 Chief of the Advanced Reactor Licensing Branch 1.

17 I'm going to cover Framework B, and that
18 is just the balance of Framework B. Jordan walked
19 everyone through Subpart A, common to both Frameworks
20 this morning, and Bill Reckley already covered the
21 Subparts in Framework B that are very similar.

22 So, I will try and get us back on
23 schedule. I've only got three slides to focus on
24 here.

25 So, Billy, if you could go to the next

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1 slide for Subpart N? Thank you.

2 So, Subpart N, when we last met with ACRS
3 in the summer, we foreshadowed the development of a
4 Subpart dedicated to siting requirements in Framework
5 B. Initially, as you'll recall, Framework B gave a
6 cross-reference to the requirements in Part 100 for
7 siting. We recognized there were some weaknesses in
8 that approach.

9 And so, what we've come up with here is
10 Subpart N, and it's new in the sense that it didn't
11 exist the last time we met and in the first iteration
12 of the Framework B preliminary proposed rule text.
13 However, it is largely derived from some of the
14 existing requirements in Part 100.

15 Subpart N is a fairly compact set of
16 requirements for siting, and I've actually only
17 highlighted one section here in Subpart N, that
18 section being 53.3525, Geologic and Seismic Siting
19 Criteria. That's really the only substantive
20 difference when compared to Part 100. All the other
21 sections on the slide generally align with Part 100.
22 However, they are in Section 3520, 53.3525.

23 We worked to broaden the proposed
24 requirements here, specifically, relative to ground
25 motion response spectra. And this relates closely to

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1 the seismic design requirements that I'm going to
2 touch on in a couple of slides.

3 So, Section 3525, and if you look at
4 paragraph 53.3525(c), you'd see it would rely on the
5 development and use of ground motion response spectra.
6 And that's defined in 53.3510.

7 The current wording, if you look in Part
8 100, the requirements, the analogous requirements, are
9 "determination of the safe shutdown earthquake ground
10 motion," SSE ground motion. What we've done is we've
11 changed that to "determination of the ground motion
12 response spectra."

13 And the key here is that the ground motion
14 response spectra would be used to either develop the
15 safe shutdown earthquake ground motion as it is today
16 for applicants using Appendix S to Part 50 or multiple
17 design basis ground motions, if an applicant were to
18 pursue the seismic design alternatives under 53.4733.
19 That's a new section, again. I'll touch on that here
20 in a moment.

21 So, again, really, the only difference is
22 that we've broadened out the requirements relative to
23 ground motion, and they can either be the existing
24 safe shutdown earthquake ground motion or multiple
25 design basis ground motions. And I'll draw a

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1 connection between those concepts when we talk about
2 Subpart R. So, again, that's really the only primary
3 difference here between Part 100 and what you see in
4 Subpart N.

5 Billy, could you go to the next slide,
6 please? Okay. Thank you.

7 So, Subpart P, these are requirements for
8 operation. I'm kind of following a similar format to
9 what Bill Reckley did in the previous presentation.
10 I'm just highlighting the areas that have changed
11 significantly from the previous iteration and the last
12 time we spoke to ACRS.

13 As you'll see on the slide, and as you may
14 have seen on Bill's slide relative to Subpart F, most
15 of the sections here, they align very closely with
16 those in Subpart F with a handful of exceptions --
17 environmental qualification of electrical equipment
18 and primary containment leakage testing. Those are
19 derived largely from their analogous requirements in
20 Part 50.

21 I've highlighted some of the sections that
22 have changed significantly, though. One is Section
23 53.4220. Those are the requirements for staffing,
24 training, qualifications, human factors.

25 This came up earlier, and I only want to

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1 highlight it because it's very short now. And it just
2 tells you that all of these requirements are now in
3 Framework A in Subpart F. And I know there's an
4 entire session dedicated to that tomorrow morning.
5 So, I'm not going to go into any great detail beyond
6 what the folks will do tomorrow.

7 I just wanted to point out, though, that
8 this is one of those areas where we've internalized
9 the feedback we've gotten and worked to consolidate
10 those requirements, so that now they are centralized
11 and it did make the rule shorter. But it's unique.
12 It was just one of the few areas where we felt like we
13 were able to do that while maintaining a level of
14 clarity and usability that we seek to preserve.

15 Under the programmatic requirements, I've
16 highlighted fire protection. There's been a lot of
17 stakeholder interest in this topic. What I would
18 offer is that the fire protection requirements in
19 Framework B, they've been significantly modified and
20 streamlined compared to the first iteration, and they
21 now really align with what's in Framework A from a
22 structural perspective, the basic components,
23 including requirements for a fire protection plan, a
24 fire protection program, program performance criteria,
25 and fire hazards analysis.

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1 Through that streamlining and the updating
2 that we've done to those requirements, we did resolve
3 one of the comments or recommendations in the 4th
4 Interim Letter from ACRS about ensuring that the
5 requirements remain technology-neutral. So, that was
6 an opportunity to kill two birds with one stone, but,
7 again, highlighting an area that has changed
8 significantly.

9 And then, the final highlight here is a
10 new section. It's 53.4420, Mitigation of Beyond
11 Design Basis Events. This section was added in
12 response to some stakeholder feedback that we had
13 gotten. Initially, Framework B, it cross-referenced
14 the existing requirements in 50.155 for mitigation of
15 beyond design basis events, a more recent set of
16 requirements.

17 We appreciated the feedback that called
18 out that some of those existing requirements may not
19 be technology-inclusive. So, we went back, evaluated
20 the bases for what's currently in 51.55 and tried to
21 develop a set of requirements that parallel that, but
22 are technology-inclusive.

23 An example would have been, you know, if
24 you look in 53.4420, we did modify some of the damage
25 states. If you look in the existing requirements,

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1 some of the damage states, they're very light-water-
2 reactor-specific. And so, we've tried to come up with
3 a more generic set of damage states, those that would
4 challenge the safety functions at the plant.

5 So, again, these are really the only major
6 changes to Subpart P that have taken place since we
7 last met. Otherwise, very minor changes to other
8 sections; the administrative process another one is.

9 Billy, if you could go to the next slide,
10 please? Thank you.

11 So here, this is Subpart R. This is kind
12 of the last generic slide I'm going to go over for
13 Framework B.

14 Just as a review, Subpart R, it mirrors
15 Subpart H and Framework A. They both were directly
16 covered in the last presentation.

17 Many of the provisions, especially the
18 process-related ones, are equivalent between the
19 Frameworks when you put them side-by-side. And we
20 actually did put them literally side-by-side over the
21 summer to ensure that there were no provisions that
22 were misaligned where they shouldn't be.

23 I've highlighted two sections that have
24 undergone some changes since the first iteration of
25 the preliminary proposed rule text was issued and we

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1 last met with you all.

2 Section 53.4730, this was discussed at
3 length with the ACRS back in June and July of this
4 year. And this section contains most of the technical
5 requirements in Framework B in the form of application
6 requirements. I alluded to that this morning, and I
7 know we had significant discussion on that over the
8 summer.

9 It's undergone some changes I'm actually
10 going to discuss in some detail in the next session.
11 I just wanted to highlight it here to flag its
12 importance and to note that, again, we will talk about
13 some of the key changes in the next presentation
14 that's coming up.

15 The other section I've highlighted is
16 Section 53.4733. This is a new section that goes
17 along with the siting requirements in Subpart N that
18 I was just describing. While it's new for Framework
19 B, conceptually, it's very similar to what has
20 previously been presented in Framework A in Section
21 53.480. Those are the seismic design requirements in
22 Framework A.

23 Here, as the section title suggests, these
24 are alternatives -- very similar to, actually, the
25 section title above it, the risk-informed

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1 classification SSCs that mirrors 50.69.

2 So, what we wanted to do here is to
3 provide some risk-informed, performance-based seismic
4 design alternatives. Those alternatives would be
5 against the requirements in 10 CFR Part 50, Appendix
6 S. The Appendix S requirements remain the baseline
7 for Framework B applicants. But again, what we're
8 proposing here is a set of risk-informed, performance-
9 based alternatives for applicants that can develop
10 sufficient risk insights, such that they could grade
11 seismic performance criteria.

12 And again, they were developed in parallel
13 to the seismic design requirements in Framework A,
14 where those seismic margins, they're really developed
15 consistent with the risk significance of each SSC
16 within the risk-informance goals. Essentially, this
17 would permit a graded approach to seismic design based
18 on the risk significance of a given SSC.

19 And so, again, I want to draw some line-
20 of-sight back to Subpart N. So, if you're pursuing
21 the baseline requirements in Part 50, Appendix S, you
22 would use that safe shutdown earthquake ground motion
23 that we are familiar with today. If you pursue these
24 alternatives under Section 53.4733, you would go kind
25 of to the other fork in the road in Subpart N, and

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1 instead of developing a single safe shutdown
2 earthquake ground motion, you would develop multiple
3 design basis ground motions. And that would allow you
4 to kind of grade the seismic design requirements using
5 what's here in 53.4733.

6 We're in the early stages of developing
7 implementing guidance for this alternative. So,
8 developing the guidance for how to effectively risk-
9 inform and categorize SSCs in this Framework, that's
10 going to be one of our key focus points for this.

11 But I did want to call it out. It is a
12 new alternative, not unlike several risk-informed
13 initiatives that have been implemented previously.
14 And it would rely on some risk information to be
15 provided by applicants.

16 So, that's all I had for Framework B. I
17 don't know if you want to stop.

18 CHAIR PETTI: Yes. Bill, I had a question
19 on the seismic.

20 So, it's allowing greater flexibility in
21 design, as I sort of look at it. And it's something
22 that fits in the philosophy of Framework A, but you
23 wanted to give some optionality, if you will, to
24 people using Framework B, to give them some
25 flexibility.

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1 Because it's a huge cost driver, you know,
2 in plants to seismically harden. And as I understand
3 it, potentially, excessive margin using the existing
4 rules, and this would allow a more sophisticated
5 analysis this risk-informs and still provides adequate
6 margin. Is that a fair --

7 MR. JESSUP: That's correct, Dave. You
8 know, if you look at it from a ground motion
9 perspective -- and, Jim Xu, speak up, if you'd like --
10 but, just as you said, if you look at the existing
11 requirements, you know, you're forced to consider that
12 minimum .1 g peak ground acceleration. If you're able
13 to grade those design requirements, then you move away
14 from a single minimum deep ground acceleration to a
15 more graded set of requirements. But, as I
16 acknowledged, that does require some amount of
17 information regarding the risk to the plant. Tech
18 should get to that point, and I don't want to
19 undersell that point.

20 MEMBER BROWN: This is Charlie Brown. Can
21 I ask a question on the seismic part of this?

22 MR. JESSUP: Sure.

23 MEMBER BROWN: In developing this for Part
24 B Framework, and giving this additional relaxation or
25 flexibility to evaluate what seismic criteria they

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1 need, was any consideration given to the North Anna
2 seismic event, which I live in McLean, Virginia.
3 That's fairly far away. I watched my house rattle.
4 In terms of, what were the results of the inspections
5 that were done at North Anna and relative to the
6 actual size of the impact at the site itself in terms
7 of developing this, quote, "more flexible" approach to
8 evaluating what seismic displacements you have to
9 consider?

10 MR. JESSUP: That's a good question,
11 Charlie. I would ask that Jim Xu speak specifically
12 to whether the operating experience in North Anna was
13 factored in, has factored into this approach overall,
14 and not just for Part 53.

15 But what I can say is that the baseline
16 requirements that exist today, they remain in
17 Framework B. As you mentioned, this is a relaxation,
18 provided that sufficient risk insights are available.
19 And I say that because a lot of where we're going, it
20 acknowledges that we are at this time able to develop
21 greater risk insights about the plants and what's
22 significant.

23 And so, I think, if I compare a plant like
24 North Anna that may not have had those tools around at
25 that time, that is a difference, but I think you're

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1 pointing out that that's bosch, then, maybe; that
2 North Anna withstood it so well, perhaps because it
3 did have all that margin. Is that what I understand?

4 MEMBER BROWN: That's exactly my point.

5 MR. JESSUP: Right.

6 MEMBER BROWN: I mean, from what I live,
7 I'm quite a distance away, and my house suffered no
8 damage. Several neighbors, their chimneys fell apart.
9 So, they didn't fall apart; they cracked. They had to
10 be redone and reworked. And obviously, chimneys are
11 an outlier. North Anna doesn't have a chimney like
12 that per se.

13 It's just seemed to be it was a great data
14 point to look and see, yes, the requirements stay the
15 same, but when you give flexibility to evaluate stuff,
16 that's a near-term actual occurrence of a plant riding
17 through, and it was amazing how they were back in
18 operation almost immediately. I say that
19 figuratively, not explicitly. So, it seemed to be a
20 good data point. That's why I asked the question.

21 MR. JESSUP: Yes. No, I appreciate it.
22 I was intimately involved with that effort and felt it
23 as well.

24 So, I don't know, Jim Xu, if you're on and
25 if you have anything to add relative to how operating

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1 experience has been considered --

2 MR. XU: Yes.

3 MR. JESSUP: -- you know, as we're working
4 to develop this methodology.

5 MR. XU: Yes, sure. Yes.

6 This is Jim Xu. I'm Senior Technical
7 Advisor out of Research.

8 In terms of this alternative, I mean, this
9 is really a goal we have to provide more flexible
10 design options when they occur, kind of a broad-brush
11 approach for seismic design.

12 So, the operating experience in North
13 Anna, obviously, is part of the consideration. And
14 the plant restarted very quickly, obviously, performed
15 very well under that particular scenario. And we
16 understand that the technical issues behind why it
17 performed well, right? So, yes.

18 But I think the seismic design alternative
19 under Subpart A -- or Subpart R, it's very similar to
20 Framework A, the alpha. And I think it's all a graded
21 approach. It gives more flexibility to a designer to
22 design the SSC in accordance with their safety
23 contribution to the system, rather than design all of
24 the safety-related to the same standard, right?

25 But, as to the challenges, what is the

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1 safety criteria for determining the adequacy of that
2 design? I think that's still a challenge to us. For
3 Framework A, we have a quantitative safety criteria we
4 can use to judge the adequacy of the design. For
5 Framework B, we should rely on principal design
6 criteria. I think that gives us some challenge
7 because the principal design criteria are qualitative,
8 and yet, if we want to rely on qualitative design
9 criteria, we need to have some qualitative or quasi-
10 qualitative acceptance criteria to assure that the
11 design meets that qualitative principal design
12 criteria. I think that remains a challenge to us, and
13 we're going to work that out in the future.

14 Thank you.

15 MEMBER BROWN: From the question I asked,
16 I presume there were measurements taken at North Anna.
17 Was it below their design criteria by much? Or a lot?
18 Was that --

19 MR. XU: Yes. No, it was on the high side
20 of the safety margin in terms of the seismic, I mean.
21 And also, if you look at the exceedance from middle
22 Virginia events, which are mostly in the high
23 frequency range, you know, I mean it cannot really
24 affect the performance of most safety-related safety
25 system components. I mean, that plant performed very

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1 well under that particular earthquake event, yes.

2 MEMBER BROWN: So, I presume, then, what
3 you're telling me -- I'm trying to work through your
4 discussion -- is that the actual measured seismic data
5 was well within their design criteria? Is that a --

6 MR. XU: Yes, that's correct.

7 MEMBER BROWN: When I say, "well within,"
8 somebody made the comment, I think made the comment a
9 minute ago, it was very conservative. Was it way
10 conservative or half the criteria or -- I never heard
11 any results from that.

12 MR. XU: I think it was conservative with
13 respect to the margin --

14 MEMBER BROWN: So, that's why I ask.
15 Pardon?

16 MR. XU: I think it's conservative with
17 respect to the design margin for the North Anna.

18 MEMBER BROWN: By a lot or just a little?

19 MR. XU: You know, I think the margin is
20 significant enough to, you know, I mean, to ensure the
21 good performance of that plant. I mean, there are no
22 vulnerabilities from a seismic perspective, at least
23 from our investigation, you know, after the
24 earthquake.

25 MR. BLEY: Charlie, this is Dennis.

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1 MEMBER BROWN: Yes?

2 MR. BLEY: There were some parameters that
3 were outside, but nothing was close to damage. There
4 was a really interesting Commission meeting with the
5 staff and with the people from North Anna and EPRI
6 folks on this. I don't know if that's still available
7 as an archive, but if it is, you'd find it really
8 interesting.

9 But, yes, the plant was pretty far away
10 from any significant damage, but some of the
11 parameters were outside of the design basis, but not
12 in a way that challenged anything.

13 MEMBER BROWN: Yes, I just -- obviously,
14 that's one of the significant things we have to deal
15 with, if we want to be able to site these things
16 around the country.

17 MR. BLEY: Yes. Just a point. I was at
18 Woods Hole in Massachusetts and felt it up there.
19 But, still, feeling it is a lot different than causing
20 damage to equipment designed for earthquakes.

21 MEMBER BROWN: Yes, but it's kind of a
22 testament to me that maybe people could say, "Well,
23 gee, you're overly conservative." Well, this is
24 another one you don't want to throw out the baby with
25 the bath water -- that's all -- in terms of

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1 flexibility-type things.

2 If you do something less, build it a
3 little less structurally formidable, how much does
4 that really save you in terms of really preserving the
5 ability to continue to operate that plant for 60
6 years, and then, maybe even 80 years?

7 That's all. You answered my question.
8 Thank you.

9 MR. XU: Thank you.

10 MEMBER HALNON: Yes, this is Greg.

11 I've got a question, back on, I think,
12 4420, the Spent Fuel Pool Monitoring that you put a
13 site number in there of five years of elapsed time for
14 the monitoring. That feels like a legacy number.
15 What is the real criteria? Is it to be able to air-
16 cool the most limiting fuel?

17 MR. JESSUP: Hey, Greg, I understand your
18 question. There's an echo. I understand your
19 question. That number did come from 50.155. What
20 you've said about air-cooling, that sounds reasonable,
21 but if you'll let me take that back? I don't have --
22 I haven't read the final rule and the preamble
23 discussion that was there. So, I don't want to answer
24 right off the bat.

25 MEMBER HALNON: Okay.

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1 MR. JESSUP: But I know it's in there.

2 MEMBER HALNON: Yes. I should have gone
3 to the preamble to see if my question was answered.
4 But it just feels like a legacy number and that maybe
5 we could get more flexible by saying what the real
6 criteria is by analysis for the most limiting fuel
7 assembly, and geometry needs to meet X, rather than
8 just an arbitrary five years. Just it would be more
9 technology-inclusive, I think, if you could put the
10 actual criteria in.

11 MR. JESSUP: No, it's a good comment, and
12 I was actually referring to the preamble or statements
13 of consideration for 51.55.

14 MEMBER HALNON: Oh, okay. Okay.

15 MR. JESSUP: Yes.

16 MEMBER HALNON: Well, I certainly didn't
17 do that.

18 MR. JESSUP: Yes. I did, but it's been
19 three or four months. But let me take that back now.

20 MEMBER HALNON: Okay.

21 MR. JESSUP: Dave, I think, just coming
22 back to your first question, I just wanted to point
23 out that there is a Predecisional Draft Guide on the
24 technology-inclusive, risk-informed, performance-based
25 methodologies for seismic design that supports what's

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1 going on, you know, that supports this discussion and
2 the proposed requirements. And I think that we would
3 expect that would come to ACRS as part of a future
4 interaction. So, I just wanted to point that out.
5 And it is out as a draft, publicly available now.

6 CHAIR PETTI: Thanks.

7 MR. JESSUP: Okay. Thanks.

8 Billy, you can move to the next slide, and
9 I'll turn it over to Bill Reckley.

10 MR. RECKLEY: Thanks, Bill.

11 So, the next few slides will talk about
12 safety analysis and, in particular, the use of the
13 Qualitative Health Objectives, or QHOs, and then,
14 Boyce Travis will talk about the safety analysis in
15 Framework B.

16 So, Billy, if we want to go to the next
17 slide.

18 Just as background, it's been interesting,
19 ever since we have tried to develop Framework A. And
20 just as background, under the bullets there, "existing
21 paradigm," we have a system in Parts 50 and 52 that
22 has evolved since the '60s. And basically, on a few
23 occasions, the question of, well, what is adequate
24 protection or how is it defined has arisen. And the
25 Commission has largely said, "We're not going to

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1 define it in technical terms."

2 But, given the evolution of the
3 requirements, along with the technology in the '50s,
4 '60s, and '70s, all the way up to the current day, the
5 election of all of the requirements that have been put
6 in place provide, or can be presumed to provide or
7 assure, adequate protection at a minimum.

8 And so, that kind of establishes that,
9 through experience, we're comfortable, but it's not
10 defined in technical terms. And you have to look at
11 all the requirements that are in Part 50 and in other
12 parts of NRC regulations and various ways that the NRC
13 has imposed requirements.

14 And then, in addition to that, the Act
15 provides, the Atomic Energy Act provides, that the
16 Commission can, as it deems necessary or appropriate
17 or desirable, take additional measures to protect the
18 health or minimize danger to life or property.

19 So, those are the two things in the Act,
20 Section 182 and Section 161 of the Act, that kind of
21 define what the NRC is obligated to do and authorized
22 to do. And so, if you're going to come up with a new
23 Framework and you're not simply going to bring over
24 those existing requirements from all of Part 50 and
25 elsewhere and kind of do a like-for-like replacement,

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1 then you have to do some exercise to say the two
2 Frameworks are providing a comparable level of safety.

3 And that's been a challenge, and you can
4 see in the rulemaking plan it was laid out as one of
5 the objectives that we would in Framework A generally
6 provide a comparable level of safety, as current
7 plants and new plants licensed under 52, and then,
8 provided a few other objectives in terms of the
9 stability; accommodate various technologies, and allow
10 those technologies where they can show they have
11 attributes from the Advanced Reactor Policy Statement
12 to take advantage of them.

13 And this kind of goes back to a comment
14 Joy made earlier. An advanced reactor is, likewise,
15 depending on where you want to look and what you want
16 to define, we've used that term ever since the
17 Advanced Reactor Policy Statement. So, it's to some
18 degree any reactor that's probably beyond generation
19 two, if you look at the timing of that.

20 The difficulty -- it's not a difficulty --
21 but the attributes of the Advanced Reactor Policy
22 Statement, and the Policy Statement acknowledges this,
23 plants can have, some of them, maybe all of them --
24 and how you judge it is based on the merits. And you
25 have to run it through the system, be it Framework A

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1 or Framework B, for that matter. And so, that's the
2 reason we got away from that terminology.

3 Even large light water reactors can have
4 attributes from the Advanced Reactor Policy Statement.
5 Obviously, the newer plants have much more passive
6 safety systems. That's an attribute of the Advanced
7 Reactor Policy Statement.

8 So, I'm going off and rambling a little
9 bit. The gist of what I was trying to get to on this
10 slide is that a challenge we've recognized from the
11 beginning is, how do you develop a new Framework and
12 compare it to the existing Frameworks when they're not
13 defined in numerical terms? And so, that's been the
14 challenge, and we've gone through various exercises to
15 try to convince ourselves and the ACRS and
16 stakeholders that we have achieved that.

17 So, Billy, if you can go to the next
18 slide.

19 This is just some of the figures we've
20 used in the past to try to talk about taking an
21 integrated approach. And that, basically, is how we
22 were looking at the development of Part 53. It's why
23 we defined it for the life cycle of a facility. It's
24 how you, in the bottom figure, that bowtie diagram
25 that we used many times early on that shows the scope

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1 of what's addressed through the Licensing
2 Modernization Project, the events analysis, the
3 assessments of the plant.

4 But you can see again, or remember from
5 the bowtie diagram, it didn't take it to the next step
6 and talk about things like how that analysis would be
7 used in siting decisions, for example. So, that was
8 one of the things we did within Part 53, is to fill
9 out the rest of that bowtie diagram to say how the
10 LMP, as a foundation, would support the other
11 decisions.

12 And in many cases, those things are
13 specifically defined in other NRC requirements, like
14 Part 100 for siting or the emergency planning
15 provisions in Appendix Z to Part 50, for example.

16 The other figures are just the figure we
17 used many times to talk about the mechanistic source
18 term kind of approach that we were taking, and which
19 is kind of necessary for non-light water technologies
20 because the system that we have in place has been
21 really built on the established barriers for light
22 water reactors -- the cladding, the coolant, the
23 containment.

24 And some designs may have a different set
25 of barriers. And so, you need to have somewhat of a

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1 different approach to achieve the same goals, but you
2 have to recognize that you're going to look at it and
3 analyze it differently.

4 And then, the last one is just a
5 representation of a general evolution from active
6 systems to passive systems. And increasingly, what
7 we're seeing is a desire to even more so base it on
8 inherent characteristics of plant features.

9 So, again, this is just kind of background
10 that we've been looking all along to take an
11 integrated approach. It kind of was a eureka moment
12 for me. I was like, what's another way to talk about
13 integrated decisionmaking?

14 So, Billy, if you go to the next slide, we
15 have a whole process on risk-informed, integrated
16 decisionmaking. And that is Reg Guide 1.174,
17 developed shortly after the NRC's Safety Goal Policy
18 Statement and the introduction of QHOs. How do you
19 consider risk-informed insights into the
20 decisionmaking?

21 And so, I looked at the five boxes that
22 have been established and really haven't changed since
23 the initial -- we've provided more detail; we've
24 enhanced them, but the basic structure is the same
25 since the first issuance of Reg Guide 1.174.

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1 What are the principles and how can we use
2 this tool to look at Framework A, in particular, and
3 say we, looking at it through another lens, have
4 confidence that we're ending up in a comparable level
5 of safety?

6 And so, if you go around the wheel here,
7 at the top is defense-in-depth, and that's stressed in
8 Reg Guide 1.174, and I think it's stressed in both
9 Frameworks, but, in particular, we're talking about
10 Framework A. It is stressed in Framework A that
11 measures have to be taken to ensure that you have
12 defense-in-depth.

13 The next one, going clockwise around, is
14 maintaining that the systems have adequate safety
15 margins. And this goes directly to what Charlie was
16 talking about just a few minutes ago at North Anna in
17 terms of the seismic design. Why did the plant
18 survive that event? Because it had safety margins.

19 And within Framework A, we have a whole
20 section in Subpart C on design requirements. Part of
21 those are to ensure that the systems, the safety-
22 related systems, have design margins in terms of their
23 use to make sure that the design basis accident meets
24 the safety criteria in Subpart B, which is very
25 similar to the Part 50 approach.

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1 So, it's easy to kind of say, in that
2 arena, there's differences. I don't want to downplay
3 the differences in the DBA, but, in large part, you're
4 achieving a comparable level of safety when you're
5 looking at it in an integrated way. So, this is the
6 caution: if you take the DBA from Framework A and the
7 DBA from Framework B or from Part 50, there are subtle
8 differences. And so, you can't say the DBA is the
9 same in the two. But when you look at it from an
10 integrated point of view, they're playing a similar
11 role, and, in particular, the role they're playing in
12 Framework A is to ensure that you have design margins
13 in the system or systems that you're relying on for
14 the design basis accident.

15 And then, you have a number of other
16 specific design requirements in Subpart C, in
17 particular, 53.440, that talks about following
18 consensus codes and standards; making sure that you
19 have proven the capability of each SSC you're relying
20 on by doing testing, analysis, and prototype testing;
21 the same thing we have in Part 50 under 50.43(e).

22 So, just looking at it again as an
23 integrated decisionmaking, we think we have this box
24 addressed. Then, you go to the next one, going
25 clockwise, in Reg Guide 1.174. It's used in a risk

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1 metric, and the risk metric that's used in both 1.174
2 and in Framework A is the QHOs.

3 Now, albeit 1.174 is written for light
4 water reactors, and it relies on the surrogates
5 because that's the way risk assessments have been
6 done. So that it's looking at core damage frequency
7 and conditional containment failures as the metrics
8 because that's what's available, and that's what's
9 been used. But 1.174 does talk about the QHOs and the
10 light water reactor surrogates.

11 And that's important. Because you have a
12 risk-informed approach, you want to have a risk-
13 related metric to make sure that you're actually
14 addressing the insights gathered from the PRA.

15 Then, the next one at like seven o'clock
16 in the diagram, Performance Monitoring, critically
17 important. We talked about this a little bit earlier.
18 That's the programmatic requirements in Subpart F.
19 It's the change control and other provisions in
20 Subpart I. And so, in terms of performance
21 monitoring, we think we have followed this general
22 process of integrated decisionmaking to make sure that
23 that feature of 1.174 is addressed.

24 And then, the last one is probably the
25 hardest one. And that is 1.174, because it was

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1 developed as kind of a change control mechanism,
2 started with the existing requirement. So, this goes
3 back to the original paradigm. We think adequate
4 assurance is provided by the existing set of
5 requirements. So, 1.174 starts with you're meeting
6 the existing requirements, except as you've justified
7 a change by consideration of these other boxes.

8 So, for us, basically, the exercise was to
9 go through methodically and say, from a technical
10 point of view, are we addressing the requirements in
11 Parts 50 and 52 and 100? And Jesse and company will
12 talk tomorrow about 55 for the staffing and human
13 factors elements. Have we looked at that whole set of
14 requirements and have confidence that we've addressed
15 technically the subject matter? And again, we think
16 we have.

17 You won't find the equivalent of, let's
18 say, 50.46 and 2200-degree peak clad temperature in
19 Framework A. You will find a requirement that the
20 designer, since it's technology-inclusive, the
21 designer or other party has to define what is the
22 design feature they're relying on; what is the safety
23 function -- you know, to address the safety function,
24 and then, in turn, also propose what is their
25 functional design criteria. So, we have the

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1 requirement for them to identify the equivalent of the
2 2200 degrees.

3 So, again, you won't find the specificity
4 in Framework A, but, as we went through and said, have
5 we addressed all of the technical requirements that we
6 think are relevant to a new plant, we think we did.

7 And so, this is just -- it's another way.
8 To be honest, I wish I had kind of developed this
9 argument and presented this before. We had gone
10 through the exercise, but just hadn't shown it.

11 We, instead -- Billy, if you'd go to the
12 next slide -- again, we were trying to explain it this
13 way, and that was, in part, because we were trying to
14 explain the top-down approach, where you end up in a
15 similar place as you do, for example, if you start
16 with a GDC; that starting top-down from safety
17 criteria to safety functions, to design features, to
18 functional design criteria, you'll end up with the
19 requirements on a particular piece of equipment that
20 is similar to where you would end up if you started at
21 the bottom and said, as a design philosophy, I'm going
22 to require X.

23 Let's say reactivity. I'm going to
24 require two systems, and one system has to do this.
25 Well, if I start from the bottom-up, I'm going to end

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1 up in a similar place on those fundamental safety
2 functions as I do when I start at the top and go down
3 and say, what is my safety criteria offsite dose?
4 What are my safety functions? I need to shut down the
5 reactor. What am I going to use to shut down the
6 reactor? In the light water reactor mode, it is going
7 to be control rods. And then now, how do the control
8 rods need to perform?

9 So, that's the argument we presented early
10 on, and we used this Chevron figure back then. The
11 safety criteria are just defined in this other box.
12 We talked about that earlier in terms of Subpart B for
13 DBAs, design basis accidents, and for licensing basis
14 events; other than DBAs, the need to defense-in-depth,
15 and so forth. Again, going back to that 1.174 figure
16 and addressing the various considerations in an
17 integrated decisionmaking.

18 One of the things that's subtle within
19 Framework A is there is, under 53.450(e) for the
20 analysis portion -- and, in particular, the analysis
21 of licensing basis events other than DBAs -- the need
22 to define for every event or category of events an
23 evaluation criteria. And so, that, under licensing
24 modernization, would be, basically, the frequency
25 consequence target figure.

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1 And that's a good way to look and analyze
2 individual event sequences, but, like in LMP and in
3 Reg Guide 1.174, you also want to look at the
4 cumulative insights related to plant risk. And so,
5 that's, again, why the QHOs come into both areas,
6 1.174 and Framework A.

7 One of the things I bolded here in the
8 text, just to be clear of the role of the QHOs,
9 because I'm afraid, again, just as we've gone through
10 public comments, maybe people were misunderstanding
11 how we were trying to use them and incorporate them.
12 The QHOs are not being used, in and of themselves, to
13 define what is adequate protection. It's only one
14 measure within all of those things that were shown on
15 the previous figure that we were looking at; all of
16 the requirements.

17 We still do not, under Framework A, define
18 adequate protection. We are, basically, saying we've
19 gone through an exercise to try to make sure that it
20 provides a comparable level of safety when you look at
21 it in total, just like 1.174 is saying, when you look
22 at it in total, you can use this kind of methodology
23 and ensure, even though you might be justifying a
24 change from an existing requirement, you are
25 maintaining adequate protection because you've gone

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1 through this exercise and looked at things like
2 defense-in-depth and cumulative risk from a PRA.

3 Dave?

4 CHAIR PETTI: Yes, this is a really good
5 discussion. I really like the previous slide.

6 I guess the concern that I have is you've
7 shown, or you think you've shown, that Framework A has
8 a comparable level of safety. But how do you know
9 it's not overregulation to get there?

10 And I think part of it must be. I mean,
11 looking at it in an integrated way, I just worry that
12 many of the comments you hear from stakeholders are
13 cherry-picking different aspects of it. And I think
14 if you cherry-pick, you can lead yourself to a
15 different answer than, you know, if you look at it in
16 an integrated way. Have you got a start of that?

17 MR. RECKLEY: Well, yes, I think we've
18 tried to. Again, since neither system, neither
19 Framework, existing or Framework A, is going to define
20 it in numerical terms, it's going to be a subjective
21 judgment on both that it's comparable; that we've
22 convinced ourselves, and two, that we didn't go way in
23 excess in Framework A.

24 And one of the ways that we can see that
25 is really drawn out of the experience on the evolution

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1 of the Licensing Modernization Project, its use in the
2 pilots that were done, and the observations that those
3 designers and staff involved in looking at those
4 tabletops -- the reason they were using the LMP and
5 thought it worthwhile was it was a way to take
6 advantage of the risk insights and focus activities in
7 the right spot, and not overdo it.

8 It does change the emphasis somewhat, as
9 does many of these things we're talking about, from
10 overdesign to what some might say is overanalysis,
11 right? So, you have to gain your objective to
12 simplify a design. Mostly under Framework A you do
13 that through analysis.

14 And so, again, I guess I'll just leave it
15 there. We've talked about it. We've thought about
16 it. It's going to be a very hard thing to have.
17 We're not going to be able to say precisely. We're
18 only going to have to say that we think we've reached
19 the right ground, and as it's exercised, if somebody
20 comes in and says, well, this is overkill, then we can
21 entertain it.

22 But it, basically, is defining a
23 methodology. There's so little prescription in terms
24 of what's actually required of the plant design, that
25 it's kind of hard to say where we would have gone

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1 overboard.

2 CHAIR PETTI: Yes. No, I think your
3 comment on the tabletops is, I think, valuable.
4 Because, in my opinion, the big thing that both the
5 licensee and the NRC have to figure out is, how do you
6 know you're focusing on the right stuff when you've
7 got a brand-new technology? And you don't have any
8 sort of basis. You need a structure. That's always
9 been the strength of LMP.

10 And so, the fact that the tabletops across
11 different technologies led you in the right places, I
12 think at least is sort of a pragmatic, a first look.
13 This looks reasonable. And I think that's a good
14 argument against some of the "Oh, this is
15 overregulation." It's just it's different, you know,
16 than what's there today.

17 No. Thanks.

18 I see Vesna has her hand up.

19 MR. RECKLEY: Uh-HUM.

20 CHAIR PETTI: Go ahead, Vesna.

21 MEMBER DIMITRIJEVIC: My comments will be
22 a little on different aspects of it. I don't even
23 know what to -- well, I want to start with the graph
24 from Reg Guide 1.174. I like how you put this story,
25 but this graph illustrates how deterministic and

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1 probabilistic things fit together. And from that
2 point of view, it is equally, or maybe even more
3 applicable, for the Part B.

4 Because the principles which are, you
5 know, the existing stuff, the defense-in-depth, design
6 requirements, performance monitoring, this all applies
7 even if you are not calculating your risk. So, from
8 that point of view, this is what is actually used
9 today. This was the main task in 1.174 to use today.
10 Why isn't something risk-informed? Why is it risk-
11 based?

12 But, I mean, I like how you integrate it
13 here. I just want to point out that this was done to
14 show how this information is coming from both sides,
15 come together, and not only on the path where we are
16 calculating risk change at the events which are
17 related to PRA.

18 So, this is just my opinion and my first
19 comment is not a question.

20 MR. RECKLEY: No, I know. No, I
21 appreciate it, and that's what I tried to capture in
22 that. We do have to be careful. 1.174 was developed
23 to evaluate changes from where we were or where we
24 are, and we are kind of extending that to the
25 development of a whole new Framework. So, point

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1 taken.

2 MEMBER DIMITRIJEVIC: Okay. And then, an
3 important part of that point is it's equally, if not
4 even more, applicable to Framework B. That's my
5 opinion.

6 Okay. My other point is related to
7 something you know that is my -- because I wrote a
8 separate opinion. It is important for me. And this
9 is the application of (audio interference).

10 So, I wanted to point to something in your
11 preamble. I'm not really good in pronouncing that.
12 But there, when you say that those are well-
13 established cumulative risk measures used in risk-
14 informed decisionmaking, and blah, blah, blah, in that
15 sense, I challenge this. I don't think that's true.
16 I think it's actually far from the truth because QHOs
17 are not cumulative. When you say, "cumulative risk
18 measure," what do you actually have in mind, Bill? I
19 mean, cumulative in the sense it's cumulative, even
20 sequences?

21 MR. RECKLEY: Yes. It's the integration
22 of the individual event sequences.

23 MEMBER DIMITRIJEVIC: So, every core
24 damage frequency is a cumulative measure, right?

25 MR. RECKLEY: Yes.

1 MEMBER DIMITRIJEVIC: So, it's a Large
2 Release Frequency? So, what I want to say what is
3 true, instead of what you are stating, the surrogate
4 for QHOs have been well-established risk measures.
5 Because when you say, "cumulative risk measures,"
6 actually, you can say CDF and LERF because that's
7 cumulative risk measures which are well-established in
8 risk measures using all applications so far. Is that
9 a true statement?

10 MR. RECKLEY: I would say the CDF and
11 Large Release Frequency or Large Early Release
12 Frequency have been used much more than have the QHOs
13 in terms of latent cancer and prompt fatality.
14 Because --

15 MEMBER DIMITRIJEVIC: But is there much
16 more that's implied that you endorse their use in the
17 risk implications?

18 MR. RECKLEY: Where CDF and LERF were not
19 an appropriate measure -- for example, in some of the
20 Fukushima work, they were not deemed to be an
21 appropriate measure; the work on spent fuel pools is
22 a good example that's not going to use CDF or LERF --
23 we used the QHOs.

24 Likewise, when we were evaluating
25 engineered filtered vents on BWRs, that was based on

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1 latent cancer and prompt fatality, the numerical QHOs,
2 not on the surrogates. So --

3 MEMBER DIMITRIJEVIC: Okay. So, let me
4 just go back and I will try to explain why I have an
5 issue with this.

6 So, for example, if you are going to use
7 the latent cancer measure of less than 2 to the minus
8 6 per year, right? And there is not any importance
9 measures, risk-importance measures, risk-significance,
10 anything based on that, or any plants reporting what
11 is the cancer fatalities. That is sort of a measure
12 which is denied on something which connects core
13 damage frequency, weak cancer which is based on all
14 studies, and you had the million assumptions under
15 this.

16 So, for example, does anybody say that
17 this only applies if there is no cleaning of the soil?
18 Or does this only apply if people come back and live
19 there for 50 years? Or does anybody -- I mean, there
20 is so many assumptions and uncertainties. And did you
21 look in the results, latest results for Level 3 which
22 show that this connection is like triple order of
23 magnitudes of -- you know, this connection which said
24 the cancer fatalities are connected, given core damage
25 frequencies are 40 minus 3? Did you guys look in the

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1 results for the latest Level 3 PRA?

2 MR. RECKLEY: Yes. So, I guess I would
3 acknowledge what you're saying, that it's a more
4 complicated calculation as soon as you need to go
5 offsite and start to calculate the dispersion and the
6 dose to individuals, and then, the health effects of
7 those doses on individuals. Yes, we'll acknowledge
8 that that's a more complicated calculation than is
9 CDF, and by its nature, then, it's also increasing or
10 introducing additional uncertainties.

11 But that is kind of built into the
12 methodology that they'll need to address those
13 uncertainties.

14 MEMBER DIMITRIJEVIC: But that's not built
15 of you give them 2 to the minus 6 as the number.
16 Then, you ought to be giving them the number which is
17 based on all of these uncertainties and it's not true.

18 MR. RECKLEY: Well, but the comparison to
19 2 minus 6 might have the uncertainties you're
20 mentioning. The 2 times 10 to the minus 6 itself is
21 just the quantitative goal of .1 percent times the
22 current estimates of the cancer occurrence. And
23 that's how you get 2 times minus 6 --

24 MEMBER DIMITRIJEVIC: Yes, I have to say
25 (audio interference), but as far as what I said in

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1 this discussion, if your plans come -- like, for
2 example, if NuScale comes under this part, they could
3 have a core damage frequency of 10 to the minus 2
4 because their correction to core damage frequency in
5 terms of that is not established. So, that's a point
6 I'm trying to make. I'm trying to make, if you stay
7 on a higher level, you can avoid all of those
8 questions and just say nothing to this higher risk to
9 the public.

10 My other concern in this is also, let's
11 say that we have a NuScale that comes now and says
12 that they meet this 10 to the minus 4 CDF, but, then,
13 in order to do the QHO, right, they have to -- you
14 know, you say also the right measures. So, let's say
15 that we have established that you already accept the
16 CDF and LERF are surrogate measures, right?

17 MR. RECKLEY: Yes.

18 MEMBER DIMITRIJEVIC: Right. So,
19 therefore, if they satisfy the 10 to the minus 4 for
20 CDF, that will imply they satisfy cancer deaths,
21 right?

22 MR. RECKLEY: For light water reactors,
23 yes.

24 MEMBER DIMITRIJEVIC: So, for example,
25 does that mean that, then, light water reactors don't

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1 need to do the Level 3 to show those deaths or not?
2 If they have a CDF and LERF, are they good to go?

3 MR. RECKLEY: Basically, yes, as long as
4 they can provide a reasonable argument. And for light
5 water reactors, it's a well-established history that
6 those surrogates are a conservative way of showing you
7 meet the QHOs. So, yes, they could come in and say
8 that they meet the light water reactor surrogates and
9 the surrogates are applicable to them. And so, we --

10 MEMBER DIMITRIJEVIC: So, they don't need
11 to do the Level 3 --

12 MR. RECKLEY: The Level 3, right. And
13 likewise, any non-light water reactor, by the way,
14 could do the same. For example, the simplest way to
15 show you meet the QHO is to show you don't release
16 radioactive materials.

17 MEMBER DIMITRIJEVIC: Right.

18 MR. RECKLEY: You don't need to do a Level
19 3 PRA or you don't need to do the dispersion models if
20 there was nothing dispersed.

21 So, if any design were to come in and say,
22 "We're don't need to calculate the QHOs," based on a
23 code like MACCS, "because we don't have any release,"
24 as long as they can convince us that they don't have
25 a release, then they're finished. You meet the QHOs

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1 if you don't have a release.

2 MEMBER DIMITRIJEVIC: Well, right, but, in
3 that case, you also need that you are not
4 presenting -- you know, if you go back to qualitative
5 goals, you are also meeting this. Why do you need to
6 do these qualitative things, which are very
7 questionable and based on these uncertainties?

8 What you're saying, they also, you know,
9 meet the goal that you are not presenting -- you are
10 not adding to any risk of an average person in the
11 vicinity of the plant if you don't have the reactivity
12 release. You are introducing something which is based
13 on a lot of -- basically, cancer fatalities are
14 calculated based on the position of the land, the
15 people coming back, living there 50 years, being
16 exposed to that. See, I mean, this is so -- this is
17 so much of the things introduced. There would be no
18 need if you just stay on the qualitative risk goals;
19 you don't have to deal with any of those assumptions.

20 So, I don't see what benefit you were
21 adding, especially because I claim it is not true that
22 they are well-established. They have been called in
23 certain circumstances, but they're not well-
24 established. 1.174 is not based on them. PRA
25 standards are not based on that.

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1 I have never reported it -- and I have
2 been doing PRA for 20 years -- I have never reported
3 cancer fatalities in my life. I never said that the
4 importance of the SSCs are based on increase of cancer
5 fatalities. That's totally foreign to me.

6 Okay. This is just my comment.

7 MR. RECKLEY: Okay.

8 MEMBER DIMITRIJEVIC: And I will stop
9 here. I have already expressed my opinion.

10 MR. RECKLEY: Okay. And, you know, the
11 only point -- and we make it in the preamble as well
12 -- is those that you mentioned, the particular ones
13 for light water, are well-established and we
14 acknowledge that.

15 The surrogate measures for other
16 technologies are not there, and we would end up having
17 to define the equivalent surrogate measures for each
18 technology then.

19 The nice part, if you want to say it that
20 way, about going back to the QHOs themselves, is they
21 are technology-inclusive.

22 MEMBER DIMITRIJEVIC: Well, so is quality
23 risks and such, you know; they are all technology-
24 inclusive. And one of the things is that, you know,
25 you can avoid -- you're talking about safety-

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1 significant components, right? If you don't have
2 surrogate measures and somebody is coming with a
3 totally different design, then how are we going to
4 establish safety importance of the components? That
5 has to be discussed also at the beginning.

6 MR. RECKLEY: Right.

7 MEMBER DIMITRIJEVIC: Is safety importance
8 of the components going to be established based on
9 their cancer risk or purely fatalities? I mean, you
10 know, this is -- what I was saying, we should leave
11 the door wide open than trying to push this very much,
12 in my opinion, at the official health objectives into
13 this.

14 So, okay, this is how I feel.

15 MR. RECKLEY: Okay.

16 MEMBER DIMITRIJEVIC: Yes, I think
17 everybody knows this by now. So --

18 MR. RECKLEY: Okay. So, we have one last
19 slide, and then, Boyce, I think, can finish up the
20 Framework B Safety Analysis stuff before lunch. I
21 know we're running a little late.

22 But, Billy, if you go to the next slide.

23 This just basically goes through the
24 comments we've received, some of which we just
25 discussed.

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1 So, the general feedback, both from ACRS
2 and other stakeholders, has been not to include a
3 cumulative risk measure, to include a different
4 cumulative risk measure, as we were just discussing,
5 in particular, surrogates for the QHOs, and then, to
6 develop new safety goals.

7 So, this is also reflected in the response
8 to the most recent letter from the Committee.

9 So, we continue to think it's important to
10 have a cumulative risk measure, and I'll point back to
11 the Reg Guide 1.174 kind of integrated decisionmaking
12 process to explain why we think that.

13 MEMBER DIMITRIJEVIC: Okay. I come again
14 -- sorry -- but I do here, because I brought this
15 discussion. What is it that you mean by cumulative
16 risk measure? You mean, actually, the integrated
17 sequences?

18 MR. RECKLEY: Yes.

19 MEMBER DIMITRIJEVIC: But they have always
20 been used? What is the other option than cumulative
21 risk measure?

22 MR. RECKLEY: Some stakeholders have said
23 we should not have a cumulative risk measure.

24 MEMBER DIMITRIJEVIC: So, what is the
25 alternative to not cumulative? Just analyze one

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1 sequence?

2 MR. RECKLEY: One would be, for example,
3 that the current way we do it in Part 52 is there is
4 no requirements in the rule to meet the safety goal,
5 but we do it through guidance. We do it in Chapter
6 19.

7 MEMBER DIMITRIJEVIC: But nothing
8 different than saying, cumulative? What you are
9 saying, that's two different stuff, right?

10 MR. RECKLEY: No.

11 MEMBER DIMITRIJEVIC: I mean, you know,
12 what is opposite of "cumulative"?

13 MR. RECKLEY: Well, Billy, if you can go
14 back up one slide perhaps?

15 For example, if you were looking at the
16 frequency consequence curve in the yellow, and you
17 look at every event sequence, if you can convince
18 yourself that every event sequence is to the left of
19 the frequency consequence curve, but, in addition to
20 that, you want to look, we think you want to look at
21 what is the cumulative risk.

22 MR. BLEY: I'd like to jump in, Bill, if
23 I might?

24 MR. RECKLEY: Yes, please, Dennis.

25 MR. BLEY: When you go to the LMP

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1 approach, like Bill is pointing out here, using this
2 FC curve is done on a sequence-by-sequence basis, and
3 then, when you're all done, you're still left with the
4 question, well, how many sequences are there? What's
5 the total risk from this thing? And is it too high
6 for the whole plant?

7 And several things have been proposed in
8 the past. 1860 has two of them. One is that there be
9 developed a CCDF curve that's a limit curve, and you
10 shouldn't exceed it anywhere with your total result
11 from your PRA.

12 The other one that was set up there, and
13 has continued in what they're saying here, is that the
14 QHOs are -- because they are a result of the sum of
15 everything in the risk, they give you a place to see
16 if the overall risk is too high or too low.

17 I always like the first of those, but
18 nobody has pursued that very much. But that's what
19 they're talking about, is, how do you make sure you
20 don't have too many of these sequences that are okay,
21 but all together the design is not okay?

22 MR. RECKLEY: Yes, thank you, Dennis.

23 So, Billy, if we can go back.

24 The two last bullets then. We talked
25 about the use of an alternative like surrogates. We

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1 say it's allowed, but keep as the measure what we
2 think is the technology-inclusive measure, which is
3 actually the QHOs.

4 And then, the last thing was some had
5 proposed that we develop new safety goals, either to
6 address concerns beyond public health or in some
7 stakeholders' views, because the safety goals should
8 be revisited. They were developed in the 1980s, for
9 example.

10 And our response -- and this is reflected
11 in the letter -- is that we stuck to the rulemaking
12 plan that, where we're going to use established
13 measures; that we really didn't have the time or
14 capacity in this Part 53 effort to do something like
15 revisit foundational things, like the safety goals or
16 linear no threshold, or some other things that people
17 thought maybe we should consider, as we did Part 53.

18 So, we stuck with Commission findings like
19 that in the Staff Requirements Memorandum for
20 SECY-10-0121, and to some degree later on, after
21 Fukushima, SECY-12-0110, where the question of, should
22 we come up with new safety goals was posed, and the
23 Commission came back and said the existing safety
24 goals are fine and should continue to be used.

25 So, that's where we are. We're not,

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1 basically, taking a position on the merits of doing
2 new safety goals or not. We're just saying that we
3 weren't able, as part of this effort, to undertake
4 something like that.

5 So, with that, Dave, I think Boyce can
6 probably be done by 12:30. Do you want to --

7 CHAIR PETTI: Yes, let's do that, and
8 then, we'll go to lunch.

9 MR. RECKLEY: Okay. Boyce?

10 MR. TRAVIS: Thanks, Bill.

11 So, this is Boyce Travis from the staff.

12 I'll be moving on to the Framework B,
13 Safety Analysis and Technical Requirements, as opposed
14 to the ones we've been discussing for Framework A over
15 the past hour or so.

16 So, moving on to the next slide.

17 So, the Framework A, Safety Analysis and
18 Technical Requirements, are largely located in Subpart
19 R, which is the licensing certifications and approval
20 section. And this is very similar to how the
21 requirements are reflected in the existing Parts 50
22 and 52 Framework.

23 And so, this slide focuses on
24 53.4730(a)(1), which is Site Safety Analysis. The
25 safety analysis requirements are derived from those in

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1 52.79 and the corresponding Part 50 requirements. The
2 first few requirements there are largely identical to
3 Part 52 requirements. I'm not going to spend a lot of
4 time on those. We've discussed them at a previous
5 ACRS meeting.

6 We have made some changes in (a)(1) to
7 ensure that the rule was appropriately technology-
8 inclusive, and we've also made some, what I'll call,
9 clarifying changes that don't change the technical
10 meaning of what's there, but did find the opportunity
11 to provide some additional clarity.

12 In addition, the preamble provides some
13 background and context discussion that we think helps
14 provide the appropriate level of detail for why we've
15 chosen the requirements that we've chosen here.

16 The third bullet contains the exact text
17 that we provided for making the rule technology-
18 inclusive with regards to Site Safety Analysis. And
19 we've afforded some additional flexibilities regarding
20 the fission product releases that could be calculated.
21 But I'll note that, consistent with what's done in
22 Parts 50 and 52, the Site Safety Analysis is based on
23 a major accident, and what that major accident looks
24 like might be different for different technology
25 types.

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1 You know, we're not going to prescribe the
2 specific release, as has been done historically for
3 LWRs because that would be generally overly
4 constraining, we think, for the broad variety of
5 technology types being considered that we know about
6 and the ones we don't necessarily know about on the
7 near-term horizon.

8 In addition, there's a requirement or an
9 optional requirement in this section that would allow
10 an applicant to comply with more restrictive dose
11 criteria, effectively, inherit these dose criteria as
12 their new Site Safety Analysis requirement if they
13 were looking to, for instance, use the Draft EPZ Rule
14 or other requirements that would impose a more
15 restrictive dose requirement rather than the 25 rem,
16 which is there in this requirement, consistent with
17 the Part 50 and 52 requirements today.

18 And so, that largely covers the Safety
19 Analysis, as I know not a lot of changes were made
20 since you all last saw this rule or this text.

21 CHAIR PETTI: Boyce?

22 MR. TRAVIS: Yes, go ahead.

23 CHAIR PETTI: I understand what you mean
24 by the italicized bullet, but, for like a molten salt-
25 fueled reactor, fuel and core damage, they may argue

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1 that they don't ever sort of get that. So, it might
2 have to be covered in some relevant guidance to expand
3 -- you know, you're looking for anything. There's a
4 potential for large radiological releases from any
5 source.

6 MR. TRAVIS: Yes, I do agree with that.

7 CHAIR PETTI: Yes.

8 MR. TRAVIS: So, I think this is
9 relatively clear in the preamble discussion, but, I
10 mean, as you know, molten fuel designs are
11 technologically unique. And I would consider the
12 release of molten fuel from the reactor coolant system
13 to be fuel damage. I understand those designers might
14 not. And so, in that case, it is a non-traditional
15 technical, not argument, but discussion to be had. We
16 think the rule captures that, but we are very
17 receptive to feedback, if we can make this more clear.

18 CHAIR PETTI: I always thought it was like
19 core upset, something like that, that might be
20 broader, but, you know, it's just something to think
21 about.

22 MR. TRAVIS: No, that's good feedback and
23 we will take it to consider. I'm sure that there are
24 numerable ways that this could be approached and I
25 would not please everyone with whatever language got

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1 chosen.

2 CHAIR PETTI: Yes.

3 MR. TRAVIS: And so, moving on to the next
4 slide, the next large set of technical and safety
5 analysis requirements is in 53.4730(a)(5), which
6 breaks out the initiating events and accident analyses
7 requirements. They're all located in one place and
8 they are more explicitly divided by event
9 classification than they are in the Parts 50 and 52
10 requirements.

11 However, the genesis behind all of the
12 requirements, but the last one that we'll discuss here
13 in a second, is derived from the philosophy and the
14 regulatory requirements in Parts 50 and 52. All of
15 what's here leverages the language that was previously
16 developed as part of Part 5X that we came before ACRS
17 with a little over a year ago, maybe a little closer
18 to a year and a half ago. And the preliminary
19 proposed rule maintains top-level requirements that
20 are consistent with acceptance criteria consistent
21 with those in 50 and 52.

22 So, moving on to the next slide, I'll
23 break these out by what's in each category of both
24 4730(a)(5). There's a top-level, you know, little
25 Roman numeral (i) for analysis and evaluation that

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1 kind of describes the high-level analysis and
2 evaluation requirements that's derived from 52.79(a).
3 We've made changes there to accommodate multi-unit
4 language that was perhaps a little muddled or not
5 explicitly clear in the previous revision of the rule
6 text.

7 In Roman numeral (ii), Design Basis
8 Accidents, we've made some contextual changes, just to
9 provide additional clarity and clean some things up.
10 And this really includes -- this is the traditional
11 requirements for deterministic analyses from Parts 50
12 and 52; i.e., your design basis analyses are defended
13 against using only safety-related equipment.

14 Roman numeral (iii), there has been a
15 change made since we last came before ACRS, additional
16 context for normal operation and anticipated
17 operational occurrences. This is consistent with the
18 existing requirements and includes the Part 20
19 acceptance criteria, and it adds normal operation.
20 And some of this discussion is provided in the
21 preamble. But there are no analytical requirements
22 for normal operation, but the Part 20 acceptance
23 criteria still do apply for normal operation. The
24 expectation is, you know, and always has been, that
25 you would remain below those as an applicant.

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1 Continuing on to the next slide for
2 (a) (5), little Roman numeral (iv) has been renamed to
3 Additional Licensing Basis Events. These are -- and
4 we've provided some additional clarity and text
5 changes in the requirement itself -- just to kind of
6 better hone in on what the scope of initiators and
7 event sequences that need to be considered to be
8 defended against using SSCs and those that need to be
9 looked at analytically as part of the plant design as
10 a whole, consistent with what's done in Parts 50 and
11 52 today under the RTNSS classification system.

12 And so, the requirement breaks out that
13 there are events like ATWS and SBO that are not
14 design-basis in the traditional sense, in that they
15 require either multiple failures or are outside the
16 scope of what's looked at in that traditional
17 deterministic analysis, but our operating experience
18 has shown that these events do need to be evaluated,
19 and the Commission has decided that there is a need to
20 provide appropriate measures to defend against these
21 events.

22 We don't want to prescribe rule text as
23 what's in the ATWS and SBO rules now because those are
24 very technology-specific to LWRs, and we acknowledge
25 that there are ways for non-light water reactors to

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1 design these out without having to provide additional
2 equipment in some cases. And that would be a viable
3 path forward to satisfy this requirement.

4 Finally -- or not finally, I guess;
5 there's two more -- severe accidents is Roman numeral
6 v. This is derived from what's in 52.79(a)(38).
7 We've made modifications here to support technology-
8 inclusiveness because the (a)(38) requirement
9 specifically refers to LWR severe accident mechanisms
10 that would not be sufficiently technology-inclusive.

11 And then, originally, in Roman numeral v,
12 I had defined a severe nuclear accident. That's been
13 moved up to the definition section to kind of bring
14 everything into one place. And that will be talked
15 about later, further this afternoon, by I believe
16 Marty.

17 Finally, there's a chemical hazard
18 requirement, Roman numeral vi. This is consistent
19 with what's been put in Framework A and it's to
20 address substances that are commingled with licensed
21 or radiological hazard-producing material.

22 Moving on to the next slide --

23 CHAIR PETTI: So, Boyce, just to --

24 MR. TRAVIS: Yes?

25 CHAIR PETTI: I wanted to come back. Joy

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1 had asked this earlier question. There's a design
2 basis, and here are additional requirements formerly
3 outside the design basis. And so, there's been some
4 comment from stakeholders about, you're including
5 license events outside the design basis now in the
6 overall licensing of a plant. But, in fact, they've
7 kind of been there all along. You're just pulling
8 them all together here. Is that --

9 MR. TRAVIS: Yes, that is correct. And I
10 would go further to say, we tried to hone this
11 requirement as much as we could because there's a fine
12 line to tread here in making it technology-inclusive,
13 trying to address the appropriate scope of events.
14 And as you know, there are a series of requirements
15 for, I'm going to call them, regulated beyond design
16 basis events for the purposes of this discussion, like
17 ATWS and SBO, that have been added to the scope of the
18 licensing basis, but are not -- and design basis is a
19 loaded term in the sense that it's not captured in the
20 structure. It's stylized design basis analysis, but
21 it is part of what is required for the plant to defend
22 against.

23 And so, the goal with this requirement was
24 to provide something akin to that that didn't
25 prescribe specifically here's what you have to do for

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1 ATWS; here's what you have to do for SBO, because we
2 wanted a more integrated look at what the hazards were
3 for the plant from the perspective of, and using this
4 as an example -- and this is in the preamble -- to
5 say, effectively, if there are things on the frequency
6 level of the design basis accidents, and they just
7 aren't captured there because of the stylized nature
8 of the analysis, you know, they need to be evaluated
9 and dispositioned somehow, whether that's via design
10 features that aren't safety-related or programmatic
11 controls or various other mechanisms that are
12 available to the designers.

13 And so, we think this provides
14 flexibility, but, as you know, this is not a
15 departure, as it were, from the existing regulatory
16 structure. It's just a different way to write it
17 down.

18 CHAIR PETTI: All right. Well, thanks.
19 That's good to have out there. Thank you.

20 MEMBER REMPE: So, again, I agree, but to
21 avoid any misconceptions by others who may not fully
22 understand it, for whatever reason, I think it's
23 important to emphasize that in the preamble, as Dave
24 suggested earlier, wherever you can, just to make sure
25 folks understand this. Because, again, I think it's

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1 great that you've kind of tried to put things in the
2 frequency regime because that's not done in the other
3 Frameworks.

4 But, anyway it's just something to think
5 about. And I know you can't do that with Framework B
6 because the frequencies aren't there, but I just would
7 make sure that everybody understands this, so there
8 aren't comments about that we're regulating down to a
9 more restrictive; you know, we've changed the bar and
10 we're making things more restrictive.

11 MR. TRAVIS: Yes, thanks, Dr. Rempe.

12 I'll note that the staff paid particular
13 attention to developing the preamble for this section
14 because we knew this was an area that the rule
15 language probably could not be sufficiently specific,
16 and the preamble was the best place to provide that
17 additional context. And so, we do appreciate that
18 comment.

19 MEMBER BROWN: Boyce?

20 MR. TRAVIS: Yes?

21 MEMBER BROWN: Charlie Brown.

22 When I go back -- I'm trying to figure out
23 where we are. Slide 30 was Framework A, Consideration
24 of Feedback, Including QHOs. The previous slide was
25 Framework A, et cetera. Now, I'm in Subpart R; it's

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1 Framework B.

2 MR. TRAVIS: That is correct, yes.

3 MEMBER BROWN: Okay. You've flipped to
4 Framework B now in your discussion, but yet, the
5 Framework B shows up -- I had to go find what you were
6 talking. So, I pulled up this other text. Then, we
7 get back into Framework B around slide 37.

8 Is there a reason? You didn't announce
9 that. Did I miss this or something?

10 MR. TRAVIS: No, I apologize. I could
11 have been more clear. And certainly, there was a --
12 I think we were trying to appropriately tie the safety
13 to -- or to draw an appropriate distinction between
14 the Safety Analysis requirements in Frameworks A and
15 B.

16 Because once we got into Subpart R,
17 Framework B, on slide 24, I believe, the two
18 Frameworks do have different ways to approach safety
19 analyses. And so, we knew that QHOs were going to be
20 a point of discussion. And so, we went into that
21 starting on slide 25, but, in reality, from a
22 consistency -- or sorry -- from a Framework B flow
23 perspective, yes, slide 30, or excuse me, slide 31
24 kind of follows slide 24 in the sense that slide 31 is
25 talking about -- starting with slide 31 is again

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1 talking about Framework B specifically; whereas,
2 slides 25 through 30 were talking about how the QHOs
3 in Framework A, Safety Analysis, were developed.

4 MEMBER BROWN: Okay. I was trying to
5 connect this with QHOs and everything else, and I lost
6 the bubbles. Okay. Thank you.

7 MR. TRAVIS: No, I apologize. In
8 Framework B, QHOs are handled the same way they are
9 handled in Parts 50 and 52 today.

10 MEMBER BROWN: All right. Thank you.

11 MR. TRAVIS: No problem.

12 So, moving on to the next slide, which
13 maybe is 35, slide 35. Thank you.

14 This is 53.5730(a)(36), which is the
15 containment requirements. This is the other, I would
16 say, large area of technical consideration in
17 Framework B that is very different from Parts 50 and
18 52 and different from what's in Framework A.

19 The containment requirements are split to
20 acknowledgment differences between non-LWRs and LWRs.
21 For LWRs, the same approach as applies under 50 and 52
22 currently is put in the regulatory requirements for
23 containment in Framework B. That is, that you need
24 leak-tight primary containment that meets Part 50,
25 Appendix J, and you need to address any technically-

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1 relevant requirements related to LWR operating
2 experience. And that's consistent with the
3 Commission's policy that was expressed in the SECY
4 paper on functional containment.

5 For non-LWRs, we afford designers an
6 additional level of flexibility to say they need a set
7 of barriers -- plural -- that are used to meet
8 requirements for AOOs, DBAs, and siting criteria. And
9 this set of barriers comprises their functional
10 containment. That definition, which was kind of
11 implicit in the text of what was previously in
12 (a) (36), has now been moved up to 53.020(a).

13 And then, the safety classification of
14 those SSCs that are credited to defend against
15 radiological releases that make up the functional
16 containment barriers need to be classified as safety-
17 related. That's explicitly required here.

18 There are no other requirements per se.
19 So, there's no, for instance, direct requirement on a
20 leakage test, as there is in Appendix J. But, using
21 as an example, if a designer was crediting the
22 performance of a building to have a certain leakage
23 level, that would be inherited as a design
24 requirement, and the NRC would expect there to be
25 maybe a technical specification, or something like

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1 that, to justify that leakage level that's being
2 credited as a functional containment barrier.

3 And so, that kind of covers the
4 discrepancies in deltas between both Framework A and
5 the language that we showed you previously on
6 Framework B for safety analysis requirements and what
7 currently exists in the proposed rule.

8 And if we move on to the next slide --

9 CHAIR PETTI: Boyce, before you go
10 there --

11 MR. TRAVIS: Yes, let's go back.

12 CHAIR PETTI: -- I'm not sure we're going
13 to talk about tech specs and LCOs, and the like, but
14 in the preamble you guys were interested in expanding
15 the definition of LCOs. And the little bit that was
16 there, I just worried that it may not be implementable
17 in some aspects of functional containment. And I was
18 trying to understand. Maybe I've misunderstood what
19 the additional wording meant. We're not going to
20 cover that later, right?

21 MR. TRAVIS: No, it's not planned as a
22 topic. I can kind of try to speak to that. I mean,
23 so we are asking a question in the FRN on --

24 CHAIR PETTI: Right, right.

25 MR. TRAVIS: -- on the change.

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1 So, the short answer is we made a change
2 to what's there because the old requirement says
3 something to the effect of -- and I'm paraphrasing a
4 little bit -- primary success path, and it wasn't
5 exactly clear to us how. So, in the previous
6 requirements there's an expectation for a containment,
7 and that containment is going to have technical
8 specifications; it does have technical specifications
9 associated with it. In the new Part 50, or the new
10 requirements, we weren't sure there was a way to catch
11 that. And so, we modified the language slightly.

12 But we are asking the question because
13 we're not sure what we did was necessarily the best
14 way to go about that. And so, I appreciate the
15 feedback, and I think we're still in the learning
16 process. We just wanted to make sure that functional
17 containment as a concept, and how those barriers were
18 reflected, specifically, that they are going to
19 perform as they are assumed to in the Safety Analysis,
20 is reflected somehow operationally. And so, we added
21 the language we chose.

22 But I think I understand your comment.
23 And does that address it at this --

24 CHAIR PETTI: I'll stick it in the letter.
25 Hopefully, it will survive discussion with the

1 Committee. But I was worried about like, of course,
2 in TRISO fuel the barriers are so deep in, you know,
3 they're part of the fuel particles; there's more than
4 one barrier in there. How you measure stuff, that's
5 what I'm worried about. I'm not worried about an
6 external barrier that is an engineering barrier at a
7 scale that one can do traditional engineering stuff.

8 MR. TRAVIS: Yes.

9 CHAIR PETTI: That was just the concern I
10 had, was how the language could be interpreted.

11 CHAIR PETTI: Sure. So, I totally
12 understand where you're coming from, Dr. Petti.

13 So, this is me personally talking. How I
14 would be addressing, how I expect that to be addressed
15 by a designer is a damaged -- basically, when you have
16 damage, you no longer meet the LCO. So, for instance,
17 a circulating activity requirement tells you that you
18 have failed TRISO barriers; therefore, you are no
19 longer -- your functional containment is no longer
20 intact, if that makes sense.

21 CHAIR PETTI: Okay.

22 MR. TRAVIS: So, not measuring the TRISO
23 directly, but saying I have a coolant activity
24 requirement that needs to relate -- for me to operate,
25 I need to remain below a certain level. And that is

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1 indicative that I still have a functional containment
2 barrier intact with the TRISO.

3 CHAIR PETTI: Right. Okay. Yes, I
4 understand. Okay.

5 MR. TRAVIS: Yes. That's all I have on
6 safety analysis.

7 The next slide contains a high-level
8 discussion of areas. If there are any questions on
9 general technical requirements, I'll let Bill Jessup
10 address those. And this just kind of goes over areas
11 where we made some changes to technical requirements
12 in 4730.

13 MR. JESSUP: Yes, thanks, Boyce.

14 And I understand I'm in the way of lunch.
15 So, I will be efficient, but please stop me if there
16 are questions.

17 Again, for context, we are still talking
18 about Framework B. Boyce hit on kind of the safety
19 analysis requirements. I wanted to wrap up to talk
20 about just some of the deltas in the other general
21 technical requirements that have been implemented or
22 proposed in the most recent iteration.

23 If you look at paragraph (a)(2) for
24 facility description, we had a requirement here
25 related to codes and standards that would be used in

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1 the design of SSCs. And we did that because we looked
2 back at the existing requirements for light water
3 reactors under 50.55(a) and recognized that, while we
4 maintained the 50.55(a) -- excuse me -- 10 CFR
5 50.55(a) codes and standards requirements for light
6 water reactors, we didn't have a similar requirement
7 that would explicitly cover other technologies. So,
8 did a paragraph to that effect under (a)(2).

9 Under (a)(4), this ties back to what
10 Jordan had mentioned earlier about the definition of
11 safety function. We appreciated the recommendation
12 from ACRS about adding clarity around that concept.
13 And so, in (a)(4), we did add a sentence that would
14 make that implicit relationship between the PDC and
15 safety functions a bit more explicit, because we
16 agreed there would be value in doing that.

17 Under paragraph (a)(11), dose (audio
18 interference) to the public, the changes really here
19 are focused on aligning these requirements more
20 closely with those that are currently in 10 CFR
21 50.34a -- it's just 50.34a, not parenthetical (a) --
22 not including the references to Part 50, Appendix I,
23 where we made some slight changes in comparison to
24 Appendix I, Part 50, Appendix I.

25 Paragraph (a)(14), Earthquake Engineering

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1 Criteria, again, linking back to the discussion that
2 we had earlier this morning, the addition here is
3 reflective of that alternative set of seismic designs
4 performance criteria that we talked about. So, this
5 paragraph preserves the baseline, Part 50, Appendix S,
6 seismic design requirements, but there is a new
7 sentence that reflects that applicants could pursue
8 the alternatives under 53.4733 that we discussed this
9 morning.

10 Paragraph (a) (34), the description of risk
11 evaluation, this is where PRA and AERI are discussed,
12 and there's going to be a full afternoon session on
13 AERI. So, I just flagged it here because there were
14 changes to the AERI approach, but those will be
15 discussed at length this afternoon.

16 Paragraph (a) (37) contains the
17 requirements specific to water-cooled reactor designs
18 that would come under Framework B. Several references
19 in this paragraph back to Part 50. Just two notable
20 changes.

21 We deleted a requirement that was related
22 to containment leakage testing because we felt it was
23 redundant to requirements that are already in Subpart
24 P, and also, what Boyce mentioned in 4730(a) (36) on
25 the prior slide.

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1 And the last item was that we removed the
2 requirement for evaluating conformance of a design
3 against the standard of U-PLAN (phonetic). Deletion
4 of that requirement actually aligns us with some of
5 the ongoing policy work in the 50-52 harmonization
6 rulemaking that recognizes that new guidance beyond
7 the SRP is going to be available for new reactors; and
8 also, that new designs are likely to be sufficiently
9 different from the large light water reactors that
10 inform the current SRP. So, maintaining and
11 performing that conformance evaluation would likely
12 have limited benefit for the staff and prospective
13 applicants as well.

14 And the last note is just kind of a
15 catchall, the other changes to 53.4730, largely
16 organizational and administrative, since the last
17 iteration.

18 So, again, I'm in the way of lunch, which
19 is a dangerous place to be. But if there are any
20 questions, I'm glad to take them.

21 CHAIR PETTI: Okay. I'm not hearing any
22 questions.

23 Let me just ask some questions. I'm
24 trying to decide, do we need the full hour for lunch?
25 And I think that, in part, depends on how long we

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1 think the discussions this afternoon will take and
2 whether members want to push beyond that. Do we want
3 to take 30 minutes out of lunch here to assure
4 ourselves we'll get done by 5:30 Eastern? Or do we
5 just want to keep with the hour and hope we're more
6 efficient this afternoon than we were this morning?

7 Members, anybody have --

8 MEMBER HALNON: Dave, this is Greg. I
9 only need 30 minutes for lunch. But my restaurant is
10 right next door.

11 CHAIR PETTI: Yes. Okay. Well, let's do
12 a 30-minute lunch then, and let's come back at 5
13 minutes after the hour, and then, hopefully, it won't
14 drag us too late in the afternoon today.

15 Thanks, everyone. That was a monstrous
16 amount of material to get through this morning.

17 And thanks, Bill and Bill and Boyce. It
18 was good.

19 (Whereupon, the above-entitled matter went
20 off the record at 12:36 p.m. and resumed at 1:05 p.m.)

21 CHAIR PETTI: Okay. Hopefully everyone is
22 back from lunch. It's five after the hour. And let's
23 start talking about AERI.

24 MS. WAGNER: Good afternoon. Welcome to
25 this presentation on Part 53, Framework B, alternative

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1 evaluation for risk insights and Draft Guide DG-1413
2 and DG-1313. Next slide, please. My name is Katie
3 Wagner, and I'm a project manager in the Division of
4 Advanced Reactors and nonpower production and
5 utilization facilities in the Office of Nuclear
6 Reactor Regulation. Next slide, please.

7 So as part of our agenda today, we have a
8 number of presentations. First, we'll go through
9 introductions and recent activities which I will
10 cover. And then Marty Stutzke will cover the proposed
11 AERI entry conditions including the draft proposed
12 real text and FRN sections.

13 Then Keith Compton will present on the
14 evaluation of dose based AERI entry criteria using the
15 MELCOR accident consequence code system which we call
16 MACCS. And then the respective authors will present
17 on DG-1413, technology inclusive identification of
18 licensing events for commercial nuclear plants and DG-
19 1414, alternative evaluation for risk insights or area
20 methodology. Next slide, please. So to briefly
21 introduce -- oh, previous slide, please.

22 Okay. So to briefly introduce my
23 colleagues, Marty Stutzke is the technical lead for
24 the Graded PRA Working Group. He is also the senior
25 level advisor for probabilistic risk assessment and

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1 the division of advanced reactors and non-power
2 production and utilization facilities in the Office of
3 Nuclear Reactor Regulation or NRR. And Keith Compton
4 is the lead for the MACCS calculations related to the
5 AERI entry conditions.

6 And he is a senior reactor scientist in
7 the Division of Systems Analysis in the Office of
8 Nuclear Regulatory Research. We also have with us
9 today Mihaela Biro who is the principle author of DG-
10 1413, technology inclusive identification of licensing
11 events for commercial nuclear plants. And she is a
12 senior reliability and risk analyst in the Division of
13 Risk Assessment and NRR.

14 And our other presenter is Anne-Marie
15 Grady And she is the principle co-author of DG-1414,
16 alternative evaluation for risk insights or area
17 methodology. And she is a reliability and risk
18 analyst also in the division of risk assessment, NRR.
19 And I already introduced myself. Next slide, please.

20 So moving on, this side shows the
21 membership of the Graded PRA Working Group. And as
22 you can see, the working group is composed of over
23 seven technical staff from several divisions of NRR
24 and also receives support from the Office of Research
25 and Dr. Robert Budnitz who is a consultant. And the

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1 membership of the working group is diverse. And so
2 that ensures that the technical questions receive
3 feedback from a variety of points of view. Next
4 slide, please.

5 So to briefly recap recent activities in
6 early summer 2022, the AERI team briefed the ACRS
7 subcommittee. And then a few weeks later on July 6th,
8 we had another briefing with the full committee
9 meeting at ACRS. And then the ACRS issued a letter
10 dated August 2nd, 2022 regarding AERI.

11 And the path forward discussion in late
12 June covered just a few -- or covered a few items
13 including for both draft guides making revision and
14 response to stakeholder feedback including the ACRS
15 and monitoring changes to the preliminary proposed
16 rule text. And for DG-1414 in particular, our group
17 had planned to develop guidance, area maintenance, and
18 upgrades. And now my colleague, Marty Stutzke, will
19 discuss the AERI-related draft proposed rule text and
20 FRN sections.

21 MR. STUTZKE: Good afternoon, everybody.
22 Next slide, please. So as Katie introduced me, I'm
23 Marty Stutzke, the senior technical advisor for PRA in
24 NRR DANU. Next slide, please. This diagram provides
25 kind of the big picture behind AERI emphasizing some

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1 of the regulatory basis.

2 And I wanted to reiterate it to help
3 orient everybody as to how AERI has been constructed.
4 So on the left-hand side of the diagram, you will see
5 some policy statement quotations there. I apologize
6 for the small font size in some cases. But we start
7 out with the policy statement on the regulation of
8 advanced reactors.

9 And in that policy statement, we find the
10 Commission expects that advanced reactor designs will
11 comply with the safety policy statement. So you can
12 see the little arrow going off to develop this
13 demonstrably conservative risk estimate in order to
14 achieve that expectation. Further down in the policy
15 statement, it also notes the Commission has issued
16 policy statements on the use of PRA and severe
17 accidents. It goes on to say the use of PRA as a
18 design tool as implied by the policy statement on the
19 use of PRA.

20 This one is interesting because when you
21 actually read the PRA policy statement, I'm talking
22 now about the box in the lower left-hand corner, you
23 find this very interesting quotation that says, it's
24 important to note that not all of the Commission
25 regulatory activities lend themselves to a risk

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1 analysis approach that uses faltering methods. In
2 general, faltering methods are best suited for power
3 reactor events that typically involve complex systems,
4 and I'll emphasize that, complex systems. The policy
5 segment and we'll talk about the use of other sorts of
6 techniques, for example, integrated safety assessments
7 from material licensees, and concludes with a quote,
8 Commission realizes that a single approach for
9 incorporating risk analyses is not appropriate.

10 MR. BLEY: Marty?

11 MR. STUTZKE: Yes.

12 MR. BLEY: It's Dennis Bley. I like this
13 quote you pulled up. It essentially says event
14 tree/fault tree PRA isn't the only kind of risk
15 analysis you can do. Given that the question that
16 arose earlier seems in need of some further explaining
17 and that is why AERI wouldn't be applicable to
18 licenses under Part 50 or 52.

19 MR. STUTZKE: Yeah, I'll try to address
20 that briefly here. I have to admit I hadn't thought
21 about it a great deal until the question was asked
22 earlier this morning. My personal view, Dennis, is
23 it's kind of a coordination or a priority issue.

24 The Part 50, 52 rulemaking started way
25 back in 2009 which clearly predates NEIMA by a decade

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1 like that, and it received various emphasis. It took
2 a long pause. And finally, in June of this year, they
3 submitted the rulemaking package to the Commission.
4 So it has not yet been issued for notice and comment
5 like that. So --

6 MR. BLEY: I guess what I was getting at
7 is some members of the Committee and they included me
8 when I was a member and still look at PRA as kind of
9 a continuum of more complex and less complex kinds of
10 analysis of risk such that many different approaches
11 can fit under that name. And we seem to have locked
12 into PRA means event trees and fault trees and
13 extremely complex modeling which has been very useful
14 for the large reactors but may not be the best
15 approach for lower power and simpler systems. So it's
16 kind of definitional.

17 And this statement by the Commission seems
18 to agree with that kind of definition. But go ahead.
19 I won't interrupt anymore. I'll let you keep going.

20 MEMBER HALNON: Hey, Dennis. This is
21 Greg. I think I sent you the email. But one of the
22 things I thought of was that if we keep the same entry
23 conditions for an area type analysis, then the whole
24 part of 53 or the facility being as simple and less
25 complex if you will would probably benefit from the

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1 rest of the Part 53 rule.

2 So going under Part 50 or 52 with such a
3 simple facility may or may not be the right call for
4 a design. So I was just thinking through what you
5 were talking about. I think stepping back, 53 and
6 AERI are pretty complementary. 50 and AERI may not be
7 as complementary.

8 MR. BLEY: Yeah, I think so. But as Dave
9 pointed out for the next three or four years or maybe
10 more, that wouldn't be an option if anybody wants to
11 come in.

12 MEMBER HALNON: Yeah, I agree with that.
13 That was a good point.

14 MR. STUTZKE: I would add to it. There
15 are a variety of ways of doing PRA as Dennis noted.
16 And specifically the non-LWR PRA standard provides a
17 way to grade the technical content of PRAs according
18 to where you are in the licensing process.

19 And that was originally how we had
20 approached the problem was, can we grade the technical
21 content by accepting lower capability categories or
22 certain supporting requirements and that sort of
23 thing? And we realized, well, it's already built in
24 to the non-LWR PRA standard like that. The second
25 thing and I agree with what Greg was saying is that

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1 for a plant to come in under AERI, they're already
2 going to meet all the other regulations.

3 In other words, they're going to have
4 principle design criteria and a full set of design
5 basis accident analyses, et cetera, et cetera. That
6 being AERI is not a maximum hypothetical accident
7 approach like we would use for research or test
8 reactors. So in that sense, the purpose of AERI is
9 like the purpose of PRA in that it is providing a
10 confirmatory or a supporting role to ensure you
11 haven't missed anything or I should say to help ensure
12 that you haven't missed anything.

13 As far as about applying AERI over to
14 Parts 50 or 52, I mean, I would just point out Part 52
15 is pretty clear. You have to have a PRA. So an
16 applicant that wanted to go down that path would have
17 to seek an exemption.

18 And as we'll discuss a little bit later in
19 this presentation, while there is currently no
20 requirement to have a PRA for Part 50 applicant, the
21 Commission certainly expects that to be the case. And
22 that's in fact one part of the rulemaking that's
23 ongoing is to require a PRA. So I won't speculate
24 beyond that.

25 Anyway, so let's flip to slide 45. And

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1 the text in the upper portion, the italics text is a
2 quote out of the preamble that's trying to explain
3 AERI would apply to commercial and nuclear plants with
4 relatively straightforward designs. Not overly
5 complex system and notice the same language appears in
6 the PRA policy statement.

7 So not overly complex systems and
8 interactions and accordingly wouldn't warrant the
9 development of PRA to provide the qualitative insights
10 or quantitative insights like that. So the big
11 challenge behind AERI is deciding when it would be
12 permissible to allow a plant to use AERI and
13 accordingly when they would be required to do a PRA.
14 And it centers around this notion of complexity and
15 interactions.

16 And quite frankly, it's been a real
17 challenge to put that down into words about where's
18 the boundary between them. So in the left-hand side
19 of the diagram, you'll see the proposed rule text that
20 we had presented to you all back in June. And then
21 the right-hand box shows what we're currently
22 proposing like this.

23 And you will notice that the entry
24 condition in 53.47, 38.34(ii), it's split into two
25 separate entry conditions, A and B as shown there.

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1 And we have worked on the language to A, but it still
2 retains the essence of dose at a distance. So they
3 acknowledge it partially demonstrates the consequence,
4 et cetera, et cetera.

5 We then added this qualification in B that
6 says, you need to demonstrate that you meet A without
7 reliance on active safety features or passive features
8 except those that don't require equipment actuation or
9 operator action, et cetera, et cetera, like this. So
10 again, that's trying to get at this point of
11 complexity versus simplicity. And I'll show you a
12 little bit later that Qualification B also enables the
13 use of generally licensed reactor operators elsewhere
14 in Framework B. So let's go to slide 46, and I'll try
15 to explain --

16 CHAIR PETTI: Hey, Marty. Just before you
17 go there.

18 MR. STUTZKE: Yes.

19 CHAIR PETTI: The second capital B, I
20 understand passive heat removal. I think I can
21 envision systems that don't require the operators to
22 do anything or any equipment to actuate. But shut
23 down, I can also envision that not requiring an
24 operator. But some equipment, a latch has to be
25 moved. There's some equipment actuation most likely.

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1 Does that mean that those guys can't get in?

2 MR. STUTZKE: I think you raise a good
3 point that we might need to explain better in guidance
4 about what sorts of systems. I certainly didn't mean
5 to exclude the idea of a SCRAM system and dropping the
6 rods in. But it gets very interesting when you think
7 about the distinction between inherent and passive and
8 active.

9 In my mind, clearly the gravity inserting
10 the control rods is inherent based on physical things.
11 But as you pointed out, you need other systems,
12 passive or active, to decide when to shut down the
13 reactor like that. So I find it very hard. I tend to
14 think of it as they're passive components but not
15 necessarily passive systems. They rather seem to be
16 a blend.

17 MEMBER HALNON: Marty, this is Greg. I
18 was going to wait till later. But this term passive,
19 there's no definitely of it. There's no real good
20 explanation of it.

21 So you're always qualifying it with
22 different stuff. Is it time to -- when you're talking
23 about this to define what you mean by passive, you
24 mentioned the GLRO. And back in that section, you
25 introduced a term called self reliant mitigation

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1 facility which is not really defined. It's kind of
2 sort of defined.

3 And now you're mixing that with the AERI.
4 And you're kind of defining it a little bit different
5 but kind of you can kind of make the case that it's
6 the same. I think you might consider taking those two
7 terms, self reliant mitigation facility and passive as
8 it's used in that and consider a very succinct clear
9 definitely so that there's no confusion when you're
10 going back and forth between GLRO, AERI, passive, and
11 that sort of thing.

12 So consider it. I get confused going back
13 and forth when I was trying to read it. And you can
14 kind of make a case that they're closed. But they're
15 not quite the same.

16 MR. STUTZKE: Yeah. Dave Desaulniers, did
17 you want to add something to the conversation? Or
18 Maybe Jesse Seymour? You'll get a whole explanation
19 on self reliant mitigation facilities tomorrow when we
20 talk about the operator licensing.

21 MEMBER HALNON: Yeah, we can wait to talk
22 a little bit in detail then. But I just wanted to lay
23 that out there because Dave brought up the passive
24 issue. Again, in our regulations and guidance, I
25 never really find a good definition of passive. And

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1 you mentioned inherent.

2 But in this thing, it talked about
3 passive, but you can't have any active portions of
4 that. Well, it should be part of the definition of
5 passive. But there's nothing active.

6 MR. STUTZKE: Yeah, and we have looked at
7 IAEA guidance trying to get some ore clarity. But
8 I'll take that one back.

9 MEMBER HALNON: And we can talk more in
10 detail about it tomorrow. But if you need some cross
11 referencing, I can show you where got more confused in
12 the license operator portion.

13 MR. STUTZKE: Certainly. Jesse, do you
14 have a comment?

15 MR. SEYMOUR: Yes, Marty. I was just
16 going to add on. This is Jesse Seymour from the
17 operator licensing and human factors branch. And just
18 that we do intend to talk a little bit more about the
19 Framework B GLRO criteria and specifically the
20 criteria that apply to non-AERI and AERI facilities
21 within that context as well as what the underpinning
22 bases are really for all the criteria.

23 So tomorrow, we'll get into that. The
24 criteria look different depending on whether or not
25 you're talking about Framework A, Framework B, or

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1 AERI. But what are the underlying objectives and what
2 are we trying to achieve there?

3 So yes, we'll dig into that. It is -- I
4 will say it's something that we continue to think
5 through and to discuss as we approach this problem.
6 And Marty and I have spent a lot of time talking about
7 what is the objective and what are we really trying to
8 achieve and exclude here.

9 What I would say is that our focus with
10 these words had really been to try to narrow things
11 down to safety features that were of a robust passive
12 nature, again, another undefined term. Or things that
13 were inherent, again, to try to -- and Marty, please
14 feel free to chime in if I mischaracterize that. But
15 really what we're, I think, trying to do here is to
16 say that in a relatively uncomplicated fashion that
17 has a very, very low probability of failure that this
18 facility would weather this event and still remain
19 within it's radiological consequence criteria, right?

20 And so that conceptually is very simple.
21 But again, the devil is in the details when you try to
22 put that into words. And one of the areas we found to
23 be something that's a complicating factor is when you
24 start trying to get into a definition for inherent, a
25 definition for passive, right, that these are areas

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1 that -- again, there is a bit of a lack of good
2 definition in some regards there. So Marty, that's
3 really all I had to add.

4 MR. STUTZKE: Yeah, thanks, Jesse. Let's
5 go to slide 46, please. As we had discussed back in
6 June, the original consequence criteria and the AERI
7 entry condition, the dose distance criteria, we're
8 inspired by the EPA PAGs. And to be fair, the EPA
9 PAGs are actually used to respond to actual events.

10 And in contrast, the AERI entry conditions
11 are talking about postulated events used to establish
12 the licensing basis. So there's been some concern
13 that we're inappropriately leveraging the PAGs for a
14 purpose that they weren't originally intended for.
15 Moreover, the PAGs aren't limits.

16 From a quote out of here, it says the
17 trigger points for taking protective actions, they're
18 not just limits that cannot be exceeded. So we don't
19 want to take them out of context. And last but not
20 least, we don't want stakeholders to misconstrue that
21 the proposed AERI entry conditions imply that it's
22 acceptable to ghost the public.

23 So we've had extensive conversations
24 between NRR DANU and NSIR, our Office of Nuclear
25 Security and Incident Response like that to arrive at

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1 the current rule text that I showed you on the
2 previous slide like that. And made a number of --
3 I'll be honest -- late night changes to the preamble
4 and to DG-1414 to incorporate those types of changes
5 like that. In a few slides, I'll hand over the
6 presentation to Keith Compton who's going to show you
7 some MACCS calculations that he's done that are
8 looking at the suitability of the AERI entry
9 conditions and some interesting things.

10 But in the second part of this view graph
11 as Jesse had explained before, the idea is to enable
12 operator licensing like this and specifically the use
13 of generally licensed reactor operators like that.
14 And I'll refer you to their white paper, the human
15 practice white paper and which in term cites DOE
16 Handbook 1224 which talks about how to perform hazard
17 and accident analysis. And you'll see a lot of the
18 same terms in there with systems that are designed to
19 survive the event, that type of language. Next slide,
20 please.

21 In addition to allowing an applicant to
22 perform an area in lieu of a PRA, the AERI entry
23 conditions were also proposing they would be used to
24 determine when an applicant would need to address the
25 mitigation of beyond design basis events in 53.44.20.

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1 In other words, if they met the AERI entry conditions,
2 that requirement would not need to be satisfied, and
3 similarly, combustible gas control requirements in
4 53.47.30(a)(7) like that. And this we discovered in
5 talking that the proposed AERI entry conditions in
6 combination with other conditions would be used to
7 determine when a plant is a self reliant mitigation
8 facility that enables the use of GLROs.

9 MEMBER HALNON: Marty, this is Greg. Just
10 real heads up for Jesse for tomorrow. Take a look at
11 the language here. It says may have generally -- may
12 have GLROs.

13 The language in 800 kind of alludes to me
14 that it's required to have GLROs if you meet that. So
15 when we get to the discussion tomorrow, we can talk
16 about that. Maybe I'm reading it wrong.

17 MR. SEYMOUR: Yes, this is Jesse. And so
18 just to confirm -- and I apologize if there's a
19 discrepancy in there. The structure of the rule
20 language is such that when the criteria are met, those
21 facilities must be staffed by GLRO.

22 So it's not an option. It's actually like
23 a conditional break point where facilities on one side
24 of the line have traditional SRO and RO staffing.
25 Facilities on the other side of the line, the so-

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1 called self reliant mitigation facilities have GLRO.

2 So again, in earlier versions, it had been
3 option. And I apologize if that carried forward.
4 It's now, like, a mandatory divide between the two.

5 MEMBER HALNON: Okay. So the slide is not
6 right, but the language is correct?

7 MR. SEYMOUR: That's correct.

8 MEMBER HALNON: Thank you.

9 MR. STUTZKE: Yeah, I apologize, Greg.
10 It's hard to keep up sometimes.

11 MEMBER HALNON: I get it.

12 MR. STUTZKE: Okay. Slide 48, next slide.
13 We've added rule text that I don't believe we
14 previously discussed with the committee on the
15 maintenance of risk evaluations. That's patterned
16 largely out of 50.74(h).

17 And I provided the rule text here. But
18 one thing I wanted to emphasize in the slide is the
19 difference between maintenance of risk evaluations and
20 the upgrade of risk evaluations. They have very
21 precise definitions.

22 I provided them to you below from a non-
23 LWR PRA standard. And those definitions are the
24 result of a multi-year discussion among the standard
25 developers, the Joint Committee on Nuclear Risk

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1 Management, or JCNRM. But the idea is that -- okay,
2 so I go to the second definition.

3 So PRA upgrade, a change, and the PRA now
4 requires that you apply one or more supporting
5 requirements at a higher capability category and
6 things like that. Items that haven't previously been
7 peer reviewed in the PRA, the use of a newly developed
8 method or method in a different context, that sort of
9 thing. But what's key to understanding PRA upgrades
10 is the standard requires that they be peer reviewed.

11 In contrast, PRA maintenance, if anything,
12 that it's not an upgrade. And the standard does not
13 require that they be peer reviewed. For example, if
14 you're merely incorporating operating experience into
15 your PRA, the assumption is that the methods for
16 performing the data analysis have already been peer
17 reviewed and you're simply exercising those methods
18 like that.

19 So we tried to stay away. We've not used
20 the term PRA update because that's vague. You need to
21 think in terms of maintenance or upgrade. Anyway,
22 enough on that. Next slide, please.

23 These are the questions that we are
24 proposing to incorporate in the Federal Register
25 Notice to seek comment from the public. And

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1 understood, earlier, Dave, that the committee or
2 individual members might provide some feedback as
3 well. And that would be wonderful to us.

4 So first question is probably asking,
5 should we even retain the AERI approach under
6 Framework B? Remember that AERI is a change in the
7 Commission's policy. It currently requires all plants
8 to do PRA.

9 And if so, should we change the proposed
10 criteria or the approach like this? And we're looking
11 for some constructive feedback. Please tell us why
12 you want to do this and how it can be changed and
13 things like that.

14 MR. BLEY: Marty?

15 MR. STUTZKE: Yeah.

16 MR. BLEY: A process question for you. If
17 you keep it, do you have to go up to the Commission
18 with a policy paper beforehand or just setting the
19 rule up with this in it is sufficient?

20 MR. STUTZKE: Well, realize the rule is
21 transmitted through a SECY paper. And that will be a
22 policy statement. And we have in addition to AERI,
23 there's some other policy-related issues that the
24 Commission will have to decide upon and direct us.

25 MR. BLEY: Okay, thanks.

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1 MR. STUTZKE: So it's all done at one
2 time. The second thing is are there other ways that
3 we could leverage the AERI entry conditions, for
4 example, physical or cyber security, access control,
5 things like that. If so, what programs and how could
6 we do it? Do we need to change the proposed rule text
7 to enable that, things like that. And the third
8 bullet goes back to the idea of the criteria and using
9 them to use generally licensed reactor operators.

10 MR. BLEY: Another question, Marty. Since
11 you came out with AERI the first time, have you had
12 any public meetings with interactions with
13 stakeholders? And if so, have you heard anything back
14 on the entry conditions? Are there places where
15 people have rationales for you to maybe weaken the
16 entry conditions somewhat?

17 MR. STUTZKE: We have heard a comment that
18 the AERI entry conditions are overly conservative in
19 the sense that the concern is that they may be so
20 prohibitive that nobody could actually meet the entry
21 condition.

22 MR. BLEY: I call that restrictive. But
23 conservative would imply there's a safety reason why
24 they should be less restrictive. Has anybody tried to
25 testify that to you?

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1 MR. STUTZKE: No, we've heard the comment
2 and the notion that there are other ways of doing risk
3 evaluations other than PRAs. But nobody has suggested
4 changing the dose distance criteria to something more
5 generous or replacing it with some other text.

6 MR. BLEY: I was just curious about that.
7 Thanks.

8 MR. STUTZKE: So with that, I shall turn
9 the presentation over to Keith Compton. He will
10 describe his confirmatory MACCS calculations. And
11 hope you enjoy a technically oriented break from all
12 of the discussion of rule text. So Keith, you're up.

13 MR. COMPTON: All right. Thank you. This
14 is Keith Compton from the Office of Research. I'm
15 going to turn my camera on very briefly so that you
16 can see me. I'm going to then turn it off because of
17 bandwidth and because my monitor -- I'm not going to
18 be facing my monitor. And you would just be looking
19 at the side of my head for the rest of the
20 presentation.

21 So all right. So yes, so I'm going to
22 talk today about some work that I had done to examine
23 the relationship between the dose at 100 meters and
24 the latent cancer fatality risk when quantified over
25 ten miles which was conventionally the metric that

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1 would be used to assess the safety goal. So could I
2 have the next slide, please. So yeah, so this
3 presentation, by the way, is going to be very narrowly
4 focused.

5 I'm not going to be talking more broadly
6 beyond what the implication is. This is simply if you
7 know the dose at 100 meters, what do you know -- how
8 much do you know about what the ten mile average
9 cancer risk is? And the way I'm going about doing it,
10 and this is building off the work that Marty had done,
11 is the first thing I did is to come up, just reproduce
12 a close form analytic approximation which is building
13 off of what Marty had done.

14 The advantage of that is that when you do
15 a derivation, you have to identify your assumptions in
16 order to justify. So now that allows me to figure out
17 how that simple approximation might translate into a
18 more complex simulation. So therefore, what I would
19 then do is just look at all those different
20 assumptions and examine them using MACCS.

21 So instead of using the closed form, just
22 use MACCS to see to see what answer MACCS will give
23 you. One thing that's very important, all the
24 analyses and the results that are in this
25 presentation, they're where we are now. There's still

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1 work to be done.

2 We're still error checking. We're still
3 making sure we're working on the right questions. But
4 I would emphasize that this is not the final work.
5 Next slide, please.

6 So in order to come up with an expression,
7 and I'll give the expression in a few slides. There's
8 a certain number of assumptions that I have to make.
9 One is that I am doing this assumption.

10 I don't include doses to individuals from
11 ingestion. I can explain why that's kind of
12 challenging. But it's consistent with how we would
13 typically quantify the individual latent cancer
14 fatality risk.

15 The second assumption is that the maximum
16 individual dose at any distance R is assumed to be
17 related to the dose at R_0 following a power law. And
18 this is important because if you know the dose at one
19 point and you know the functional relationship, then
20 principally, you know the dose everywhere. The next
21 assumption is that the material is released in a
22 single plume.

23 And the reason for that is that you have
24 to have some -- you have to understand how the dose
25 varies, not simply radially away from the site but

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1 also how it would vary off the centerline. But
2 typically, the max dose is on the centerline. But
3 that is not the does across the entire 360 degree
4 mark.

5 We assume the population density is
6 constant. That is independent of distance. And then
7 finally we've made the assumption that the latent
8 cancer constant -- the risk constant is -- it's
9 constant and it's independent of does. So next slide,
10 please.

11 So now here -- and as we get through the
12 presentation, you'll see this is where most of the
13 interest is. The -- in order for the dose to fall off
14 with a 1 over n kind of relationship, there's certain
15 assumptions that are kind of implied by it. One of
16 them is that the does needs to be at ground level and
17 non-buoyant.

18 In other words, it's not rising above the
19 point of release or it's not released essentially
20 above a receptor set. And the reason -- and I'll have
21 slides that will illustrate the effective model is
22 that if you have an elevated release or a buoyant
23 plume, your dose actually can increase with distance
24 until the plume impacts the ground and starts
25 decreasing. So that can -- that would violate the

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1 assumption used to develop the approximation.

2 Second is that protective actions to limit
3 dose are not taken. So this analysis assumes that
4 you're not trying to take protective actions. And
5 again, the reason is that protective actions have the
6 effect of constraining the dose and making the
7 relationship between atmospheric concentration and
8 dose, it breaks it.

9 In other words, if you take protective
10 actions, you'll preferentially eliminate or reduce
11 high doses. The third bullet is -- or the third
12 assumption is that the plume is completely reflected
13 at the ground and it's also unconstrained by a mixing
14 height. And in the atmosphere, there's typically --
15 there's a boundary layer.

16 And at short ranges, the plume does not
17 fill up that boundary layer. But at longer distances,
18 the plume can expand large enough that it will reach
19 an inversion layer and start mixing vertically. And
20 so you no longer have a Gaussian distribution in the
21 vertical.

22 And I've got, again, some things to
23 illustrate that. And finally, the reduction
24 coefficient is assumed to be the dose -- the dose
25 reduction coefficient is assumed to be independent of

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1 distance. And I'll show some examples of when that is
2 and is not true.

3 CHAIR PETTI: I had a question here. I
4 always thought that elevated releases resulted in less
5 dose than ground level releases. But your rationale,
6 is this just a relative term? It's a relative
7 increase in concentration if the same material was
8 released at ground level?

9 MR. COMPTON: Yes, and I'll show you
10 something that maybe illustrates that point. The
11 point is that -- well, I'll address that when I get to
12 the slide which is I think --

13 (Simultaneous speaking.)

14 CHAIR PETTI: Okay, okay, great. Thanks.

15 MR. COMPTON: Sure. Next slide, please.
16 Okay. That actually was the next slide. So again,
17 the idea is that if you have an elevated release, your
18 -- and if you can imagine, let's say you had -- now
19 this was a buoyant plume. This is a plume that had I
20 think 19 megawatts of energy. So it was very highly
21 buoyant.

22 I think that's how I generated these
23 curves. But what it shows is that for most of the
24 curves at short distances -- and this is -- the scale
25 is in kilometers. In short distances, the dose is

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1 lower than it is as you get downwind.

2 And that's because the plume is basically
3 overhead. The ground level concentration is if not
4 zero, it's something very, very low. And then as the
5 plume continues to move away and grow, then eventually
6 the plume will contact the ground. The ground level
7 concentration will start rising.

8 That is a function of the stability class,
9 in other words, a very unstable condition which is the
10 blue or marked A, grow very rapidly. So they fill up.
11 They basically rapidly get to a uniform -- more or
12 less a uniform distribution in the vertical if you're
13 highly stable which normally would lead for ground
14 level releases to high centerline concentrations.

15 It's still a high centerline
16 concentration, but it's also keeping it from hitting
17 the ground. So you have to go further and further out
18 before you get your ground level concentration. So
19 any questions on this slide?

20 Because this is kind of the key point. If
21 you have a -- and I have a sensitivity where I looked
22 at it. If you anchor your dose at 100 meters and then
23 your dose increases with distance as opposed to
24 decreasing the distance, you can see that you may have
25 problem. I see a hand raised. I don't know who.

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1 MEMBER BIER: Yeah, Vicki Bier. I have a
2 question not on this slide but on the previous
3 assumptions. I understand the reason for assuming
4 uniform population density. But it seems to me not
5 implausible that population density would actually be
6 quite a bit higher at ten miles than right at the
7 plant boundary. And have you looked at that also as
8 sensitivity?

9 MR. COMPTON: Yes, and I do -- well, yes,
10 my last -- and well, I've looked at it a couple of
11 ways, some of which is in the presentation, some of
12 which I wasn't able to get it into a form ready to
13 assemble. But yes, I ended up with a sensitivity
14 where I just put in an actual site population
15 distribution because typically --

16 MEMBER BIER: Okay.

17 MR. COMPTON: -- population would --
18 typically population density increases with distance.
19 I would note the interesting thing about this is that
20 depending on the application if you had, let's say, a
21 very remote site, it could be that most of your
22 population might be close and not further away.

23 MEMBER BIER: Sure. Thank you.

24 MR. COMPTON: Sure. And the importance of
25 population is that essentially it's a waiting function

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1 on the average dose. If most of your population is
2 clustered away, it's going to -- the average dose will
3 be lower. If it's concentrated close, then it'll
4 weight the doses closer. Okay? I see another hand
5 up.

6 MR. BLEY: Yeah, this is Dennis, Keith,
7 Dennis Bley. I don't know if you were here early in
8 the meeting. If you were, you heard Vesna offer a lot
9 of issues with respect to the QHOs. And the biggest
10 areas here were in the consequence calculations. I
11 guess I would say I've done some PRAs that have
12 carried them all out to eventual consequences and
13 others have done that too.

14
15 But can you address the amount of
16 uncertainty in the consequence calculation, especially
17 given the assumptions you mentioned earlier, and any
18 way to determine if this calculation the way it's done
19 currently is a near bounding calculation? Or is it
20 kind of an estimate of central tendency? Can you say
21 anything about that?

22 MR. COMPTON: I can say something about
23 it. Whether it'll be satisfactory or not, I don't --
24 but I'll speak briefly about it. With respect to
25 whether -- well, I'm not going to -- I won't weight in

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1 to -- I'm not going to weigh in on the QHOs and
2 whether one should use or should not use the QHOs.

3 So in terms of uncertainties from a purely
4 scientific predictive point of view, yes, there are
5 uncertainties obviously. Now this is going to be a
6 judgment on my part. But some of the uncertainties
7 that I would consider to be worth recognizing is that
8 there are uncertainties in any atmospheric dispersion
9 calculation, whether you do it for QHO purposes or any
10 other purposes.

11 But those could be noticeable. Also,
12 there are uncertainties in cancer risk estimation
13 obviously, particularly at low doses. There are
14 uncertainties particularly for calculating kind of a
15 long term dose.

16 There are uncertainties associated with
17 what are the actions that people might take in
18 response to an accident. So there's clearly an
19 uncertainty there. The one thing that I would note
20 that those -- how to put it. There are what I would
21 consider to be fairly accepted methods for addressing
22 those. We have accepted methods for doing atmospheric
23 dispersion calculations.

24 And so from that perspective, I would say
25 the models, for example, are used in MACCS are

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1 reasonably consistent with what other decision support
2 models would use, the same with cancer. There are
3 methods that have been used to -- in fact, so for
4 example, the does coefficients that are used in MACCS
5 and the risk coefficients are -- these are consistent
6 with the approaches used in SOARCA with Federal
7 Guidance Support No. 13. And then for long-term
8 protective actions, this is something that we've
9 acknowledged is that we use -- we typically use the
10 intermediate phase relocation criteria as a surrogate
11 for return criteria, recognizing that decision would
12 be more of a political and social decision.

13 So now in this analysis, again, what I'm
14 trying to do is compare if you calculated a dose --
15 using the same methods, if you calculated the dose at,
16 say, 100 meters and then using methods that are kind
17 of consistent with how we would calculate it for, say,
18 the Level 3 PRA or any NEPA analysis, what answer
19 would you get? So in a certain sense, it's a little
20 bit narrower. If you calculated the dose using the
21 methods that we would typically calculate, what would
22 be the ten mile cancer risk also using the assumptions
23 and methods that we would typically use? Does that
24 make sense?

25 MR. BLEY: Yeah, that's pretty good. I

1 appreciate it. I'd just make two comments. One, the
2 dose side of the issue, at least for low doses, is
3 certainly an area fraught with some uncertainty. On
4 the dispersion side, I have one example that I found
5 pretty interesting.

6 Back when they invented the TMI
7 containment, some colleagues of mine at the time were
8 using models that are predecessors of the ones you're
9 using today. But they were predicting where that
10 release would go and had people up in a helicopter
11 chasing it. And the predictions were pretty darn
12 close to reality. That gave me a lot more confidence
13 than I had previously. But go ahead.

14 MR. COMPTON: Okay. And one thing, one
15 could have an entire separate meeting on the accuracy
16 of dispersion models. I would note that that has been
17 talked to by the American Meteorological Society, the
18 accuracy of Gaussian models. And the other is that
19 we've also independent of this work, we've done some
20 recent work using a more state of practice model
21 called HYSPLIT. And we're finding that the Gaussian
22 model kind of in an average sense does not do terribly
23 badly.

24 MR. BLEY: And there are specific kinds of
25 locations where you get things that override that

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1 quite a bit like lake effects and the like. That's
2 good. Thanks.

3 MR. COMPTON: Yeah, okay. I see another
4 hand up.

5 MEMBER DIMITRIJEVIC: This is Vesna. I
6 have actually my least concern is about dispersion
7 which you said it's the main thing. That's absolutely
8 not what I think is main source uncertainty. And I
9 appreciate all the developments in that.

10 In addition to those, the other important
11 factor is timing. So my question is for how long
12 time? This exposure in the cancer calculation all
13 considered to come from plume? And what is the timing
14 of that exposure?

15 So that's my question when it comes to
16 cancer facility because as much as I saw Level 3 PRA,
17 the cancer facility main exposure comes from land
18 contamination and then the different timing related to
19 that. And I assume that this is also part of the
20 MACCS calculation. So my question is about time of
21 exposure. Is it all related to plume?

22 MR. COMPTON: Well, and I'll speak when I
23 get to the actual cases. I'll speak to the
24 assumptions that I made. But just briefly, the
25 calculations that I will do just assumed that you had

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1 a release.

2 I use a 96-hour exposure period for the
3 early phase, the plume phase which is more than enough
4 for the plume to pass buy and deposit. And then I
5 used -- and again, this is consistent with the Level
6 3. I used a 50-year exposure period to represent the
7 long-term dose.

8 And then the dose and that long-term
9 period is -- typically it's dropping because both
10 radioactive decay and there are functions that we use
11 in MACCS to represent the effects of environmental
12 weathering on both the reduction in groundshine dose
13 and the resuspension dose. And those are --

14 MEMBER DIMITRIJEVIC: So for this long-
15 term exposure for 50 years, you assume there is no
16 cleaning of the land done. Or what did you assume on
17 evacuation? And do you assume how long people
18 evacuate and when do they return? Do they leave
19 there? I mean, there is so many questions I have
20 about that.

21 MR. COMPTON: Sure. Well, and I think I'm
22 going to -- I think I'll move on because I think that
23 I will have addressed those in the further slides. So
24 for example, I assumed no evacuation. So --

25 MEMBER DIMITRIJEVIC: So this much I think

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1 of main sources of uncertainty, not this great
2 mathematical model you have for dispersions. I don't
3 really care about that uncertainty. I haven't said --
4 I can estimate those with acceptable level of
5 uncertainties.

6 But everything which comes after that, I
7 have a -- also, the land (audio interference).
8 Feedback, but my main concern is not with this
9 mathematical models. I think they have the dose
10 calculation.

11 I think that you have acceptable levels of
12 uncertainties there. All my main uncertainties come
13 from these further assumptions. So the land
14 contamination and what happened in the 50 years of
15 that, about where the factors and things like that.

16 MR. COMPTON: Okay. Well, and I'll move
17 on. And hopefully I will at least speak to some of
18 those. I don't know if I will answer all the
19 questions. But why don't we go on to the next slide
20 because I might have something that addresses that.

21 Yes, actually the next one. So this is
22 just illustrating the effect of protective actions --
23 modeled protective actions I would say on both early
24 and late phase doses. This is actually out of the
25 recently published Level 3 PRA that's been put out as

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1 a draft for comment.

2 But it shows on the left you see what I
3 did is I pulled out the dose versus distance on the
4 left to the non-evacuating cohort. So that's for the
5 early phase and on the right to the light phase
6 cohort. And so what you can see is that I'm going to
7 pick up the right first is that in MACCS the
8 protective actions -- the MACCS will do whatever is
9 needed to ensure that the habitability criteria are
10 met.

11 In other words, they have acceptable dose
12 levels. And the effect of that is that it keeps the
13 dose -- it essentially constrains the dose to be more
14 or less flat until you get to the point where you're
15 not needing to take protective actions anymore. So
16 you can kind of see that.

17 You can see that for some of the release
18 categories it was not very high close end. But it
19 just didn't fall. Whereas for some of the more lower
20 magnitude release categories, it was projecting that
21 protective actions weren't needed and they kind of
22 fell in the more typical fashion.

23 On the left, it shows the effects. Now
24 this was relocation. So -- and again, this was for
25 the non-evacuating cohort. So if you -- essentially,

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1 it's showing that if you didn't -- if they were
2 exposed to the plume, the dose drops off with
3 distance.

4 But if you are able to relocate them
5 before the bulk of the plume had arrived, you could
6 actually -- you would kind of flatten out the curve.
7 I don't know if you can see some of the -- there's a
8 few figures there that are a little bit flat. The key
9 thing -- I don't want to go into detail on all these
10 results. But they just illustrate that protective
11 actions tends to flatten those and result in a lower
12 dose drop off. And then that would affect obviously
13 the derivation. So next slide.

14 So now the next thing that I talked about,
15 the things that could cause the dose not to drop off
16 in a $1/r$ to the n fashion is that if you have a
17 mixing height that the plume can expand beyond. And
18 so the figures on the right which I understand that
19 you can't read, but they're just illustrations of some
20 typical mixing heights that you would get across the
21 United States. And so what you get it the mixing
22 heights in the morning can be anywhere from 300 to 900
23 meters, and mixing heights in the afternoon after
24 you've had the insulation and sun exposure can be
25 anywhere from 800 to 2,600 meters.

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1 The figure on the left shows the standard
2 deviation of the Gaussian plume as a function of the
3 different stability classes. So again, the blue is
4 Class A, highly unstable. What you see is that it
5 rapidly vertically mixes.

6 And so it's going to start -- it's going
7 to essentially hit the cap and start -- then your
8 reduction is not going to be as fast as you have
9 sequentially more stable conditions. You may get to
10 the point where you go out a long distance and you
11 still have not vertically mixed. All right. Next
12 slide. Now the assumption that the power law
13 coefficient would be constant, these are just some --
14 these are the -- some of you may be familiar with
15 these.

16 These are the Pasquill-Gifford diffusion
17 coefficient curves. And what you can see if that
18 transverse dispersion, dispersion in the cross wind or
19 y-direction, it's pretty much a straight line on a
20 log-log plot. So you can represent those curves with
21 a single value for N.

22 But vertical dispersion generally doesn't
23 follow a power law. And so you can see that they're
24 not straight lines. That's the only message to take
25 off of this is that you can't -- vertical dispersion

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1 which would affect the dilution afforded by dispersion
2 is not necessarily going to be represented by a single
3 constant.

4 Under certain conditions, it's not bad.
5 But it's not a uniform thing. Okay. Any questions on
6 that? I don't see any hands. So we'll go to the next
7 slide.

8 Now one other thing that as I mentioned,
9 you have to -- if you have the downwind dose and the
10 rate that it drops off with distance, your problem is
11 not fully specified. You also have to specify how the
12 dose varies off the centerline. Now one could simply
13 just assume that the plume fills in to one 22.5 degree
14 sector, in other words, 1/16th of the arc. So you
15 could model those just as a top hat.

16 What I tried to do is to model the actual
17 kind of average concentration at a certain radius by
18 just averaging the Gaussian over the circumference of
19 the circle. So I'm not going to go into this slide in
20 a lot of detail other than you do have to -- you have
21 to make some kind of assumptions. And one of the
22 things that I'll point out is that if you have
23 multiple plumes meaning that everything doesn't come
24 out in one pulse, your distribution azimuthally is not
25 going to be Gaussian anymore.

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1 So it makes it hard to do the derivation.
2 But this is all a part of what we're trying to come up
3 with, come up with the analytical approximation. Next
4 slide, please. So this is -- there's not a lot on
5 this slide other than to basically say provided that
6 you have met those various assumptions, you can
7 develop a closed form solution. So you can look at
8 how the -- basically, all you're doing is you're
9 calculating the average.

10 You're taking a dose at one point and then
11 calculating it as an average over a region. And
12 provided that your assumptions hold, the analytics
13 should be the same as the numerical. And then if you
14 have the average dose and you know the cancer risk per
15 unit dose, then you can calculate a cancer risk.

16 And the nice thing about this
17 approximation is that you can calculate it any given
18 set of distances. It's not dependent on being -- the
19 inner distance being 100 meters or the outer distance
20 being ten miles. So nothing more about that other
21 than this is the equation that I'm using to compare
22 MACCS to the analytic. Next slide, please.

23 Okay. As I mentioned, what I did is that
24 I developed a set of MACCS modeling cases. I'm going
25 to be going through those to examine the impact of

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1 those various assumptions. I'm going to use some
2 source terms from the Level 3 to represent some
3 different source term characteristics.

4 And kind of this is the key to the
5 methodology is that I basically scale the size of the
6 release to get exactly 25 rem lifetime dose at 100
7 meters. So I do that by basically taking the source
8 term with the full size core and then just calculate
9 how much smaller would it need to be in order to get
10 to 25 rem dose. I would mention that I did this on 25
11 rem, not on the PAGs.

12 I've got a slide that speaks to that at
13 the end. And then last bullet is that I used just
14 combinations of constant weather conditions, constant
15 population density. And then I used some SOARCA
16 meteorological files and site files to look and sett
17 how much the answers would change if you put something
18 more realistic in. Next slide.

19 So the source terms that I used, so as I
20 mentioned, all of them were inventory scales to get
21 exactly 25 rem dose. The base case plume is an
22 interfacing systems LOCA, then I have a few others
23 that I'm using as sensitivities to see if different
24 types of source terms cause the results to be
25 different. And these are just some characteristics.

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1 And one of the things that may be worth
2 noting, I mean, this is -- these source terms
3 obviously were developed for a large light water
4 reactor. They're not source terms that would be used
5 for a non-light water reactor or basically any other
6 technology. But what they do is they offer a range of
7 source term characteristics that might impact my
8 analysis.

9 In other words, I've got some that are
10 very early, some that are fairly late. I've got some
11 that have a relatively short duration. It's a short
12 duration release, some that are much more prolonged
13 release.

14 So the -- and some that are relatively
15 more enriched in noble gases and some that have
16 relatively more volatile fission products. So the
17 idea here is not to try to claim that I've covered
18 every possible source term. But I wanted to get a
19 diversity of source terms that kind of cover the
20 attributes of a source term that could affect the
21 results. So next slide.

22 And then so here are the cases that I
23 looked at. So I start off with a case which is
24 designed to be as close as possible to use MACCS to
25 mimic the assumptions that I made in doing the

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1 derivation. I set the boundary layer heights to its
2 maximum height.

3 I used an approximation which allows me to
4 use just a straight power law. And I'll talk about
5 that more. But the idea is that I start with as
6 simple as possible and then I start adding complexity
7 in.

8 So Case 1 goes in and uses the Pasquill-
9 Gifford stability classes and a few other things. And
10 then I look at the effect of having a buoyant plume.
11 And then I look at the impact modeling like effects.

12 So you can read down through here. But
13 the idea is just to sequentially add things such that
14 by the end, I've got something which is a little bit
15 more representative of how we would model an actual
16 source term. I'd point out that the -- in Cases 0
17 through 4, those are modeling single stabilities at a
18 time, in other words, A stability, B stability, A
19 through F.

20 When you start weather sampling, obviously
21 you have a wide range of stabilities. So there are
22 other -- the cases are very -- on other attributes
23 besides stability. Okay. Next slide. And all the
24 rest -- basically, the rest of the -- most of the rest
25 of the presentation is going to be a slide like this,

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1 just with the different assumptions. So the simplest
2 case, they used a power law.

3 They have constant weather conditions. It
4 was A through F, constant wind speed, no rain, very
5 high mixing layer because I didn't want it to reflect
6 constant deposition, velocity. I'm not going to read
7 through all these. But the idea is that they're
8 supposed to be very simple.

9 Fitted n, there's a column that says the
10 P-G N and the fitted n. The P-G N is what kind of
11 theoretically you would expect the dose reduction
12 coefficient, if it was purely following Pasquill-
13 Gifford power law. The fitted n is when I ran the
14 model and I just fitted a power law representation to
15 the curve.

16 And those curves by the way for each of
17 these cases there are some selected dose versus
18 distance curves as supplemental slides in case we
19 wanted to refer to them. And for each one, you see
20 that the overall, the dose, the combined early and
21 prompt phase dose is exactly 0.25 sieverts or 25 rem.
22 And then this gives you a scale so that you get that
23 overall dose, what is the early phase dose?

24 What is the prompt phase dose? And then
25 what is the -- the next column is what is the ten mile

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1 cancer fatality risk? So again, the overall dose,
2 first column, the ten mile cancer risk is in the
3 fourth column.

4 And then the second to last column is the
5 results of the analytic calculation. And then the
6 final column is the difference. So just a few things
7 to observe about this slide is that I can get -- I'm
8 getting different -- for a variety of reasons, but at
9 least because I get different values of n for
10 different stability classes.

11 I get different ten mile cancer risk
12 results from MACCS. But all of them are less than 2
13 times 10 to the -6. And the differences -- the
14 approximation ranges from very good for stable
15 conditions, OF. That's at 3.6 percent degree
16 difference.

17 It's off for unstable conditions. I
18 believe that's largely due to the effect of the
19 vertical -- effect of the cap. But I'm still trying
20 to understand why is it not exactly right and is it
21 for explainable reasons. So next slide.

22 I'm going to do something very similar.
23 But I make the boundary layer something a little bit
24 more reasonable, 1,000 meters. I use the non-
25 spatially constant power law coefficient. I'm using

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1 Kotechek (phonetic) as just -- it's a piecewise
2 approximation to the vertical dispersion coefficient.

3 So those are implemented into MACCS. My
4 deposition velocity, I let it be based on what the
5 results that were associated with that source term
6 were. Instead of using an effective dose cancer
7 coefficient, I use the organ specific cancer
8 coefficients.

9 So that's the difference from the simplest
10 case but still single stabilities. And so again,
11 observations, the 25 rem lifetime dose because ten
12 mile cancer risks ranging from $1.4e-7$ to $3.3e-7$. The
13 difference between the MACCS and the analytic
14 calculation ranges between 40 percent and 264 percent.

15 Again, the analytic calculation seems to
16 be conservative with respect to the MACCS calculation.
17 The short way to see if it's conservative or not is
18 that if the percent difference is positive, the
19 analytic calculation is higher. If it's a negative
20 number, then the analytic calculation is lower.

21 But again, all the cases produce a cancer
22 risk that's below 2 times 10^{-6} . And I should
23 emphasize this is -- these are all conditional
24 results. So when this is 2×10^{-6} , this is not
25 multiplied by any kind of frequency.

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1 This is a risk that is basically the --
2 it's the average cancer risk among the ten mile
3 population given that you have the source term. All
4 right. Next slide. So now I look at plume buoyancy.
5 And if you recall, I said that you if you fixed your
6 calculation so that you get a 25 rem dose at 100
7 meters, you got there because you had plume buoyancy
8 and essentially your plume might've been overhead at
9 that point.

10 Your ten mile cancer risk could be higher.
11 And you would kind of expect that. If you anchor at
12 the same anchor but then let it increase instead of
13 decreasing, you'll get a higher average dose and a
14 higher average risk.

15 So again, it ranges between $2.5e-5$ to
16 $6.1e-3$. The approximation -- the analytic calculation
17 is anywhere from negative -- I should've said -38
18 percent to 566 percent. The key is that the analytic
19 can be either conservative or non-conservative.

20 What you do see is that the fitted value
21 for n can be negative which implies that on average
22 the dose is increasing which, again, makes sense if
23 you look at the figure of plume rise that
24 concentration can increase beyond 100 meters. Next
25 slide. So then I decided to look at -- this was the

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1 -- I decided to look at wake effects to see whether
2 wake effects would impact the results. And so I used
3 the -- this is basically using the new near-field
4 capability we put into MACCS.

5 And we're using what is called a Ramsdell
6 Fosmire model. It's essentially the same mathematical
7 relationship for dispersion with distance that's used
8 in the ARCON Model. So it accounts for the fact that
9 you can have plume meander and wake effects.

10 So again, just something to try to bring
11 a little bit more realism or complexity into the
12 calculation to mild cancer risk between $5.5e-7$ to
13 $1.9e-6$. The analytic calculation is generally
14 conservative with respect to the MACCS calculation,
15 not always. But they do all produce cancer fatality
16 risks less than $2e-6$ even if it's only barely under
17 stable conditions. Next slide.

18 So now when I model protective actions,
19 again, I'm predicting that the effect of my protective
20 actions is to have a lower value for n. And you see
21 that. Instead of having values for n that were in 1.6
22 to 2 range, these are values that tends to make the
23 curves drop off -- or not drop off very quickly. It's
24 about one.

25 And what you see is the effect of when you

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1 credit protective actions, you're -- the analytic
2 calculation by the way did fairly well. But it was
3 generally non-conservative. But you're getting
4 something above to e-6 when you model those protective
5 actions. And again, I think largely because you're
6 flattening the curve. Next slide, please.

7 Now I start moving beyond using single
8 weather trial commissions and using more diverse set
9 of weather conditions. So I sample the -- from a
10 meteorological file both with and without buoyancy.
11 I think I should have said -- I didn't put it on the
12 slide.

13 This is -- I'm sampling the weather, but
14 I'm still releasing everything as a single plume. I
15 just took all the plumes in the original source term
16 and just compressed them into a single release so that
17 a plume only goes in one direction. But now it can go
18 in different directions with different wind speeds and
19 different stabilities.

20 Again, the difference is between MACCS and
21 analytic is between 20 to 40 percent. The analytic
22 calculation is conservative. You are below -- in both
23 cases, below 2e-6. Next slide, please.

24 Now I relax the condition, and it all has
25 to come out in one plume. And I allow it to

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1 essentially come out with the time dependence that it
2 would've been modeled in the Level 3. And I looked at
3 -- for this, I looked -- this is where I started
4 looking at different source terms.

5 I use one which again I said it was more
6 of an early post type release and then the late
7 containment failure which was a very prolonged release
8 and then another containment failure source term.
9 Again, scaled them all so that they would get exactly
10 the same dose. And just again note that you're below
11 $2e-6$ when you do multiple plumes and you sample
12 weather.

13 Now one thing, I just had a little
14 footnote saying that in order to do the analytic
15 calculation that's kind of challenging, I have to pick
16 a transverse dispersion coefficient. I picked what I
17 assumed was highly unstable. It seemed to work.

18 But at this point, you're really not --
19 it's really hard to actually say what would the right
20 value be for the analytic calculation. It's pretty
21 different than the base case assumptions. Next slide.
22 And now -- so again now I've added on weather
23 sampling.

24 I've added multiple plumes. And now I
25 introduce instead of a constant population density, I

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1 introduce spatially variable population density. And
2 I think, yeah, I used it based on Peach Bottom.

3 And the -- so again, now this is getting
4 about as far away from the assumptions used to make
5 the derivation as I could get. But the -- so the
6 differences, they're ranged between 180 percent to
7 almost an order of magnitude. But they do tend to
8 result -- they all resulted in cancer fatality risks
9 that were lower than $2e-6$.

10 And I think I observed that they were
11 lower than the constant population density as well
12 which would make sense again if you're concentrating
13 your population further away where the doses are
14 lower. Your weighted mean is going to end up being
15 lower. So next slide, please. So what I didn't pull
16 together is that much of the reasons I believe for the
17 thing that drives the relationship between the 100
18 meter dose and the 10 mile average cancer risk or
19 average dose is basically how fast the doses drop, the
20 concentrations and the doses drop off with distance.

21 So I just put it in a scatter plot all the
22 various different fitted values for n. And so you can
23 see there's a fairly clear relationship that the
24 slower your dose drops off with distance, the higher
25 your average risk will be for a given 100 meter dose.

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1 So again, that should make sense from a -- just from
2 a first principles basis.

3 But I just wanted to plot it to see if
4 it's holding up. So all right. Next slide. So now
5 the next thing is that in order to do the -- examine
6 the relationship between dose at 100 meters and the
7 ten mile cancer risk, I have to pick a dose that I'm
8 scaling everything to. But in this slide, I was
9 trying to understand how doses might vary over time.

10 So this slide is where I basically did a
11 case for some different source terms to see -- now
12 this is only looking at the long term dose. But I
13 essentially took my three different source terms and
14 I scaled them all to get exactly 2 rem in the first
15 year. I did this by modeling just a one-year exposure
16 period, and then I just sequentially added --
17 increased the exposure -- the long-term exposure
18 period until I got a total of 50 years and then took
19 the difference to figure out the dose.

20 And so what you see is they don't all drop
21 at the same rate. And also, I put in the early phase
22 does that it took to get exactly 2 rem. And so what
23 you see is the difference -- well, I'll just read the
24 bullets.

25 The accumulation of dose and long-term

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1 phase occurs at different rates for different source
2 terms. And the insight from this is that there's no
3 fixed ratio between early phase dose, the first year
4 dose, and the 50 year dose. In other words, I don't
5 know yet how I could design something that would
6 exactly meet 1 rem in 96 hours, 2 rem in the first
7 year, and 500 millirem in subsequent years.

8 But what I would note is that for the
9 scale source terms that we used in this analysis, if
10 you meet the 2 rem intermediate phase relocation AG,
11 you'll probably get a lifetime -- it appears that
12 you're going to get a lifetime dose less than 25 rem.
13 The lifetime dose could be anywhere from 5 to 10 in
14 this analysis. So the significance of this is that
15 all this analyses that were done anchoring everything
16 on a 25 rem lifetime dose, if you did have something
17 that met the criteria, you'd probably get a lower
18 lifetime dose. And therefore, you'd get a lower
19 lifetime cancer risk calculation. So next slide.

20 So in summary, we developed the analytic
21 derivation of the relationship between the lifetime
22 dose at a single point and the ten mile average cancer
23 risk and used that to come up with some assumptions to
24 design test cases. Generally, the 25 rem dose at 100
25 meters corresponds to a ten mile population weighted

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1 lifetime cancer risk, less than 2 times 10 to the -6
2 unless you have buoyant releases or protective actions
3 that are accredited in reducing the dose. And in
4 those cases, you can -- your dose reduction is lower
5 or even increases with distance.

6 And again, next bullet, the actual
7 relationship is sensitive to what you -- how you
8 assume that the downwind dose reduction occurs. And
9 then from the previous slide, there's no single --
10 there's no fixed ratio between the early phase dose,
11 the first year dose, and the 50 year cumulative dose.
12 Yeah, and then the last, for the scale, for the source
13 terms we looked at in this analysis if you meet the 2
14 rem, you're probably going to get a dose less than 25
15 rem.

16 It's not on the slide. But I would
17 mention that radioactive decay is always going to kick
18 in. And typically these source terms are going to be
19 driven -- much of the long-term dose is going to come
20 from cesium-137, cesium-134. 137 has a 30-year half
21 life, but cesium-134 has about a 2-year half life.

22 And you've got some other shorter lived.
23 So it's likely that your dose is going to drop. It's
24 going to be less than 27.5. In other words, if you --
25 it's going to keep going down.

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1 There's also -- I've done some -- I've
2 been trying to do some work to figure out if you use
3 the weathering factors that are currently used in
4 MACCS to reduce the dose, I don't remember them off
5 the top of my head. But essentially -- and this is
6 based on some data from Chernobyl -- about half of the
7 initial dose decays with a fairly quick half life due
8 to weathering -- simply due to weathering, like, with
9 a half life on the order of, I think, a year or so or
10 maybe less. And then about half of the dose -- it's
11 a two compartment model.

12 Half of the dose decays -- drops off
13 because of weathering with a much longer time period,
14 like a 90 year dose. So you get that immediate
15 weathering effect as the positive material kind of
16 migrates down into the soil, gets covered up, and
17 weathers. So it drops rapidly at first and then drops
18 off more slowly.

19 I think that is my last slide. Go to the
20 next slide, please. My bibliography, next slide.
21 Yeah, and then these are just the supplemental slides
22 that just show how weather is dropping off and kind of
23 -- so for example, this one shows under Class A as
24 simple as I could make it.

25 It still managed to fill up the boulder

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1 layer. And so it did not drop with 1 over r
2 relationship. It did out to about a few kilometers.
3 And then it starts dropping off more slowly because
4 the reduction is only due to transverse dispersion
5 whereas under Class F.

6 So much more narrow plume, but it drops
7 off more slowly but it keeps dropping off. So I'm not
8 going to go through all of these unless folks have a
9 question about a specific one. So that's all that I
10 have.

11 CHAIR PETTI: Members, any questions?

12 MEMBER DIMITRIJEVIC: You know, I have a
13 feeling you've been discussing some things which we
14 understand better than other when you were discussing
15 that. Like, we were talking in light and then looking
16 the dark parts of the problem, you know, when we have
17 much more uncertainties connection, those leading to
18 cancer. I also was wondering what are the exposure in
19 this. This exposure, you said the plume exposure was
20 only analyzed for the four days. And after that, it
21 comes from the positions, right?

22 MR. COMPTON: Right.

23 (Simultaneous speaking.)

24 MR. COMPTON: Go ahead.

25 MEMBER DIMITRIJEVIC: So this land, the

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1 positions, what would be -- what is the background,
2 the exposure to the people who live in this area? I
3 mean, would that be considered acceptable? I mean,
4 there's a lot of questions I have. But let me just
5 ask you some general question. What kind of doses the
6 MACCS uses to predict this cancer fatality?

7 MR. COMPTON: What are the dose
8 coefficients?

9 MEMBER DIMITRIJEVIC: Yeah.

10 MR. COMPTON: The dose coefficients are
11 derived from Federal Guidance Report 13. And --

12 MEMBER DIMITRIJEVIC: When was this
13 issued?

14 MR. COMPTON: 1999. It's the most -- I
15 think they're updating it. I think they have FGR 15
16 out for external dose coefficients. I could be wrong,
17 but I don't think they've put out the updated one.
18 But those, I'm not expecting the -- now that's the
19 dose. That's essentially the exposure to dose
20 coefficients.

21 The risk coefficients that were used were
22 based on the risk coefficients that were used in
23 SOARCA. And they were provided by Keith Eckerman.
24 And they're also essentially consistent with FGR 13.

25 So they're consistent with federal

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1 guidance. And that kind of goes to I think a
2 statement that I made earlier is that I recognize the
3 uncertainties in it. But I would say the use of the
4 Federal Guidance Report 13, it's an accepted method.
5 One can certainly argue about the uncertainty and
6 everything else in it. But it's as good as we can
7 make it.

8 MEMBER DIMITRIJEVIC: All right. But the
9 results you reported from MACCS are all mean values?

10 MR. COMPTON: Well, yes, for anything with
11 meteorological sampling, I reported the mean values.
12 For the single weather trial, MACCS is going to take
13 it's statistics over the number of weather sampling
14 trials. So if I do a constant weather condition,
15 that's just the value that it is. If I do it over a
16 meteorological file where I'm sampling from different
17 weather, that's going to be the mean value across all
18 the different weather conditions.

19 MEMBER DIMITRIJEVIC: So does MACCS report
20 to you the distribution the 95 percentile?

21 MR. COMPTON: Yes, yes. That's actually
22 -- yes, it does.

23 MEMBER DIMITRIJEVIC: Do you know what
24 distribution MACCS runs over different -- not
25 meteorological factors but other factors like a risk

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1 factor?

2 MR. COMPTON: Sure. So MACCS is set up
3 that typically you would run MACCS -- MACCS will
4 always do if you tell it to a sampling over weather
5 conditions. But it will use single point estimates
6 for all other parameters. It does have the capability
7 to -- you do have the capability to sample other
8 parameters. And that's what it was done in the SOARCA
9 of certain analysis is they sampled a selection of
10 MACCS parameters, came up with distributions, and then
11 sampled them.

12 (Simultaneous speaking.)

13 MR. COMPTON: And not surprisingly --

14 MEMBER DIMITRIJEVIC: -- risk factors,
15 things like that. So then you had some feeling what
16 type of distributions if it's not meteorological data?

17 MR. COMPTON: You mean whether MACCS --

18 (Simultaneous speaking.)

19 MEMBER DIMITRIJEVIC: No, no, no. You
20 just explained to me they use a point estimate for
21 everything other than meteorological data, right, in
22 these runs which you have performed. But you said
23 that there were runs performed as a part of SOARCA
24 analysis. We consider other uncertainties other than
25 meteorological like a population density or like risk

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1 dose, or the time exposure.

2 (Simultaneous speaking.)

3 MR. COMPTON: Right. And some of those --

4 MEMBER DIMITRIJEVIC: Do we have any
5 feeling what type of certainty we are talking when
6 these other factors are considered?

7 MR. COMPTON: Well, if I recall, this is
8 from -- there's been a number of SOARCA uncertainty
9 analyses. I think one of the things it does tend to
10 show up -- well, a few things tend to show up as
11 significant. One is usually the source term, the
12 characteristics related to the source term. So
13 obviously if you -- any uncertainty you have in the
14 source term propagates into the Level 3. But of the
15 MACCS parameters by themselves, the cancer risk
16 coefficients --

17 MEMBER DIMITRIJEVIC: Right.

18 MR. COMPTON: -- tended to show up as the
19 most significant. I think I got to be careful because
20 Tina is not here to keep me on the straight and
21 narrow. But I believe -- and that makes sense.

22 It's a linear -- that's just a linear
23 multiplier at the end of the calculation. But there
24 is -- and I don't have it memorized. But there is a
25 published distribution of risk factors.

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1 So basically, uncertainties in the PRA,
2 everybody know they high Level, but they high in Level
3 2. In my opinion, the highest in Level 3 based on my
4 experience. So I mean, for me, I was trying to
5 measure those uncertainties because if the cancer --
6 this latent cancer risk would be our risk measures.

7 We should really have some -- we should
8 really believe that we can actually evaluate that with
9 some reasonable certainty. And that's why I sort of
10 question because you talk about meteorological data.
11 And obviously, the very good models develop them,
12 mathematical models.

13 But there is so many other important
14 factors. Is it 50 years? Is it -- do they ever? Do
15 they come back? Is the land going to be clean before
16 they come back as I point out?

17 And then comes the risk dose which is the
18 major factor. And there is a huge uncertainty
19 associate with it. Thank you. Thanks for your
20 presentation. I learn more about MACCS than before.
21 So appreciate it.

22 MR. COMPTON: Thank you. Any other
23 questions?

24 CHAIR PETTI: I'm not hearing any. So
25 thanks so much again. We've been at this now -- let's

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1 see. It's 2:43. I'm just thinking maybe we should
2 take a short break now and then we've got about 20
3 slides left, maybe 17 slides. So why don't we take a
4 break to the top of the hour, and then we'll come
5 back. And these are the last two sets of
6 presentations. Thanks.

7 (Whereupon, the above-entitled matter went
8 off the record at 2:44 p.m. and resumed at 3:00 p.m.)

9 CHAIR PETTI: Okay, it's the top of the
10 hour, so let's keep on going and start with Draft
11 Guide 1413.

12 MS. BIRO: Okay, I'll take it up. So good
13 afternoon, my name is Mihaela Biro, I'm a Senior
14 Reliability Risk Analyst in the Division of Risk
15 Assessment in the Office of Nuclear Reactor
16 Regulation. And I'm going to talk to you about Draft
17 Guide 1413, which also goes as proposed new Regulatory
18 Guide 1.254, for technology-inclusive identification
19 of licensing events for commercial nuclear plants.
20 Next slide, please.

21 So as a refresher, this guide applies to
22 all the framework, all light water reactors and non-
23 light water reactors licensed under Part 50.52 and 53
24 for Frameworks A and Framework B. As any guide, this
25 comes with three section.

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1 Before I go there, a refresher that the
2 term licensing event is a generic term we chose to use
3 in this draft guide to -- because the guide applies to
4 all licensing frameworks.

5 I'm going to turn my camera off because
6 it's -- I think I have bandwidth issues.

7 So the licensing events is a generic term
8 we use in the context of this reg guide to refer to
9 those collection of designated event categories
10 identified in Parts 50.52 and Part 53. So this draft
11 guide has three sections.

12 Section A is dedicated to introduction and
13 a view of applicable regulations. Section B provides
14 a discussion and an overview of the ACRS
15 recommendation. And Section C provides the staff
16 guides, which outlines an integrated approach for
17 identification licensing events.

18 And this integrated approach comes in
19 three main aspects. One is the systematic and
20 comprehensive search for initiating events, meaning
21 identifying all possible perturbation to the plant
22 that can challenge the control and safety systems.
23 This work needs to start with a blank sheet of paper
24 without preconceptions or reliance on predefined
25 lists.

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1 Second part of this is the delineation of
2 -- the delineation of a comprehensive set of event
3 sequences, which is the analysis of the plant response
4 to the initiating events. And finally in Part 3,
5 grouping and mapping those initiating events and event
6 sequences into licensing event categories.

7 Lastly, this guide also contains an
8 appendix that reviews the techniques for searching for
9 initiating events and provide a list of these for
10 references but does not recommend any particular
11 technique. Next slide, please.

12 So since from -- since last time we
13 presented at the Subcommittee meeting in June, we
14 revised the two tables we had in the previous version
15 of this guide and combined them into one large table
16 which attempts to summarize the licensing pathways and
17 the licensing event categories. It looks quite a busy
18 table so I'll try to briefly walk you through it.

19 So in the first column we've captured the
20 various licensing frameworks, such as Part 50.52, 53
21 Framework A and 53 Framework B. Looking at the second
22 and third columns, we noted that the guidance related
23 to the licensing modernization projects, also known as
24 LMP, which includes NEI 1804 and Reg Guide 1.223.

25 This guidance applies only to non-light

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1 water reactors at this time, and so on the second
2 column, we have to differentiate between light water
3 reactors and non-light water reactors.

4 Also going down to Framework A, note that
5 the existing LMP guidance does not currently apply
6 under Part 53 Framework A. But in the future the
7 staff intends to revise Reg Guide 1.223 to address
8 licensing under Part 53 Framework A.

9 Moving on to the fourth column, I'll
10 summarize the licensing event categories under each
11 framework. You've probably seen that before in a
12 previous version. So note that Parts 50 and 52 do not
13 have clear definitions and the list on this table
14 includes everything that was identifying regulation
15 associated regulatory guides.

16 On the second row, entry, if LMPs use with
17 comments on only licensing event categories that were
18 defined in LMP guidance and so on. Release the
19 licensing event categories under Part 53 Framework A
20 and Framework B.

21 Finally --

22 MR. BLEY: This is Dennis Bley. The row
23 on Part 53 Framework A, when you read through, it says
24 LMP is not applicable. I don't understand that. I
25 thought that was the whole purpose of Part 53,

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1 originally.

2 MS. BIRO: Yeah, but it just -- it's, we
3 have to go based on the status code. So if you go and
4 open Regulatory Guide 1.223, it currently says it's
5 not. It doesn't list Part 53 Framework A.

6 MR. BLEY: So the Reg Guide doesn't list
7 Part 53. But Part 53 essentially asks for LMP.

8 MS. BIRO: Yeah, it's built upon. So this
9 is something that came out during our review with the
10 -- with the little council. So we just had to reflect
11 the present state as of yesterday.

12 MR. BLEY: But it's not that LMP doesn't
13 -- isn't applicable to Part 53. LMP isn't applicable
14 to the reg guide because the reg guide doesn't say so.

15 MS. BIRO: Yeah, and I think you're also
16 getting into those, if you look in the next, in the
17 licensing events, right, the terms that are being
18 used.

19 MR. BLEY: Yeah.

20 MS. BIRO: And Framework A has, for
21 example, micro sequences while they -- the guidance
22 has DBs, BDBs, etc. So we'll have to address that.
23 It's a technicality I think, yeah.

24 MR. BLEY: Yeah, I guess so. It's the
25 logic of the display that's bothering me. It seems to

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1 me when I read Framework A, LMP is perfectly
2 applicable. The reg guide you can't use because it
3 says you can't use it. But, and that's your guidance
4 for using LMP. Anyway, you're going to fix it, so
5 that's.

6 MS. BIRO: Yes, that's the point, that's
7 the point. It's just not applicable at this very
8 moment, I would say.

9 MEMBER REMPE: Dennis, if you looked at
10 the table in the draft guide we were given, they've
11 got a footnote saying that they plan to update it. So
12 maybe it's just this slide that's bothering you?

13 MR. BLEY: It's the language that says
14 Part 50 -- LMP is not applicable to Part 53. To me,
15 LMP's not applicable to the reg guide. That's clear
16 until you fix the reg guide. But LMP ought to be
17 applicable to Part 53 Framework A because it
18 essentially tells you to do that.

19 MEMBER REMPE: Yeah, I guess I thought the
20 footnote, it didn't bother me when I looked at the
21 table. But it does have an N/A, but it has a footnote
22 right there saying we're going to update it. So maybe
23 it's just the way it's worded with the footnote.

24 MR. BLEY: Yeah, if I were -- if I were
25 doing the table in the reg guide, I would just have

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1 the footnote, I wouldn't say not applicable. But
2 anyway, go ahead.

3 MS. BIRO: Yeah, it's very hard to capture
4 all the subtleties in a few words, but I appreciate
5 the comment. We'll see if we can improve the text.

6 MEMBER HALNON: Will the revision allow
7 the light water reactor --

8 MS. BIRO: Excuse me, I didn't?

9 MEMBER HALNON: Would the -- this is Greg.
10 Would the revision include light water reactors? I
11 know it obviously includes non-light water, but.

12 MR. BLEY: Revision of the reg guide.

13 MS. BIRO: Yes.

14 MEMBER HALNON: Yeah, for Part 53. Okay,
15 it will be both those --

16 MS. BIRO: I believe so. We haven't gone
17 through all the detailed discussion on that, but I see
18 no reason why not. But I guess we'll have to take
19 back and yes.

20 MEMBER HALNON: Okay, thanks.

21 MR. STUTZKE: Greg, this is Marty Stutzke.
22 I'll note NEI 18-04 itself says that it only applies
23 to Parts 50 and 52 non-light water reactors. So it's
24 more than updating Reg Guide 1.233. NEI would have to
25 update its guidance as well.

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1 MR. BLEY: Well, wait a minute. You as
2 the regulator, if you update Reg Guide 1.233, can
3 right there say that from a regulatory point of view,
4 LMP is appropriate to Part 53. NEI isn't a regulatory
5 document.

6 MR. STUTZKE: True, but Reg Guide 1.233
7 endorses NEI 18-04, so.

8 MR. BLEY: It could, with the exception
9 that it also applies to Part 53. Then you'd be done.

10 MEMBER HALNON: It would be good to clear
11 everything up. So I'm sure this --

12 MR. BLEY: I think it would but making
13 yourself wait for NEI, if you have to wait for it,
14 doesn't seem to make sense to me.

15 MEMBER HALNON: I'm good, you can go on.

16 MS. BIRO: Yeah, okay. All right, well,
17 thank you. So moving on to the last column, the
18 summarize, the use of a PRA is required. So we noted
19 that under Part 50, a PRA is not required at this
20 time.

21 However, there is some rulemaking
22 activities. SECY-2252 described the NRC proposed
23 changes to the regulations in Parts 50 and 52 to align
24 reactor licensing processes incorporating lessons
25 learn from new reactor licensing.

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1 So the NRC is proposing to any regulations
2 to Part 50 to require the construction permit and
3 operating license applicants to submit a description
4 of the plant-specific PRA and its results.

5 So under Part 52, a PRA is required.
6 Under LMP, a PRA is implied. And then moving down, of
7 course Framework A also requires a PRA. And then when
8 you lastly on the, moving on to Part 50, Framework B.
9 An applicant may elect to develop an AERI as an
10 alternative to a PRA if the entry conditions are met.

11 So in summary for a stable, the choice of
12 licensing framework influences the process to be
13 followed for the licensing event identification. And
14 that it establishes what licensing event categories
15 will be used, whether PRA will be used, and how those
16 risk insights from the PRA will be used. Next slide,
17 please.

18 MEMBER HALNON: Just one, just a follow up
19 so that Dennis and I don't bring it back up. Do you
20 have an approximate schedule for the 1.233 revision
21 just so we can see how that all works, or is that
22 still to be determined?

23 MS. BIRO: I believe it's to be
24 determined. I don't think we have that.

25 MEMBER HALNON: Okay, it'll be prior to the

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1 53 being out for final rule, I would assume, right.
2 Since it's guidance to work Part 53.

3 MS. BIRO: Yeah, I can't answer that.
4 Marty, do you have any thoughts?

5 MEMBER HALNON: Maybe that's just a
6 suggestion to get it out, you know, next year some
7 time.

8 MR. STUTZKE: We'll take that back.

9 MEMBER HALNON: Thanks.

10 MS. BIRO: Thank you. Any other
11 questions? If not, moving on to the next. So on the
12 next four slides, I will walk you through the approach
13 outlined in Section C of the guide for technology-
14 inclusive identification licensing events.

15 You've seen this before at our previous
16 engagements. Before we got into the flow chart, we
17 identified a five overarching principle that are
18 color-coded.

19 So NEI will identify application-specific
20 factors. Orange, conduct a systematic and
21 comprehensive search for initiating plants. In blue
22 is a systematic process to delineate event sequences.
23 In green group the initiating events and event
24 sequences into the designated event categories
25 according to -- licensing framework. And lastly,

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1 right, provide assurance that the set of licensing
2 events is sufficient. Our next slide, please.

3 So before I review the process on the flow
4 chart, I'd like to highlight this process is meant to
5 be iterative. And thank you for Subcommittee member
6 comments in our previous June meeting.

7 We have a text the draft regulatory guide
8 to highlight this aspect that the design process and
9 the development of licensing basis information is
10 meant to be iterative. When you -- involves
11 assessment and decisions of system design, operating
12 parameters, programmatic control.

13 So the identification of initiating events
14 and event sequences is expected to be performed as the
15 designer goes through the conceptual phases. And as
16 the design matures, the licensee or applicant should
17 consider the licensing framework it is planning to
18 use. Because as I mentioned before, this decision
19 influences the process for identifying licensing
20 events.

21 Now, go on to the flow chart. You've seen
22 this flow chart before, but since the last meeting, we
23 moved a couple boxes. But generally the same idea of
24 the flow chart remains. Changes we've made are marked
25 on this flow chart in this transparent caption boxes.

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1 So I'm going to briefly review the
2 process. So again, process starts with box 1,
3 assemble the team. So we -- to conduct an
4 identification licensing event, we believe that it's
5 necessary a multi-disciplinary team with the right
6 expertise.

7 And we listed a number of disciplines that
8 we believe that need to be part of the team. So of
9 course licensing of plan design, thermohydraulics,
10 PRA, even expertise in selected metal analyses, etc.

11
12 Box 2, establish a control -- quality
13 control program. And this is a new explicit step we
14 added in response to the informal subcommittee member
15 comments. We added an explicit guidance and step on
16 establishing a quality control program prior to
17 engaging in the work. And I will discuss this in a
18 lot more detail in the following slides.

19 Then we move in the next boxes to
20 collecting application-specific information. Most
21 yellow boxes at the top. In Box 3, we'll collect all
22 the plant-specific information and site
23 characteristics. In Box 4, identify all radiological
24 sources and transfer barriers from the source and the
25 environment.

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1 In Box 6, include explicit search for
2 sources of hazard chemical materials, which may be
3 none, similarly to searching for the radiological
4 sources. This, as a refresher, we are thinking of
5 those chemical hazards that are combined with the
6 radiological hazards, which can impact a plan response
7 initiating event or may affect the properties of the
8 radiological release.

9 And also want to mention other hazards.
10 If there's hazards from nearby industrial facilities,
11 that could induce an initiative event to the nuclear
12 plant. I'd expect that to be covered during search
13 for initiating events. And we updated a text on that
14 section as well.

15 Then on Box 6, we'll proceed to the
16 identification of those previously defined safety
17 function and identify assistance needed to perform the
18 safety function. We appreciate ACRS member comments
19 on previous texts and we updated the draft guide to
20 better reflect progress on safety function.

21 But the key highlight here I want to
22 mention is that the definition of safety function is
23 expected to be performed during the design stage. And
24 here in this guide we assume that those safety
25 function have been already defined. And with the

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1 definition and identification, one can proceed to
2 identifying initiating events.

3 In Box 7, we identified end states for
4 event sequences which will be used to support event
5 sequence delineation selection.

6 So now moving to the bottom of the slide,
7 in -- we aligned the selection of the analysis methods
8 in Box 8. Selecting methods or techniques for
9 identification initiating events. This is the key,
10 selecting the methods is the key for conducting the
11 search that is systematic, comprehensive, and without
12 preconception or reliance on predefined risk.

13 So refresher that we think this search
14 needs to start with a blank sheet of paper to ensure
15 that the plant design is appropriate, analyze and
16 demonstrate it to be safe. The techniques --

17 MR. BLEY: Can I interrupt you here?

18 MS. BIRO: Yes, please.

19 MR. BLEY: This is just a point of
20 argument for me, but to me what you're talking through
21 right now on the systematic and comprehensive search
22 for initiating events is what provides assurance that
23 the set is sufficient.

24 The QA program, I don't know how it does
25 that. It seems inside out. The QA program is kind of

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1 an overview to make sure that you're following
2 process. But this search for the initiating events is
3 really the thing that provides assurance that we have
4 a good set.

5 MS. BIRO: Okay. So are you -- are you
6 commenting on the colors, or I'm sorry, it's a good
7 point. Yes, absolutely. That's the --

8 MR. BLEY: Yes, I am commenting on the
9 colors. Now, you have more colors than are used in
10 the Reg Guide, I think. Maybe not.

11 MS. BIRO: Yeah, I think we have them the
12 same, but we can definitely take it back and think of
13 that.

14 MR. BLEY: Anyway, to me, QA isn't the
15 thing that makes sure we've got a good set. It's --
16 think about that when get to that.

17 MS. BIRO: Well, I mean, yeah, of course
18 the work, doing the work correctly, it's important,
19 right. And then the quality assurance is just
20 assurance that another layer on top of it to ensure
21 that the work is done correctly. So yes.

22 MR. BLEY: Go ahead.

23 MEMBER REMPE: So this -- Dennis, are you
24 done?

25 MR. BLEY: I am.

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1 MEMBER REMPE: This is Joy, and I
2 appreciate your willingness and in a very positive
3 way. So I'm almost embarrassed to be asking for me.
4 But on Box No. 5 where you talk about co-located
5 facilities and you say we're going to talk about this
6 more in Items 26-29, and I, when I went to 26-29, I
7 didn't see what I was hoping to see.

8 I think just a few more words to talk
9 about other site-specific hazards that could adversely
10 affect plant operations. And then adding something
11 about like gas lines, a hydrogen production facility,
12 a rail line. Just a few more items to give the
13 applicant a bit more of an idea of the thoroughness
14 expected would be helpful.

15 MS. BIRO: Thank you for your comment. We
16 tried to capture that somehow based on the previous
17 work that's been done. Just looking for hazards and
18 initiating events, at least external to the plant have
19 been the key in the PRA development over the many
20 years.

21 So there are references, there are a lot
22 of long list of items that have been compiled over the
23 years. And we did provide a reference the latest PRA
24 standard for non-light water reactors. And so it's
25 endorsed in the reg guide.

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1 So if you open that, it has like
2 everything under the sun that can be considered. But
3 if you feel like you would need more to highlight that
4 importance, we can definitely add a sentence or two
5 and then refer them --

6 MEMBER REMPE: Yeah, well like Box 10-12
7 says other hazards such as hazards from your bio-
8 industrial facilities that could induce initiating
9 events. And then it says hey, go look at 26 and --
10 paragraphs 26-29 below.

11 So that was where I expected it, but when
12 I got to those paragraphs, it mainly focused on
13 internal hazards like flooding and external hazards
14 like seismic and high winds. I didn't see things that
15 I wanted to see there. So I think some additional
16 words would really help. But again, it's just one
17 member's comment.

18 MS. BIRO: Okay --

19 MEMBER HALNON: So this is Greg, just to
20 carry on the paragraph before that, number 11, it
21 talks about the chemical sources that are outside the
22 scope. Which is fine, it just kind of leaves me
23 hanging.

24 Just, you might consider giving the
25 nuclear designer a place that they can go look or at

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1 least an agency that they would go look for guidance
2 on chemical sources, given the fact that we don't know
3 what kind of chemicals will be on some of these
4 plants.

5 That's just a suggestion. The question I
6 -- another question I have is in fact in the quality
7 control program it talks about making sure that the
8 PRA is peer-reviewed or has a self-assessment. The
9 self-assessment guidance in 1.200 points back to an
10 ISG for a DC or COL.

11 Is that what you intend to use for people
12 to see that self-assessment or use the self-assessment
13 guidance in that box or quality control program and
14 the adequacy of PRA?

15 MS. BIRO: Marty, can you help? I'm not
16 familiar with the COL, but I guess we have a, my last
17 slide is covering with, you know, we have certain
18 parts of this guide that we believe they should be
19 subject to quality control. And then others to
20 quality assurance.

21 And the parts that are being traditionally
22 part of the PRA as the initiating event search and
23 event sequences, those would be a quality control.
24 And we would use existing programs such as those that
25 are currently used for a PRA, which include a peer

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1 review guidance and self-assessments.

2 MR. STUTZKE: Yeah, if can add to it,
3 Greg. DC COL ISG 028 again applies to LWRs. So we're
4 developing another guidance document that would apply
5 to the non-LWRs.

6 MEMBER HALNON: Okay, I just wanted to
7 make sure that we were not just relying on that one
8 ISG.

9 MR. STUTZKE: Right.

10 MEMBER HALNON: And if you were, that it
11 was going to get looked at.

12 MR. STUTZKE: Right.

13 MEMBER HALNON: Sounds like you got it, so
14 thanks, Marty.

15 MS. BIRO: Thank you. Any other
16 questions? Okay, so I'll continue on then.

17 So we were at Box 8, selecting the
18 initiating event identification method. I want to
19 mention that the Appendix A summarizes know and well-
20 established techniques.

21 And we appreciate Dr. Bley's references
22 and information on the system-level FMEA. And we did
23 not get a chance to yet to update the appendix, but
24 are planning to update it in the near future. Okay.

25 So then on Box 9, describe the strategy

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1 for grouping initiating events, and in Box 10,
2 consider any analytical methods for event sequence
3 delineation, such as event trees that are well known
4 to the PRA practitioners and similar event tree
5 diagrams, which is a graphical tool similar to the
6 event tree. Next slide, please.

7 So then the online process proceeds to
8 identify in the list initiating events, applying the
9 selected methods and grouping strategy. We already
10 kind of covered this, that we've tried to add a little
11 bit more detail on the initiating event analysis,
12 listing that to include both internal hazards such as
13 the internal flooding, fires, but also external
14 hazards, seismic events, high winds, external floods,
15 and other external hazards. And multiple reactor
16 modules.

17 So then as I mentioned, we added a
18 reference. There are many reference that provide us
19 a list of external hazards. And so we reference Reg
20 Guide 1.247 and the associated non-light water PRA
21 standard, which provides a pretty comprehensive list
22 which is compiled based on the review of previous
23 references. But we'll take it back and see if we can
24 enhance the text.

25 Then moving on, Box 13 includes a step for

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1 reviewing any relevant operating experience, as well
2 as any prior relevant initiating event analysis. Then
3 similarly in Box 15 on the bottom of the page, apply
4 the selected methods to analyze the plant response to
5 initiating events to delineate event sequences.

6 So now I want to talk about Box 14 and 17
7 regarding the independent review and quality control.
8 So in this guide we recommend a quality control of
9 this work for initiating events and for event sequence
10 selection, two items that are on this page of the flow
11 chart.

12 Because they are not directly -- this work
13 is not directly part of the design basis information.
14 And so we don't think this should be subject to formal
15 quality assurance. And this is a continuation of the
16 current practice with those that develop a PRA. Next
17 slide, please.

18 So finally, proceeding to the licensing
19 events. If a PRA's developed, provide initiating
20 events and event sequences to the PRA.

21 MR. BLEY: I'm sorry, can you go back to
22 that last slide? I missed something reading. Right
23 at the end here you were describing the search for
24 initiating events and event sequences. Oh, okay,
25 you're making the distinction between quality control

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1 and quality assurance.

2 MS. BIRO: Yeah, and I have a slide on
3 this. We'll clarify this.

4 MR. BLEY: Okay.

5 MS. BIRO: My last slide is going to cover
6 just this aspect of quality assurance versus quality
7 control and which parts are what.

8 MR. BLEY: Good, I need help with that.

9 MS. BIRO: Yeah, so I'm almost there,
10 almost there, I promise. I got one more slide before
11 that. Okay, so next slide, please.

12 So in Box 20, identify the required
13 categories of licensing events for a selected
14 licensing framework. If the LMP is being used, we
15 just, we discussed currently only applies to non-light
16 water reactors licensed under Parts 50 or 52. And in
17 that case, we expect -- we direct to the use of Reg
18 Guide 1.233 as the relevant guidance for the licensing
19 event identification.

20 As I mentioned, we do intend to revise the
21 guidance in 1.233 to address licensing under Part 53
22 Framework A in the future, but a flow chart reflect
23 the current state of things as we -- as right now.

24 So now going down, for all other
25 application, it will remain in scope of this draft

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1 guide, 14-13. And we'll proceed to licensing event
2 identification in Box 21. The designer applicants
3 expected to define the strategy for grouping event
4 sequences, which can be done by frequency or
5 qualitatively or quantitatively or by type.

6 Then Box 22, apply licensing event
7 grouping strategy. And then Box 23, identify the
8 limiting cases for each group of licensing events.

9 In Box 24, we still have a step for
10 comparison to predefined list. We added this because
11 comparison with the standard review plan is required
12 currently under Part 50 and 52 for light water
13 reactors.

14 And then finally, in Box 25, independent
15 review and quality assurance activities for the
16 licensing event identification. So as you can see
17 here, we are expected quality assurance, or formerly
18 quality assurance program, as opposed to a previous
19 slide, which is was just quality control.

20 So moving on the next slide, try to
21 capture the differences here. So as we said in Step
22 2 at the beginning, it's expected to establish a
23 quality control program prior to engaging in the work.

24 And now there are two parts to this,
25 right. The initiating event and event sequence

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1 analysis are not subject to the quality assurance
2 requirements, the -- which is quality control, because
3 a PRA is not part of design basis information.

4 And we do list several system programs
5 that may be leveraged that we had over there for PRA
6 configuration control and peer reviews.

7 And then finally, the other part --

8 MR. BLEY: I'm sorry to cut in again. If
9 I'm reading your words correctly, the only in NRC's
10 parlance that quality assurance applies to is design
11 basis information? Is that definitional? I mean,
12 there's -- the rest of the world about quality
13 assurance in a somewhat different way, I think.

14 MS. BIRO: Okay, I guess we're kind of
15 considering context of the NRC regulations here. I
16 don't know.

17 MR. BLEY: So it sounds like it's
18 definitional. Quality assurance is something that for
19 the NRC is only applied to design basis information.

20 MS. BIRO: That's how we see it for this
21 guide, yes.

22 MR. BLEY: Okay. I can't argue with a
23 definition, but it's new to me.

24 MR. STUTZKE: Dennis, if I could, let me
25 go back. There was a rulemaking on Part 52 back in

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1 2007. And at that time, the staff determined that
2 Tier 2 information -- or the PRA was not part of the
3 Tier 2 information for a design certification.

4 And based on that, SRP Chapter 19.0 was
5 revised to conclude that because the PRA is not part
6 of the Tier 2 information, it's not subject to quality
7 assurance requirements.

8 MR. BLEY: I didn't know or remember that.
9 And it feels odd to me, but okay.

10 MR. STUTZKE: But when we use quality
11 control, we're talking about the guidance that
12 originally appeared in Reg Guide 1.174. Use qualified
13 people, independent review, configuration control, and
14 that thing.

15 MR. BLEY: Okay, so we're covered. It's
16 just this definitional thing.

17 MR. STUTZKE: Right, it's just the
18 boundary between the formal QA program and what we
19 normally do for PRA.

20 MR. BLEY: I thought Chapter 19 was part
21 of Tier 2. It's not?

22 MR. STUTZKE: No, that's the -- actually
23 it's in ISG 28 and SRP 19, yeah.

24 MR. BLEY: Fair enough, okay.

25 MS. BIRO: Thank you, Marty. So that's

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1 all I have. So again, the licensing event selection,
2 it would be subject to quality assurance as opposed to
3 the initiating event sequence analysis, which would be
4 quality control.

5 That's all I have. If there are any
6 questions? All right, then, I guess we can --

7 MR. BLEY: I guess I do have a question,
8 and this is probably more for Bill. Are we consistent
9 in this use of QA in the language that's in Part 53
10 and this guidance? I'd have to go back and look, I
11 don't know. Is Bill still here?

12 MR. RECKLEY: Yeah, I'm still here. I
13 think we are, Dennis, but let us go back and study
14 that. But I think we are.

15 MR. BLEY: Okay.

16 MS. BIRO: All right, well, thank you for
17 your time. I appreciate your time giving me a chance
18 to present today, and I'm going to turn it over to
19 Anne-Marie.

20 MS. GRADY: Next slide, please.

21 Good afternoon, I'm Anne-Marie Grady, a
22 Reliability and Risk Analyst in the Office of Nuclear
23 Reactor Regulation, Division of Risk Assessment.

24 And I'm going to discuss today with your
25 DG-1414, the alternative evaluation for risk insights

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1 methodology. I'll be focusing on the changes that
2 we've made to DG-1414 since we presented to you last
3 in June. And the additions that we've made and a
4 little bit of emphasis. Next slide, please.

5 The alternative evaluation of risk
6 insights methodology provides the guidance on the use
7 of an AERI methodology to inform the content of
8 applications and licensing basis for LWRs and non-
9 LWRs. 10 CFR 50.4730(a)(34)(ii) establishes AERI as
10 an alternative to a PRA for a risk evaluation if entry
11 conditions A and B for the -- for an AERI are met.

12 The title of this draft guide is now AERI
13 Methodology to distinguish it from Part 53 Frameworks
14 A and B. The new title does not signal any change in
15 approach.

16 In the green box below is a statement that
17 was in the previous guide that you've already seen,
18 but it bears repeating because it seems like it's
19 understood by some people. And it states the
20 following: applicants who meet the AERI entry
21 conditions, they elect to develop an AERI in lieu of
22 a PRA.

23 However, a PRA confers additional benefits
24 such as a means to operate the design and the ability
25 to take advantage of various risk-informed

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1 initiatives, for example risk-informed completion
2 times, risk-informed categorization of SSCs, etc.
3 Next slide, please.

4 You didn't see this in the Subcommittee,
5 this particular licensing pathways flow chart exactly
6 as it is right here. You did see it for the full
7 Committee.

8 And the differences in what you saw last
9 in subcommittee is in -- under the AERI box, the
10 various elements of the AERI are Q4 has been added,
11 which assesses defense-in-depth adequacy by reviewing
12 all of event sequences. Other than that, there is no
13 change to what you have seen before in subcommittee.
14 Next slide, please.

15 The elements of the AERI methodology.
16 There are some changes. It applies to LWRs and non-
17 LWRs under Part 53, Framework B. And the elements
18 include identification and characterization of the
19 postulated part -- the events.

20 MR. BLEY: Anne-Marie?

21 MS. GRADY: Yes.

22 MR. BLEY: I'm a slide behind you catching
23 up with my brain here. This is Dennis.

24 MS. GRADY: Oh, I'm sorry.

25 MR. BLEY: You don't need to back up.

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1 From my reading, and I think from what you just said,
2 whether you do a PRA or AERI, you do the same search
3 for initiating events and scenarios.

4 MS. GRADY: Yes.

5 MR. BLEY: Same thoroughness, okay.
6 That's really essential, I think, but go ahead.

7 MS. GRADY: One part of the elements of
8 how the AERI methodology and selection of licensing
9 events, which has already been covered by Mihaela in
10 DG 1413. It considers both core and non-core
11 radiological sources. And the non-core radiological
12 sources is a change that I'll discuss in a little bit
13 further.

14 It performs a consequence analysis for the
15 selected licensing events and multiple bounding events
16 could be considered for events with approximately
17 similar likelihoods of occurrence and similar overall
18 radiological impacts with different radiological
19 release characteristics.

20 The next element would be estimating dose
21 consequence for the postulated bounding event to
22 confirm the reactor design meets the AERI entry
23 conditions. That is covered under Part
24 53.47(a)(34)(ii) Condition A.

25 Condition A is one that you have seen

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1 before, and it talks about the dose at the
2 consequences at 100 meters from a plant to not exceed
3 one rem TEDE over the first four days following a
4 release. An additional two rem TEDE in the first
5 year. And a half a rem TEDE in the second and
6 subsequent years. And those are conditions that have
7 been discussed at length today and you've seen before
8 in this draft guide.

9 Condition B has been added, as Marty
10 alluded earlier, described earlier today. And it must
11 be without, it says Condition B is now the Condition
12 A must be met without reliance on active safety
13 features or passive safety features, except passive
14 safety features that don't require equipment actuation
15 or operator action to perform their required safety
16 functions that are expected to survive accident
17 conditions.

18 And it cannot be made unavailable or
19 otherwise defeated by credible human errors of
20 commission or omission.

21 One acceptable approach to developing a
22 dose consequence estimate is to provide the postulated
23 bounding event source term to a program such as MACCS
24 or a comparable analytical model.

25 MEMBER HALNON: Anne-Marie, this is Greg.

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1 That bullet under Condition B just exemplifies the
2 earlier comments we made about being able to define
3 passive. And clearly the passive, if it required
4 equipment actuation, wouldn't be considered passive.
5 Or if it needed operator action, it wouldn't be
6 considered passive.

7 So it's kind of talking past itself. I
8 know Marty took a note, but just wanted to exemplify
9 the earlier comment about defining what passive is.

10 MS. GRADY: Thank you, Greg. I heard your
11 comment earlier today and I think we'll be revisiting
12 that. Not changing it, but making sure that we've
13 stated clearly what we mean.

14 MEMBER HALNON: Yeah, and consistency
15 through the, you know, between the GLRO and this would
16 be -- would be good, just to make sure that we're not
17 adding confusion.

18 MS. GRADY: Yes, I'm making a note of
19 that. Okay, next slide, please.

20 There is no change in the presentation on
21 this slide of these elements of the methodology. It's
22 to determine a demonstrably conservative risk estimate
23 for the postulated bounding event to determine that
24 the QHOs are met. And the elements are described in
25 the draft guide and you've seen them before.

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1 Utilizing the consequence estimate, the sooner
2 frequency of once a year.

3 Compared to the QHOs, the applicant may
4 use a different frequency than once a year with
5 justification, which the staff will review on a case-
6 by-case basis. And the applicant should identify any
7 software codes used for consequence analyses and
8 provide information on how the development and
9 maintenance of these codes meets quality standards
10 commensurate with the application. Next slide,
11 please.

12 Okay, what is here that has changed is the
13 definition of severe accidents. And this is the
14 definition that is applicable to Framework B under
15 Part 53. And it's specific to that. And the search
16 for severe accident vulnerabilities involves severe
17 accidents obviously.

18 Severe accidents are those events that
19 progress beyond DBAs in which substantial damage is
20 done to the reactor core and that -- or to any other
21 structure, vessel, or retention system containing a
22 significant inventory of radiological material,
23 whether or not there are serious offsite consequences.

24 Now, that -- the definition that I just
25 read to you is a definition that we've had for

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1 decades, except for the part of the non-core source
2 term. And that's been added -- excuse me -- that's
3 been added for this AERI methodology. And it's to
4 make it technology-inclusive.

5 MEMBER HALNON: So Anne-Marie, is this the
6 same definition of severe accident that's in the front
7 of Framework B in the definition section?

8 MS. GRADY: Yes, in 53.028.

9 MEMBER HALNON: Okay, because when I was
10 discussing this with Travis, and it was probably the
11 wording on the slide, it struck me as not. This is --
12 this is a good definition. I don't have some of the
13 same issues with it. So it probably was just the way
14 it was on the slide. Thank you.

15 MS. GRADY: I'm sorry, okay. The search
16 for severe accident vulnerabilities are aspects of a
17 design which represent an over-reliance on a single
18 design feature, either for accident prevention or
19 mitigation that could lead to a severe accident. It
20 encompasses the entire set of licensing events and any
21 additional severe accidents. Searches for cliff edge
22 effects it considers external hazards.

23 The search for severe accident
24 vulnerabilities addresses how identifying severe
25 accident vulnerabilities could enable a design to

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1 prevent or mitigate severe accidents.

2 And if in the course of the reactor plant
3 design, if a severe accident vulnerability could not
4 be designed out or was chosen, elected not to be
5 designed out, then the applicant, to meet the -- to
6 meet the AERI methodology would need to justify why
7 the vulnerability was left in the design and why it's
8 acceptable for the design. Next slide, please.

9 The last slide on the elements of AERI
10 methodology includes the identification of risk
11 insights, the objective of which is to understand the
12 issues that are important to plant operation and
13 safety, such as important hazards and initiators,
14 important event sequences and their associated SSC
15 failures and human error, system interactions,
16 vulnerable plant areas, likely outcomes,
17 sensitivities, and areas of uncertainty.

18 The search encompasses the entire set of
19 licensing events. It provides an understanding of the
20 hierarchy of events ranked by frequency. And the
21 assessment for this, and the next bullet is the one
22 that was added since you've last seen this description
23 of the AERI methodology, is the assessment of defense-
24 in-depth adequacy, which encompasses the entire set of
25 previously identified licensing events.

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1 And the facility design should include a
2 reasonable balance among the layers of defense to
3 ensure that failure of a single barrier does not
4 result in a severe accident.

5 MR. BLEY: Anne-Marie

6 MS. GRADY: Yes.

7 MR. BLEY: This is another definitional
8 question. I liked the last bullet, but is layers of
9 defense, I mean, that's used in Europe a lot, but I --
10 is that a defined phrase in NRC speak?

11 MS. GRADY: I don't know the answer to
12 that. I am familiar with it in the IAEA documents.

13 MR. BLEY: Yeah, that's where I've seen it
14 too. And I've kind of liked what they did. I've seen
15 -- I've encountered folks at NRC in the past who
16 didn't like that approach at all. Anyway, I just
17 wondered if layers of defense has a fixed meaning.

18 MS. GRADY: Layers of defense are not
19 defined in this draft guide for sure. And I don't
20 know where I would find it if I were looking for it.
21 Maybe Marty knows, but I don't.

22 MR. BLEY: Okay, but it's something that
23 maybe ought to be clarified. I don't know if it can
24 cause confusion or not. It doesn't bother me, but I
25 could see it maybe being a problem.

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1 MEMBER HALNON: This is Greg, just one
2 thing I wanted to highlight, and maybe you can tell me
3 if I'm wrong. When you do the assessment of defense-
4 in-depth, I mean, we've already eliminated any
5 operator action from this assessment, correct?

6 I mean, is that -- because the operator is
7 like a real important aspect of defense-in-depth that
8 we talk about today. But here we've eliminated that
9 operator action from being considered. Is that
10 correct?

11 MS. GRADY: Yes.

12 MEMBER HALNON: Okay.

13 MR. BLEY: So even errors of so-called
14 errors of commission, which could create situations
15 nobody thought about.

16 MEMBER HALNON: Yeah, that's a question
17 that I was going to follow up with.

18 MR. BLEY: Oh, I'm sorry.

19 MEMBER HALNON: I mean, you're absolutely
20 right, Dennis. Throughout this credited human
21 actions, and the questions would be, well, what about
22 uncredited human actions.

23 And I think part of the assessment of its
24 -- I mean, the entry criteria eliminates those as
25 well, because it talks about -- I think this is the

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1 area that it talks about. Or is that in the -- see,
2 I get them mixed up now, GLRO, the license operator of
3 this one.

4 MR. BLEY: I think it's in here, but.

5 MEMBER HALNON: Yeah, I think it
6 illuminates that errors of commission and omission in
7 the entry criteria so that --

8 MR. BLEY: There's a bit of a problem with
9 that, and that is I don't know of any, I'll call it
10 approved, NRC guidance that gives people guidance on
11 how to search for those errors of commission, things
12 we didn't expect the operators to do.

13 I sat in on a meeting, God, it's probably
14 been 30 years ago, with a passive design group of
15 folks. And nothing could happen to that reactor, but
16 I saw a couple dials and said, well, what if the
17 operators closes those, you could get into a pretty
18 bad state. And their response was well, nobody would
19 ever close those. And you know, that kind of stuff
20 happens.

21 The Athena guidance gave one way to look
22 to try to search for errors of, so-called errors of
23 commission. But I -- maybe somebody on the staff can
24 tell us how they're going to gain confidence that
25 there are no errors of commission that could cause a

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1 problem.

2 MR. SEYMOUR: So if I -- if I could just
3 make a point here, again, sorry to interject. This is
4 Jesse Seymour from the Operator Licensing and Human
5 Factors Branch.

6 One thing that I wanted to kind of harken
7 back to we talked about earlier was how the, you know,
8 the AERI criteria, you know, pointed to inherent
9 characteristics and passive safety features of, you
10 know, what I referred to in passing as a robust -- of
11 a robust nature. And the reason for that, the basis
12 for that, gets right to the heart of this issue,
13 right.

14 How do you go through and how do you, you
15 know, address the potential not only for errors of
16 commission, but also errors of omission, right. So
17 either folks going through and doing things that they
18 shouldn't do or failing to do things that they should,
19 right.

20 So in terms of someone not taking a
21 mitigative action, that's a little bit, you know,
22 easier to go through and to assess. In the case of an
23 error of commission, someone, you know, taking some
24 type of inappropriate act, that's a much wider range
25 of things, right.

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1 And so the types of things that were on
2 our mind as we consider that were what happens if
3 someone goes through and you know, leaves a valve out
4 of position during maintenance, right. Or if they go
5 through and they, you know, leave a train of reactor
6 protections, you know, in a deactivated state, right,
7 inhibited or whatnot.

8 And so as we went through, what we found
9 was that you know, the complexity of that issue was
10 such that if you instead looked at the types of safety
11 features that could be used and you limited those to
12 things that were would be generally resistant to the
13 influence of those types of errors, right, so things
14 of -- you know, and I've used the terms robust,
15 passive, and inherent.

16 But you know, to make it tangible the
17 types of things that we're talking about are, you
18 know, concrete, steel, you know, advanced types of
19 fuels, right, you know, heat pipes, right. These
20 types of things that don't have, you know, valves that
21 move and you know, components that actually so on and
22 so forth. Or even necessarily reliance on stored
23 energy.

24 And if you use those types of, you know,
25 mechanisms, then you're going to be hard-pressed to

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1 have human errors that are going to be able to
2 influence their function on these types of conditions,
3 right.

4 And so when we're dealing with AERI, one
5 of the things that we don't have is we don't have, you
6 know, the PRA approach that would go through and that
7 would really dig into, you know, the complexities of
8 active systems and so forth.

9 So another layer to what we had to do here
10 is to say in the absence of that type of approach,
11 what is it that we're willing to credit if we're not
12 going to go through and quantify, you know, the
13 function of those active features and also, you know,
14 the human interaction with them.

15 So again, I just wanted to put those
16 points out there, you know, again, just kind of
17 jumping in a bit with some of what we'll talk about
18 tomorrow as well.

19 MR. BLEY: Yeah, well, given the right
20 design, as you were saying, it gets much easier to
21 show there's nothing anybody can do to cause a
22 problem. But we don't know what designs will come in
23 and try to come in under AERI.

24 So if there are human actions that can get
25 us in trouble, they may be harder to search for. If

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1 the systems are simple enough, maybe, maybe not.
2 Maybe it's easy.

3 CHAIR PETTI: I thought I'd let folks know
4 someone posted in the chat, which we're not supposed
5 to do, but the glossary, the definition of defense-in-
6 depth in the NRC glossary has the terms the layer of
7 defense in their definition.

8 MEMBER HALNON: It has emergency response
9 actions too, so if that's the -- what we're
10 eliminating in this, what we're talking about. So
11 anyway, that's a key portion of defense-in-depth, and
12 I think we just have to change our mindset a little
13 bit because we've seemingly eliminated the human
14 portion of this earlier on by getting to this point.

15 MS. GRADY: Largely, the plants that are
16 going to be able to avail themselves of the AERI
17 methodology are hopefully very simple plants. And
18 there's not a lot of complexity that we seem to be
19 thinking of as examples.

20 MEMBER HALNON: I agree, Anne-Marie, but
21 it's very difficult for an operator to put their hands
22 in their pockets and just watch something happen.

23 MS. GRADY: Yes.

24 MEMBER HALNON: So that's the point Dennis
25 is trying to make I think.

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1 MS. GRADY: Okay, so would you like some
2 elaboration on this further in the draft guide, is
3 that what you're saying?

4 MEMBER HALNON: Not necessarily. I mean,
5 I think that it's something to think about. I think
6 it goes back to the passive discussion to some extent.
7 And you know, you've got it clearly covered in the
8 entry criteria.

9 I think the difference is that we have to
10 change at this point. When we say here defense-in-
11 depth, we've to change the paradigm in our mind that
12 there is no human action permitted to be talked about.

13 I mean, we talked about credited human
14 action with the license events. But there's a lot of
15 human actions that aren't credited that could either
16 help or hinder the response of the plant.

17 And those need to be looked at as well.
18 And you sort of have it up front, but I think it just
19 needs to be kept in mind as we go through defense-in-
20 depth, because it is a pretty broad terms that
21 includes human actions.

22 MS. GRADY: Thank you. Any other
23 questions? Next slide, please. Could we see the next
24 slide, please? How about the previous one? Thank
25 you, thank you.

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1 Okay, the next two slides are new since we
2 spoke about Draft Guide 1414 back in June, when we had
3 promised you that we would address maintaining and
4 operating the AERI risk evaluation. And the material
5 is in the draft guide. And I'm going to summarize it
6 here.

7 And on this slide, the slide one of two,
8 the steps that are going to be recommended are
9 required are to assure that the risk evaluation
10 continue to be useful, valid, and an adequate basis
11 for regulatory decisionmaking throughout the plant
12 lifetime.

13 The initial risk evaluation must be
14 performed by the scheduled fuel log date. The risk
15 evaluation should be maintained or upgraded every five
16 years. The -- we -- also required is to regularly
17 assess that the postulating bounding event selection
18 remains current. If it's not, we need -- the
19 applicant needs to identify a new postulated bounding
20 event to be used in an upgraded risk evaluation.

21 The as-built, as-operated facility needs
22 to be reflected in the -- or an operational scheme
23 needs to be reflected since if it's been changed since
24 the prior risk evaluation. And if it has, then risk
25 evaluation needs to be maintained or upgraded.

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1 If any new safety issues have arisen, then
2 it needs to be ascertained that the new safety issues
3 that have arisen since the prior risk evaluation, that
4 the risk evaluation would be maintained or upgraded to
5 reflect the new safety issues.

6 Likewise, if new data, information, or
7 analyses become available, they need -- the applicant
8 needs to ascertain if any relevant new data,
9 information, or analyses have arisen since the prior
10 risk evaluation. And if so, to maintain or upgrade
11 the risk evaluation.

12 Now, I need to -- I need to explain a
13 distinction between this slide, which is current and
14 worded carefully to reflect either that the risk
15 evaluation needs to be maintained and/or upgraded,
16 because the draft guide language right now in Part --
17 in Section C in the draft guidance is lagging in this
18 current wording.

19 And in the draft guide, the wording where
20 we have maintaining or upgrade, we have updated. And
21 that's going to be changed at the next opportunity to
22 change the draft guide so that the draft guide will
23 conform to what you see on this slide 98. So
24 maintained and upgraded are the proper terms, the ones
25 that we've relied on and will continue to rely on.

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1 The draft guide will be updated. And that
2 applies to Sections C 7.2, 7.3, an 7.4. Updated is --
3 will be revised.

4 MEMBER HALNON: Anne-Marie, this is Greg.
5 Thanks, that is a curious question. But also is the
6 five years expected to be or intended to be a backstop
7 in that if there's any significant change, that they
8 should be upgraded in real time? Or is it just keep
9 a list of all the stuff and upgrade it every five
10 years?

11 MS. GRADY: I don't-- the draft guide is
12 not specific, to answer your question. I assumed it
13 was going to be keep track of it and maintain it or
14 upgrade it every five years. But if somebody knows
15 more than I do, then I appreciate any insight they
16 might have.

17 MR. BLEY: This is Dennis. Somebody early
18 today, one of the first presentations, and it might
19 have been Bill, I'm not sure, who first described this
20 language change, and it's nice to have fixed language.
21 I thought, like the PRA, it's updated periodically.
22 And I thought he said this, unless there's a change.
23 And then at that point, you have to upgrade it
24 immediately.

25 Somebody said that, and the reg guide

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1 should be fixed to be specific to make that clear.

2 I don't know, Bill, was that you or
3 somebody else talking about this upgrade language? I
4 remember the slide.

5 MR. STUTZKE: Yeah, Dennis, this is Marty.
6 I talked about it earlier. And I will go back and see
7 what the rule text actually says.

8 MR. BLEY: Okay, because I think, it must
9 have been your presentation. I think when you said
10 it, at least the impression I got was you upgrade
11 either at the fixed time interval or if there's a
12 significant change to something that might affect the
13 rest of the plant.

14 MEMBER HALNON: And that's what I was
15 hoping. That's what I'd expect, I thought the five
16 years would just be a backstop to make sure that it's
17 -- it's current.

18 MR. BLEY: Yeah, and yeah, to accumulate
19 changes like they collected data and this sort of
20 thing, yeah. So it ought to say that, and we probably
21 ought to consider that in our response to this.

22 MEMBER HALNON: Yeah, I agree.

23 MR. BLEY: That would be a good one to
24 bring up at the full Committee, by the way, and
25 clarify that point.

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1 MS. GRADY: Yes, we will check the rule
2 language and we will bring -- we will address it at
3 the full Committee meeting.

4 MEMBER BIER: Hi, another question, this
5 is Vicki Bier. First of all, thank you, Dennis, for
6 raising that point. Also, I may have kind of missed
7 some details on this earlier in the day, but what is
8 the distinction of what would require an upgrade
9 rather than just maintenance like repeating the
10 analysis with more up-to-date data?

11 MS. GRADY: If it would change the risk
12 evaluation, the consequences of the evaluation. If
13 the new information would change the results.

14 MEMBER BIER: I guess I'm wondering is it
15 just sort of new plant information, like we discovered
16 a new scenario that wasn't in our original analysis?
17 You know, kind of a Browns Ferry type situation?

18 Or whether it's also, you know, kind of
19 updated methodology that, you know, other plants have
20 been doing more sophisticated AERIs or the NRC has
21 changed the guidance on AERI so now you have to do a
22 little more than you had to five years ago.

23 MS. GRADY: I don't know if you're
24 suggesting that the conditions for the risk evaluation
25 should be changed once somebody has met the entry

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1 conditions. I think they just have to keep them
2 maintained or upgraded. I don't think -- I don't
3 think new requirements can be imposed, I guess is what
4 I'm saying.

5 MEMBER BIER: Got it. Okay, yeah, I think
6 I'm just stumbling over the concept of upgrade, the
7 term upgrade. Because I kind of feel like, you know,
8 gee, upgrade kind of talks about new methodologies.
9 They're a better method for doing this now. But it
10 doesn't sound like that's what is meant by it in this
11 context, so that's fine. Yes, thank you.

12 MS. GRADY: You're welcome. Next slide,
13 please.

14 MEMBER DIMITRIJEVIC: Anne-Marie, hi, this
15 is Vesna. I just have to point out that here we are
16 talking about ultimately the evaluation of risk, you
17 cite risk evaluation, so. You know, this risk
18 evaluation doesn't go with AERI, so it's just we have
19 to keep in mind what we are talking in AERI. We're
20 already talking about evaluation of risk is just
21 alternative.

22 It's just my comment on the language, that
23 we have repetition. Maybe this -- you should you call
24 every approach ultimate risk assessment, ARA or
25 something, risk evaluation. But here you already have

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1 evaluation of risk in AERI.

2 MS. GRADY: Vesna, I'm sorry, I'm not
3 following your point.

4 MEMBER DIMITRIJEVIC: Okay, then main AERI
5 already has risk evaluation.

6 MS. GRADY: Yes.

7 MEMBER DIMITRIJEVIC: So they just say --
8 so basically what you are saying ultimate evaluation
9 of risk inside risk evaluation. That doesn't make
10 sense. That's what I'm saying, so.

11 Because if that will be equivalent if I
12 say PRA, you know, risk assessment, because risk
13 assessment is already part of PRA, you know, what I
14 mean? It's the way how it's phrased, it's duplicate
15 of the aggravation and the roles.

16 MS. GRADY: Thank you. Marty.

17 MR. STUTZKE: In the, I agree, the title
18 of the slide is a little awkward. In the rule text,
19 we require applicants to perform a risk evaluation,
20 which is either a PRA or this AERI, the alternative
21 evaluation for risk insights. In other words, both
22 AERI and PRA are types of risk evaluations.

23 MEMBER DIMITRIJEVIC: Okay. I mean, this
24 is like, because basically your AERI is just
25 alternative to PRA. Simplified PRA or whatever,

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1 something which is not cumulative about the event. So
2 I mean, I just want to say the way how, you know, then
3 maybe you shouldn't have a risk evaluation in the --
4 all right.

5 Just picking on the -- that's okay.
6 Whatever you have, you already developed, so it is
7 best.

8 MS. GRADY: Thank you for your comment.
9 Next slide, please. Okay. Moving on to maintaining
10 and upgrade the AERI. The QHO comparison, if the AERI
11 risk evaluation requires upgrading, the QHO comparison
12 should be revisited and modified if appropriate.

13 Likewise, for the vulnerability search, if
14 the risk evaluation requires upgrading the severe
15 accident vulnerability search should be revisited and
16 modified if appropriate.

17 For the search of risk insights, if the
18 risk evaluation requires upgrading, the search for
19 risk insights should be revisited and modified if
20 appropriate. And likewise on the defense-in-depth, if
21 the risk evaluation requires upgrading, the defense-
22 in-depth should be -- evaluation should be revisited
23 and modified, if appropriate.

24 And as I mentioned on the previous slide,
25 the slide itself, this slide is current, the language

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1 is current. The language requiring upgrading and
2 revisiting and modifying are all current. The
3 language in the draft guide is lagging.

4 And where it says upgraded on slide, it
5 says updated in the draft guide. We are going to
6 revise that to conform the draft guide to this slide.
7 And the affects in Section C of the draft guide
8 Sections 7.5, 7.6, 7.7, and 7.8.

9 That's all I have. If anybody has any
10 further questions or comments.

11 MEMBER REMPE: Hi, this is Joy. I was
12 looking through the updated draft guide, the fact that
13 it emphasizes if you don't have an essentially
14 complete design you may have trouble going through
15 AERI caught my eye. And it was actually in the
16 earlier version.

17 But I'm just wondering if that point has
18 been sufficiently emphasized in your interactions with
19 other stakeholders so everybody understands this.
20 Because I mean, that was one of their complaints, that
21 it was hard to do a PRA for these simple designs. But
22 I'm also wondering if it's also a lack of completeness
23 in their design methodology.

24 Any thoughts on that topic?

25 MS. GRADY: We have a meeting with -- in

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1 meetings with stakeholders emphasized the fact that
2 they may want to avail themselves of the AERI
3 approach.

4 And it may be early in their design phase,
5 which probably means that it's going to be kind of an
6 iterative process for them. Because eventually once
7 their design has reached some sort of mature stage,
8 they'll have establish that they meet the entry
9 conditions.

10 So we have emphasized it's iterative in
11 our discussions with stakeholders, yes.

12 MEMBER REMPE: Okay, thank you.

13 MS. GRADY: You're welcome.

14 MEMBER HALNON: Members, any other
15 comments? Well, thank you, Anne-Marie. With that, we
16 have covered everything that we had planned to cover
17 today. And we will be back at it, same time, same
18 place, tomorrow to continue.

19 I just want to reflect there's a lot of
20 information here. The presentations were really
21 helpful. As I think about having to wade through the
22 2000 pages last week, it would have been nice to have
23 had the slides ahead of that. It would have helped me
24 focus.

25 But does anyone want to have any broad

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1 discussion? Or we can obviously wait until tomorrow
2 when we've finished the rest of the topics.

3 I think we're on the down side of
4 diminishing marginal returns here then. So why don't
5 we recess today, and we'll see everybody again at 8:30
6 tomorrow morning. Thank you.

7 (Whereupon, the above-entitled matter went
8 off the record at 4:15 p.m.)

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NUCLEAR REGULATORY COMMISSION

Title: Advisory Committee on Reactor Safeguards
Radiological Rulemaking Policies and
Procedures Part 53 Subcommittee

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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REGULATORY RULEMAKING, POLICIES AND PRACTICES:

PART 53 SUBCOMMITTEE

+ + + + +

WEDNESDAY

OCTOBER 19, 2022

+ + + + +

The Subcommittee met via Video
Teleconference, at 8:30 a.m. EDT, David Petti,
Chairman, presiding.

COMMITTEE MEMBERS:

DAVID PETTI, Chair

RONALD G. BALLINGER, Member

VICKI BIER, Member

CHARLES H. BROWN, JR., Member

VESNA DIMITRIJEVIC, Member

GREGORY HALNON, Member

JOSE MARCH-LEUBA, Member

JOY L. REMPE, Member

MATTHEW SUNSERI, Member

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1 ACRS CONSULTANT:

2 DENNIS BLEY

3 STEPHEN SCHULTZ

4

5 DESIGNATED FEDERAL OFFICIAL:

6 DEREK WIDMAYER

7

8 ALSO PRESENT:

9 BOB BEALL, NMSS

10 MIHAELA BIRO, NRR

11 KEITH COMPTON, RES

12 DAVID DESAULNIERS, NRR

13 CYRIL DRAFFIN, Public Participant

14 ROBERT FORTNER, Public Participant

15 RANI FRANOVICH, Public Participant

16 ANNE-MARIE GRADY, NRR

17 NIAV HUGHES GREEN, RES

18 JORDAN HOELLMAN, NRR

19 WILLIAM JESSUP, NRR

20 CONNIE KLINE, Public Participant

21 HILARY LANE, Public Participant

22 STEPHANIE MORROW, OEDO

23 LAUREN NIST, NRR

24 WILLIAM RECKLEY, NRR

25 AARON SANDERS, NMSS

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- 1 MAURIN SCHEETZ, NRR
- 2 JOHN SEGALA, NRR
- 3 JESSE SEYMOUR, NRR
- 4 MOHAMED SHAMS, NRR
- 5 MARTIN STUTZKE, NRR
- 6 BOYCE TRAVIS, NRR
- 7 KATIE WAGNER, NRR
- 8 KALENE WALKER, Public Participant
- 9 JIM XU, RES
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P R O C E E D I N G S

8:30 a.m.

CHAIR PETTI: Good morning, everyone.
Welcome back to Day Two of our discussions on Part 53.

For the benefit of the court reporter I'll just go through who I see online, we have Member Brown, Consultant Bley, Member Halnon, Member March-Leuba, Member Rempe, Member Sunseri, Member Ballinger, Consultant Schultz, Member Dimitrijevic, and Member Bier. So we have everybody we had yesterday.

With that I'll just turn it over to the staff to continue following the agenda.

MR. GREEN: Hi, good morning. This is Brian Green. I think we still have one member who's still trying to get into the meeting, so let me just confirm, Maurin, have you made it in yet? This she was having trouble with one of the links --

(Simultaneous speaking.)

MR. SCHEETZ: No, I'm in. I think Theresa was just joining, I think we got Theresa in now, too, so we're good.

MR. GREEN: Okay, great, we'll get started.

Thank you. My name's Brian Green, I'm the Human Factors Team Lead for NRR. I worked -- previous

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1 to joining the NRC 12 years ago I got my PhD in
2 industrial engineering and human factors at the
3 University of Buffalo, where I studied trust of
4 automation and different human factors aspects related
5 to the aviation industry.

6 Today I'm going to be bringing the Human
7 Factors team to discuss some of the aspects of Part
8 53, about how operator licensing and human factors
9 will be treated under there, as well as the key
10 guidance that we have.

11 Just like to start with a few opening
12 remarks and then I'll go through an agenda, and
13 introduce the rest of the team.

14 Throughout the history of nuclear power
15 the nuclear power plant operator has been considered,
16 often assumed, and sometimes taken for granted as a
17 last line of defense. When active systems like pumps
18 fail, it's expected that the operators will recognize
19 the condition and take appropriate actions to ensure
20 safety.

21 The NRC has taken an active role in
22 ensuring that operators are capable of completing such
23 actions by verifying their qualifications through
24 operator licensing program, and ensuring the operators
25 have the correct displays, controls, alarms and other

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1 tools necessary to complete important tasks, by
2 conducting human factors license reviews.

3 It is true that we have always relied on
4 the operator as the last line of defense, however it
5 may not always have to be that way. Small source
6 terms, inherent safety features and other design
7 features have already decreased the role that the
8 operator plays in ensuring safety. This trend is
9 likely to continue into the foreseeable future.

10 Recently NEIMA challenged the to create a
11 regulation that is technology-inclusive, risk-
12 informed, and performance based. Therefore, the staff
13 drafted Part 53 which proposes certain regulations
14 that allow for more flexibility of operation,
15 training, and human system interface design for
16 facilities that have a strong safety case that
17 operator action is in fact not necessary to ensure
18 safety.

19 For designs that continue to rely on
20 operator actions to safely manage emergencies under
21 abnormal events, the requirements are scaled
22 appropriately.

23 Skeptics of what we proposed in the draft
24 rule language may believe that it is appropriate to
25 maintain the high standards currently used for

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1 operator licensing and human factors design.
2 Maintaining these high standards would certainly help
3 ensure safety, we know this because the existing rules
4 have been in place for decades and they've served us
5 well in that time.

6 However, maintaining these high standards
7 comes with a significant financial cost. It is
8 expensive for utilities to develop and maintain
9 operator licensing programs under Part 55, and it is
10 expensive to implement a human factors design process
11 like the one described in NUREG-0711 which is
12 currently used with Part 50 and Part 52 licensees.

13 While these costs are justified with large
14 facilities, they may be impediments to innovation for
15 smaller designs. In some cases these costs may not be
16 necessary or justified to provide a reasonable
17 assurance of safety, especially for the smaller
18 designs. Therefore, the staff proposed a series of
19 gatekeeping elements in the draft rule to help ensure
20 that these designs have robust inherent designs with
21 demonstrated lower consequences are not subject to
22 overly burdensome regulatory requirements.

23 Previously the human factors and operator
24 licensing staff presented draft rule language to this
25 committee, the industry, and to the public on numerous

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1 occasions. The rulemaking language is written at a
2 high level and many of the details that the staff had
3 considered were not included in that language, because
4 it was reserved for key support-guidance documents
5 where this level of information is more generally
6 preferred.

7 On September 30 the staff released the
8 first draft of several key guidance documents
9 associated with the human factor and operator
10 licensing programs.

11 The staff and I believe that this
12 guidance, when paired with the draft rule language,
13 will provide a flexible framework that is consistent
14 with the congressional mandate described in NEIMA to
15 be risk-informed, performance-based, and technology
16 inclusive. While still relying, to the degree
17 necessary, on various regulatory mechanisms, like
18 human factors licensing design reviews, operator
19 licensing principles that are scaled to appropriate
20 levels, based on risk associated with the specific
21 design characteristics.

22 The staff welcomes any feedback that this
23 committee provides that will help ensure that we meet
24 the mandates in NEIMA, while still providing a
25 reasonable assurance of safety.

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1 And I'd like to quickly run through our
2 agenda and introduce the team. Next slide, please.

3 So we've just gone through our
4 introduction here, we're going to go through the
5 updates to Subpart F and P since the second iteration.
6 And then we're going to go through a quick summary --
7 well, I guess how quick it will be, I think we've got
8 four hours to go through it -- but we are going to go
9 through overviews of several ISG documents for
10 operator licensing program reviews, staffing plan
11 reviews, and a scalable human factors engineering
12 review plan. And of course, we'll have plenty of time
13 for questions. Next slide, please.

14 I'd like to thank many of the staff that
15 are here to support us today, including Theresa
16 Buchanan who will be speaking, Dr. Dave Desaulniers,
17 Dr. Niav Hughes Green, Dr. Stephanie Morrow, Lauren
18 Nist our Branch Chief, Maurin Scheetz, and Jesse
19 Seymour. All of which have played a key role in
20 developing the rule -- the draft guidance that you'll
21 be discussing, and there have been several others who
22 have contributed to this effort as well.

23 Now I'd like to turn the presentation over
24 to Jesse Seymour. Jessie?

25 MR. SEYMOUR: Yes, thank you, Brian, I

1 appreciate it.

2 So, my name is Jesse Seymour and I am an
3 operator licensing examiner and human factors
4 technical reviewer in the Office of Nuclear Reactor
5 Regulation.

6 And I will be discussing several items
7 before we get into this morning's detailed discussion
8 of our key guidance documents that cover the areas of
9 the operator licensing program, staffing plan, and
10 human factors engineering reviews under Part 53.

11 Specifically I'll be highlighting certain
12 changes that have been made to the preliminary Part 53
13 rule language since the last presentation that we made
14 to this committee, some of which were in direct
15 response to points raised by the committee members.

16 I'll also be discussing the present status
17 of our approach within the areas of engineering
18 expertise and generally licensed reactor operators, as
19 well.

20 Lastly, I'll also discuss the related
21 portion of the staff's latest letter response to the
22 committee and how these considerations informed our
23 portion of that response.

24 To begin with, a significant change since
25 our last presentation -- actually, I'm sorry, can we

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1 move on to the next time, please? I just realized the
2 slides had advanced, thank you.

3 To begin with, a significant change since
4 our last presentation is that all of the operations
5 phase requirements from human factors engineering,
6 staffing, operator licensing, and training have now
7 been consolidated under Subpart F.

8 For its part, Subpart P now just contains
9 a single pointer that is located at 53.4220 to
10 indicate the dual applicability of Subpart F's single
11 set of requirements for these areas within both
12 frameworks.

13 This approach was used in conjunction with
14 some limited modification to Subpart F's wording to
15 allow for those requirements to apply to both
16 frameworks, A and B. In this way we've been able to
17 substantially reduce the overall quantity of rule
18 language needed to cover the full scope of Part 53's
19 requirements for operations.

20 Additionally, in response to a request
21 from stakeholders to provide a specific name for the
22 class facilities that would utilize generally licensed
23 reactor operators, we've defined the class of reactors
24 meeting those technical requirements under the new
25 term of self-reliant mitigation facilities.

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1 This term reflects that a primary
2 characteristic of these facilities is that they are
3 not dependent on operator interaction in the
4 mitigation of events, and as a result can be viewed as
5 relying upon the characteristics of their own design
6 in that regard.

7 Another area where we have sought to
8 simplify our requirements has also been within the
9 area of programmatic requirements for procedure
10 management.

11 Based upon a careful review of other
12 related requirements within Part 53, we determined
13 that our separate requirement located under 53.730(e)
14 was duplicative and could be consolidated without
15 leaving any gaps in the regulatory treatment of these
16 programs.

17 With regards to facility staffing plan
18 requirements of 53.730(f), we modified the nature of
19 the description provided for non-operations personnel
20 such that greater emphasis will now be placed on
21 describing how support functions like maintenance,
22 fire protection and radiation protection will be
23 accounted for under the proposed staffing plan.
24 Instead of the focus being on defining the numbers of
25 staff within various support roles.

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1 The intent here is to be able to gain the
2 same insights about what support is provided to
3 operators, as well as what additional responsibilities
4 might compound the operator's workload, without
5 necessarily locking a future licensee into unwarranted
6 license amendments to modify the number of
7 individuals, like maintenance staff, later on once the
8 staffing plan has undergone its initial approval.

9 Separate from these areas, we've updated
10 our requirements for operator licensing examination
11 programs to explicitly require that such programs
12 provide for exams to possess the fundamental testing
13 attributes of being both, valid and reliable. This
14 update is interrelated with the operator licensing
15 program guidance that will be discussed in the next
16 portion of the presentation.

17 And these concepts of validity and
18 reliability in exams factor centrally into that
19 approach.

20 A further enhancement to the rule language
21 within the area of operator licensing is that remedial
22 training is now explicitly mandated for operators who
23 do not pass their periodic continuing training
24 examinations.

25 Lastly, within the context of the training

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1 and examination programs for licensed operators, a
2 change has been made such that commission approval is
3 no longer required for simulation facilities.
4 Instead, an approach comparable to that currently
5 utilized for plant reference simulators would be
6 utilized exclusively instead. Under which the
7 suitability of stimulation facilities would be
8 determined the via inspection by the staff.

9 It is anticipated that this will allow for
10 a more efficient process for new simulation facilities
11 being placed into service. Next slide, please.

12 MR. BLEY: Jesse, this is Dennis Bley.
13 Are you going to talk more about that last bullet?

14 MR. SEYMOUR: I don't have another, you
15 know, slide that comes back around to it. So we can
16 certainly talk more about it now.

17 MR. BLEY: Yeah, if you could go over it
18 again I'd appreciate it, and I guess I'm not
19 completely familiar with the commission approval
20 process for current large reactors. Say a little
21 more about this if you can, explain it.

22 MR. SEYMOUR: Sure, I'll start out and,
23 you know, Maurin, you know, if you have insights as
24 well, too, that you'd like to share please, you know,
25 feel free to add on.

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1 But currently, under, you know, the
2 existing simulator regulations, you know, so again
3 55.46, there are two tracks by which you can get a
4 simulator essentially, you know, able to be used, you
5 know, from a regulatory standpoint.

6 And one is to use a plant reference
7 simulator and the other is commission approval, right?
8 Now, commission approval, you know, is a little bit
9 different in that it leaves alternatives to the use of
10 a full-scope plant reference simulator. So, again, it
11 is something that could be used to address a wider
12 variety of approaches.

13 However, as we went back and we looked
14 through this approach what we found was that we could
15 leverage the same, you know, type of approach that's
16 currently used to review plant reference simulators,
17 and consider a wider variety of technologies without
18 necessarily having to go through that, you know,
19 administrative step of commission approval.

20 So, again, you know, the simplification
21 here is that, under a plant reference simulator
22 approach, we wouldn't be going through and doing, you
23 know, a review and approval, you know, of the
24 simulator in a way that -- actually, let me re-phrase
25 that. We wouldn't be going through and, you know,

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1 doing this, you know, commission approval process in
2 necessarily the same structured way.

3 What it would do is let us come in and,
4 using an inspection procedure, inspect the facility
5 that was intended to be used and then go ahead and,
6 you know, allow it to be used within that context.

7 So, again, it's a mechanism -- and by that
8 I mean, commission approval is a mechanism that's
9 really there to allow for alternatives, you know, to
10 a full-scope plant reference simulator. And, really,
11 what we would be doing is taking that plant referenced
12 type of structured approach and just allowing it to be
13 used for a wider variety of simulation facilities.

14 Maurin, did you have anything that you
15 felt that you could, you know, add onto that?

16 MR. SCHEETZ: I actually don't, Jesse.
17 And I thought Theresa covered this a little bit in her
18 ISG, I wasn't sure.

19 MS. BUCHANAN: I think there is a slide
20 related to that section, there's a section on
21 simulators in the operator licensing ISG, Jesse.

22 MR. SEYMOUR: Okay. Yeah, so we will
23 circle around a little bit.

24 MR. BLEY: That helps me a bit, thank you.

25 MEMBER BIER: Another interruption, this

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1 is Vicki Bier. I don't want to get us too off track
2 before getting into the detailed discussions,
3 obviously, but I have a little bit of concern with
4 some of the language. Both, with what you said about
5 self-reliant mitigation facilities and with Brian's
6 comment that we are no longer relying on humans as the
7 last line of defense.

8 And, you know, I understand that, yes,
9 there may be circumstances with the safety case
10 doesn't depend on human involvement and where, for
11 whatever reason, inherently safe features, or a small
12 source term, or whatever we feel comfortable going
13 with, a lesser level of requirements for human
14 operators.

15 But I think the language that says that we
16 don't need to rely on humans maybe sets a little bit
17 of a wrong expectation, because in a number of these
18 cases I think the technology, whether the reactor
19 design or the software design -- if it's an automated
20 safety actions -- is not necessarily going to be
21 mature at the beginning of licensing.

22 And, you know, I was just talking about
23 this with a colleague of mine about, you know, what is
24 and isn't mature in automation. And you can think of
25 a car as being automation but it's at a mature level

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1 where I can set out driving from, you know, D.C. to
2 California and I don't need to bring a mechanic or,
3 you know, plan for stops along the way for upgrades or
4 whatever.

5 But that's because we have, you know, a
6 century of design experience and improvement, and, you
7 know, if you think about even just, for example, the
8 Browns Ferry fire, you know, we had learning along the
9 way of what was needed to achieve safety for our
10 current fleet.

11 And so, it's one thing I think to say that
12 we don't anticipate that human involvement would be
13 needed, but I think it's still helpful to keep a
14 mindset that, even though we aren't anticipating that
15 human role, humans may still be the last line of
16 defense. Even, for example, if it is not an operator
17 based at the site, but somebody brought in, you know,
18 in an unanticipated type of emergency.

19 So there's just that caution from my side
20 about let's not put too many assumptions in the
21 language. It's one thing to say that, you know, we
22 think we can have a lesser reliance on humans, but not
23 think that humans are out of the loop. Because there
24 could still be unanticipated occurrences where we turn
25 out to need humans, even though we didn't think we

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1 would.

2 So that's my comment.

3 MEMBER BROWN: This is Charles Brown --
4 (Simultaneous speaking.)

5 MR. GREEN: Hi, Vicki --

6 MEMBER BROWN: This is Charles Brown. I
7 wanted to echo Vicki's thoughts, particularly
8 discounting the operators specifically but also the
9 thought process that maintaining the high standards --
10 which was stated in the introductory comments --
11 maintaining the high standards of the past was kind of
12 counterproductive to where we were going.

13 That's the way I read the comment,
14 counterproductive to where we're going in the future
15 with this rule. So that's somewhere disturbing to me,
16 to cut the operators out and/or either to not cut them
17 out, but then think they don't need to be as well
18 trained. I just have a psychological problem with
19 that, that's my thought process.

20 MR. GREEN: This is Brian Green, I'll
21 respond to both of those together.

22 We are not making any assumptions that the
23 operator will be cut out, we understand that that is
24 a desired place for the industry to go and we're
25 attempting to be flexible, and create a rule that's

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1 flexible that should somebody be able to propose a
2 design that relied very little on a human, that we
3 could scale the oversight to that particular facility
4 appropriately.

5 Now, whether anybody or not can ever get
6 there and prove that to us, that remains to be seen.
7 But, I don't want to send the message that we're
8 assuming that that's the way things are going to go,
9 we're just planning for the flexibility to have a rule
10 that adjusts the regulatory oversight accordingly to
11 what the facility design needs.

12 And Vicki, I agree with your statement
13 that, you know, when an applicant comes in some of the
14 design is still unclear. So, you know, when we get
15 into the human factors, the scalable human factors, we
16 have designed a process where we will, you know,
17 consider what we know throughout the pre-application
18 process and adjust that as we go as we learn more
19 about the design.

20 But we are sensitive to that fact that,
21 you know, the design on day-one is not necessarily the
22 same as it's going to be by the end of the licensing
23 process.

24 MEMBER BROWN: At some point you have to
25 make a thought that -- it's still walking past me to

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1 think that, yeah, that's where industry wants to go,
2 where they can totally divorce a site and you're just
3 giving them the flexibility to justify that.

4 At some point I just think the NRC should
5 be putting their foot down and say, no, we will have
6 operators regardless. I'll quit with that.

7 MEMBER BALLINGER: This is Ron Ballinger.
8 I'm going to, I guess, extend a little bit of what
9 Vicki was saying.

10 I'm assuming that you're connected with
11 both, the NASA people and actually the state of the
12 art of the aircraft industry, they don't use the term
13 self-reliant mitigation but that's what it is.

14 And what they have is kind of a
15 supervisory program which, for lack of a better word
16 -- I'll use a buzzword, I'll call it a digital twin,
17 but maybe not -- where, at least in the NASA case,
18 while there's obviously no operator if the device is
19 200 million miles away from the earth, but they have
20 rules by which they calculate what they call time to
21 critical event in the case of a satellite.

22 And in the case of an aircraft, like the
23 777 or the even newer ones, they have the same kind of
24 thing which these planes will fly themselves from
25 take-off to landing with no operator intervention,

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1 except to change the coffee cup.

2 But if something is going wrong the system
3 kind of detects it and then lets somebody know that
4 you're getting into a region of the operating envelope
5 that's not quite what it should be, and that some kind
6 of operator -- whether it's 200 million miles away or
7 in the pilot seat -- has to take some action.

8 So I'm assuming you're cognizant of that
9 stuff?

10 MEMBER BROWN: Also look at how well that
11 philosophy worked with the Boeing issues, they locked
12 the pilot out, he couldn't recover --

13 MEMBER BALLINGER: Well --

14 MEMBER BROWN: Because the software wasn't
15 good enough.

16 MEMBER BALLINGER: Well, but the prime
17 directive here is you can't fix stupid.

18 MEMBER BROWN: Well are we going down that
19 path or not?

20 (Laughter.)

21 MEMBER BROWN: I'm just disturbed by
22 thinking we're going to allow anybody to think we're
23 going to allow these reactors to operate unattended,
24 period.

25 MR. SEYMOUR: So if I could speak to those

1 points -- and actually, if we could just advance the
2 slide, see the next slide number 107, it'll, you know,
3 provide some additional information that we're get
4 into it.

5 Because I kind of want to, you know, tie
6 in some of this information to speak to those points.
7 And what I think is essential to realize here is that,
8 there's a few underlying principles that we worked off
9 of.

10 One is that there's no circumstance where
11 we completely remove a human being from, you know,
12 from involvement with a plant, right, from an
13 operation standpoint, it doesn't exist within our
14 framework here, right?

15 The other thing that I just want to point
16 out is that there's extensive gradations that go on
17 here, and there's still a floor, right, so even though
18 we may scale down requirements, right, there's still
19 a prescriptive floor that's set, you know, that
20 establishes a level of capability and instrumentation
21 that we just don't go below, right?

22 So, again, you know, on this slide here
23 what we begin to talk about are the criteria that
24 screen which plants can have the generally licensed
25 reactor operator versus, you know, plants that require

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1 the traditional ROs and SROs.

2 And in conducting that evaluation, you
3 know, again there's a number of factors that we look
4 at but really what we're doing is we're trying to say,
5 is there a credible context where, you know, the
6 operator is going to have to interact with that
7 facility in order to assure, you know, an acceptable
8 safety outcome.

9 And, if that's the case, what we do is we
10 keep things in the regime of having specifically
11 licensed SROs and ROs, right, which, you know, as the
12 NRC we come in, we independently evaluate, you know,
13 to assess the competence and so forth to provide that
14 independent check.

15 However, even when the plants do cross
16 that threshold and, you know, qualify for the
17 generally licensed reactor operators, that's where
18 they end up, they don't go to a state of having no
19 people, right?

20 So I'll give an example, for the SRO and
21 RO plants, right? Again, you know, this threshold,
22 right, the self-reliant mitigation facility
23 technological threshold applies to more than just the
24 operation staffing right? It's crosscutting in that
25 influences how we consider the staffing of a facility

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1 and the human factors engineering requirements as
2 well.

3 So for a facility that has this, you know,
4 this, you know, kind of foreseen credible, you know,
5 role of the operator in assuring, you know, the safety
6 performance of the facility, we're going to require
7 that the state of the art in human factors engineering
8 be required in all contexts where the operator is
9 going to be in a position to have to fulfill safety
10 functions.

11 For the plants that meet that threshold to
12 be a self-reliant mitigation facility, what we do is
13 we still establish that there's a minimum suite of
14 indications and capabilities that the operator has to
15 have. And those indications are derived from the post
16 TMI, you know, HSI design requirements.

17 So again, you know, indications that would
18 be indicative of core damage states, radiological
19 release, and so there's a whole suite of those. So
20 that's required whether or not that plant, you know,
21 qualifies for that treatment.

22 Additionally we mandate from a staffing
23 perspective, that the generally licensed reactor
24 operator, even though we don't require the
25 performance-based testing to show how many of them

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1 need to be there, we establish a prescriptive floor
2 that there must be a provision for continuous
3 monitoring of the fueled reactors, and a continuity of
4 responsibility for them across the life of a facility.

5 So what that equates to is that at any
6 given point in time there has to be someone with, you
7 know, some oversight of that facility. So again, you
8 know, we have minimum indications, we have, you know,
9 that minimum, you know, staffing floor that we put
10 there.

11 And an additional factor that I think it's
12 very important to point out is that we also mandate
13 that the generally licensed reactor operator, you
14 know, has a dedicated set of capabilities that they
15 have to have.

16 And this is something that, even if the
17 human factors engineering requirements were to scale
18 down to close to zero for these facilities -- because
19 there's no human role in the safety functions -- these
20 operators, right, we still mandate for these self-
21 reliant mitigation facilities that the generally
22 licensed reactor operators have to have the capability
23 to shut down the reactor from their location.

24 To, you know, essentially be able to
25 monitor those reactor parameters and those other items

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1 that I described before, you know, indications of core
2 damage state, you know, so on and so forth. They have
3 to have the capability to implement notifications that
4 may be required, again, if they have emergency plan
5 responsibilities.

6 And also, perhaps as importantly, they
7 have to have the capability of dispatching operations
8 and maintenance personnel to that facility. So again,
9 what we do is we establish a floor, you know, below
10 which no more, you know, gradations and capabilities
11 occur.

12 Now, what about the capabilities of the
13 operator themselves, right? And again, we'll get into
14 this when Theresa goes through the operator licensing,
15 you know, process. But what we'll see is that, you
16 know, nearly identical, you know, testing and
17 evaluation, you know, measures are established under
18 the guidance for what we would look for in SRO and RO,
19 you know, examination programs, as well as for the
20 GLRO programs.

21 A key difference is the regulatory
22 footprint that we have there, so in both cases we're
23 reviewing them against essentially the same standards,
24 it just really comes down to, are we going out there
25 and administering, you know, those examinations. And

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1 then there's also, you know, the general licensing
2 aspect of it.

3 So again, there would be the same type of
4 rigor expected in going through, you know, a task
5 analysis that looks at what the required, you know,
6 job responsibilities are for those generally licensed
7 reactor operators, and testing them to make sure that
8 they do have that confidence. And then, you know, for
9 the ongoing re-qualification supplement assessments
10 and so forth to make sure that they maintain that, as
11 well as proficiency.

12 So again, what I want to do is really just
13 dispel this notion that we ever go to a state of
14 having zero people in the loop.

15 MEMBER BIER: So this is Vicki Bier again.
16 I understand that and I understand that, yes, there
17 may be reasons to have fewer people in the loop, or
18 less requirements on the people who are in the loop.

19 But I'm still just concerned about the
20 language setting a wrong expectation, because your
21 description that a licensee could come in and persuade
22 you that their design is sufficient, that they can be
23 considered self-reliant. You may nonetheless find
24 sometime during the life of the facility that, oops,
25 they weren't actually self-reliant and there was an

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1 unforeseen circumstance.

2 So I just feel like the language kind of
3 sets a little bit too high an expectation -- and I
4 don't have new language to propose but something that
5 is, you know, more like anticipated self-reliant, or
6 whatever. But says, hey, we may learn as we go along,
7 so.

8 MR. SEYMOUR: That's a fine point, too,
9 that -- this has come up in one of our earlier
10 discussions as well. And I just want to kind of weave
11 Bill Reckley in the discussion as well in case he has
12 anything to add, but one thing that we talked about in
13 the past with us is that the NRC retains a very broad
14 authority to modify, suspend licenses, right, issue
15 orders if we find that there is a condition that is
16 going to be unacceptable from a public health and
17 safety standpoint, right?

18 So we do have regulatory mechanisms that
19 we can go through to take action and require. And
20 again that's a circumstance where backfit does not
21 apply, right? So if we need to order that a licensee
22 take a certain action and modify that license or
23 whatnot, because there is some unacceptable issue that
24 hasn't revealed itself and that puts the public health
25 and safety into an unacceptable state, then we do

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1 retain that authority to do so.

2 So something I think is important to keep
3 in mind though is that would that type of a revelation
4 -- once we've licensed the facility, would that
5 necessarily automatically equate to needing to adjust
6 the staffing such as for example taking a general
7 licensed reactor operator plant and shifting it to
8 being a SRO/RO plant be in order or something like
9 that?

10 I think what we probably would have to
11 consider is that the licensee; and by that I mean the
12 facility licensee, would have to determine whether or
13 not they wanted to try to address whatever the
14 underlying issue was via an engineering means or via
15 a staffing means.

16 So again, if the issue is that there is
17 some inherent or passive safety characteristic or
18 feature that we had predicated -- our designation of
19 this facility is being self-reliant -- on and later on
20 we find out that there's some performance issue,
21 there's something that appears in the data and we find
22 out that we can't make that assertion anymore, then I
23 think the logical next step in that process would be
24 in the licensee going to remedy that by adding a new
25 safety feature to address that or are they going to

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1 leave it relegated to something that requires human
2 action to assure the safety performance of the
3 facility? And in that case the (audio interference)
4 treatment.

5 So again, I think that's an important
6 point to bring up, just that the regulatory and legal
7 mechanisms are there, right, to take those actions to
8 protect the public health and safety on our part as
9 the regulator. And also that there's more than one
10 possible outcome for how a facility licensee might
11 choose to address that just based on the nature of the
12 assessment that's done to determine whether a facility
13 is self-reliant or not, right?

14 Because inherently what you're getting,
15 and pardon the pun there, but what you're getting down
16 to at a fundamental level is this use of safety
17 features that are generally going to be inherent or
18 passive, perhaps under certain concepts even active,
19 but again there's something that you determine about
20 their performance that leads to questioning the
21 designation of that facility. So again, there's an
22 avenue where potentially the fix to that is
23 engineering instead.

24 But, yes, I just wanted to see if Bill
25 Reckley had anything that you wanted to add on that,

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1 because I know we've had some good discussions in the
2 past.

3 MEMBER BROWN: Before Bill says anything,
4 could I ask a question?

5 One of your sentences early in your
6 discussion in response to Vicki relative to, quote, a
7 plant being self-reliant. And then you said
8 something; and I'm hoping I'm saying this correctly,
9 was that the NRC's thought process would be that no
10 matter where the operator is he would be able to
11 intervene, which gave the impression that the operator
12 could be 500 miles away, a remote operator that's
13 trained to take the action. That implies then that
14 you have some very significant method of communicating
15 and trying to take action that is not a manual backup
16 to significant automated-type systems. And that's
17 very hard to do from a distance outside the plant in
18 some other city.

19 I am not sure that -- that idea of no
20 matter where the operator is he'll be able to take
21 manual action infers that your automated systems are
22 accessible via the internet or some wireless means
23 such that they could then actuate the stuff, the
24 equipment, which is also software-based, which may be
25 malfunctioning. That just seems to me those doors

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1 being half open just leads to a lot of difficulties.
2 Just throwing that in.

3 You got to be careful when you're thinking
4 about this kind of stuff. There are a lot of
5 ramifications. Operators are important. They're
6 probably the most important thing we have in the plant
7 and on-site with a manual backup that overrides or
8 that can bypass the software-based or automated
9 systems is pretty critical whether you've got a self-
10 shutting-down plan or, quote, a safe plant, they've
11 all got uranium in them. They've all got a propensity
12 to do something we don't expect. So maybe I'll give
13 up after this.

14 MR. SEYMOUR: No, those are absolutely all
15 legitimate concerns that weighed heavily in our
16 thinking. And something else -- just like I wanted to
17 emphasize the point that we never truly take the human
18 out of the loop in this paradigm, something else I
19 want to point out is that we -- and again, by that I
20 mean operator licensing and human factors engineering,
21 and basically the team that worked on this particular
22 set of requirements -- we are not the cybersecurity
23 folks, right? So again, what we don't do is -- within
24 the course of our language here is we don't establish
25 any requirements that would govern the cybersecurity

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1 implications or so forth, right? That's outside of
2 our wheelhouse. And that would be a matter that we'd
3 have to have other folks speak to.

4 When I discussed the language in question,
5 right --

6 MEMBER BROWN: I wasn't dealing with
7 cybersecurity. I was just talking about manual
8 backups to automated systems that are failing that
9 we've been relying on with operators hundreds of miles
10 away, not cybersecurity issues. Don't conflate and
11 mix the two.

12 MR. SEYMOUR: Okay.

13 MEMBER BROWN: Those are two different
14 issues.

15 MR. SEYMOUR: Yes, I appreciate that.

16 MEMBER BROWN: That was not relevant to
17 this particular discussion. That's my only point.

18 MR. SEYMOUR: Yes. And so what we do is
19 we say that the general licensed reactor operator has
20 to be able to shut down the reactor from their
21 location, right? And again, we leave that where it
22 is. So within a traditional framework that means a
23 location that's somewhere co-located with that
24 reactor, right? So again, we leave our language where
25 it is, but we don't weigh in on the broader

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1 ramifications of remote operations.

2 But what I would say is there's also
3 another layer to that language as well, too. And what
4 we require is that the operator has to have the
5 ability to dispatch maintenance and operations
6 personnel as well, right? So a general licensed
7 reactor operator, besides have the capability to shut
8 the reactor down, also has to have that ability to
9 dispatch maintenance and operations personnel. And
10 part of our reasoning, part of our rationale in
11 establishing that requirement was to leave the door
12 open for those types of local manual actions should
13 they be require.

14 Again, what we see within the legacy fleet
15 that's out there is that you'll have reactor operators
16 and senior reactor operators located in a control
17 room. And when there are circumstances that require
18 local manual actions out in the plant, generally --
19 and there are times where the licensed operators would
20 actually go do it themselves such as a control room
21 evacuation. But generally speaking what they're doing
22 is they are directing non-licensed equipment operators
23 to go out there and perform certain field actions.

24 So our rationale in including that
25 requirement was to achieve a similar type of

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1 functionality. Again, for the sake of that self-
2 reliant mitigation facility technological designation
3 we don't want those types of things to have to be
4 credited to meet the analytic requirements. However,
5 that being said, from a prudent standpoint we still
6 want that capability to be there for those reasons
7 that you discussed. You get out in that un-analyzed,
8 beyond-design-basis-type of space into some situation
9 that was never envisioned.

10 And just from the standpoint of prudence
11 it's wise to still have that trained and qualified
12 operator who has the capability to shut the reactor
13 down and also to get individuals out into the field to
14 take local backup actions that may be needed. But
15 again, the difference is with those types of
16 facilities we don't want that to be credited in
17 meeting the analysis.

18 CHAIR PETTI: I see lots of hands.
19 Dennis, why don't you go, and then Greg?

20 MR. BLEY: Okay. Yes, I'm kind of coming
21 back to where Vicki was talking with you earlier, and
22 it's a mix of what's actually in the rule language.
23 And the way Brian introduced this in some of your
24 language leaves a little area of discomfort. Now it
25 might well be that we need a different kind of quality

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1 and depth for these general licensed operators and
2 maybe it's not the hands-on kind of activities we've
3 seen the past. Words that worry me are credible and
4 self-reliant, those kind of things.

5 We always get surprised by something we
6 though was incredible somewhere along the line, and an
7 operator who understands how this system works and how
8 it might fail perhaps beyond those things we call
9 credible is going to be important. Your idea of
10 having a capability floor for the operators makes
11 sense to me and I think that's the way the rule
12 language is pushing.

13 The thing Ron talked about; and I don't
14 think you gave him an answer back, or maybe you did,
15 a computer system that monitors the operation of the
16 facility. And not so much operates it, but alerts
17 someone when the machine isn't responding the way the
18 computer system was trained to expect to respond is
19 really a very useful idea and seems to me it might be
20 very important to include.

21 I think all of us are a little worried
22 about designers' and perhaps regulators' hubris and
23 naivete on a new machine that's better than the others
24 because we solved problems, but until we get a pretty
25 broad base of experience we ought not have as much

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1 confidence as we do in things we've observed for many
2 years.

3 MEMBER BALLINGER: It may be that every
4 one of us has sworn up and down that one of our
5 designs or experiments are perfect only to find out
6 that we've been hoisted by our own petard.

7 MR. BLEY: It's happened to all of us I
8 think. That's all I want to say.

9 MR. SEYMOUR: So, if I could speak to
10 that. What I want to point out is where some of the
11 mechanisms that we have built in tend to address those
12 interfaces irrespective of how involved the automation
13 might be.

14 And so what I want to begin with is let's
15 start with a plant that doesn't meet the self-reliant
16 mitigation facility criteria, right? So a plant that
17 has our traditional SRO and RO staffing. What they're
18 going to be required to do is they're going to be
19 required to apply the state-of-the-art in human
20 factors engineering to essentially any place where
21 they're going to have those interactions for
22 fulfillment of safety functions.

23 So again, if you're talking about
24 automation that is involved in those plant safety
25 functions being fulfilled; and by that we're talking

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1 about generally things like reactivity control, heat
2 removal, control of radioactive releases via
3 containment or functional containment, then what we're
4 going to expect is that state-of-the-art human factors
5 engineering be applied.

6 And traditionally that's involved
7 something that's akin to NUREG-0711-type of process
8 where a designer goes through this essentially systems
9 engineering process that's been adapted to human
10 factors engineering. Again 12 steps from the
11 operating experience all the way through task analysis
12 continuing on into design of the HSI, verification and
13 validation and graded system validation, resolving
14 discrepancies and so forth, and then ongoing
15 performance monitoring.

16 So again, we don't intend to step away
17 from that type of requirement.

18 And again, if you look at how does that --
19 how would that get involved with a heavily-automated
20 facility, well again those are the types of things
21 that are going to integrate into the task analysis,
22 right, into the training and procedures aspects of
23 that process. There are things that have to be vetted
24 out in the integrated system validation. And also as
25 you move through that process what's going to come out

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1 of that as well, too, is the influence on staffing.

2 So again, staffing -- and again, Maurin
3 will talk about this later, but when we get into how
4 the staffing plan is reviewed for those types of
5 facilities, what we would find is that again it
6 doesn't mirror all the steps of that human factors
7 engineering process that I've described, but it
8 borrows fairly heavily from that. And what it does is
9 it applies this performance-based approach to
10 essentially confirm that the number of operators via
11 performance-based testing is going to be sufficient to
12 fulfill what's needed for safety.

13 And what we've seen historically when that
14 type of a process has been applied is that operators
15 are put into challenging high workload situations with
16 failures of the automation and so forth to make sure
17 that that staffing complements can use the procedures,
18 the training, and the human system interfaces that are
19 provided in the presence of those types of failures,
20 right, under high-workload conditions and still
21 mitigate that that's successful and so forth.

22 So again, on that side of things we've got
23 mechanisms that are going to cover a range of
24 automation going from things that are very manual-
25 intensive all the way up through the hypothetical

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1 almost fully autonomous facility.

2 When we're talking about plants that have
3 the generally licensed reactor operators, again the
4 threshold to get into that regime was that even down
5 to the level of defense-in-depth, we went through and
6 we said that there isn't a human role to meet that
7 analytical requirement. So at that point what we do
8 is again we set that floor for capabilities. And
9 again, we discussed what that looks like and so forth,
10 but again the difference is is that by virtue of those
11 analyses what we've done is we've said that we
12 credibly don't think that that human role is there.

13 And what we do is we instead kind of fall
14 back on that minimum capability floor such that there
15 still be someone that's there in the loop, someone
16 with that minimum suite of indications, like
17 capabilities and so forth. We just don't require the
18 performance-based testing to necessarily go through
19 and vet that out. And again, that's predicated on
20 those very rigorous analytic requirements being met.
21 And that's something that I'll be speaking to a little
22 bit more on this slide as well.

23 MEMBER HALNON: Jesse, it's Greg Halnon.
24 This discussion has been very, very helpful, but
25 there's a couple of things: One is that as you hear

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1 the primary concern we're dealing with now is the role
2 and qualifications of an operator. And you go often
3 go back to the administration of the licensing process
4 or licensing status to answer that. And I think that
5 we need to separate the two issues.

6 There is a level of automation that may
7 decrease the requirements for operators, and I don't
8 think you've heard -- I haven't see any concern with
9 the K&As and other things that we will use to qualify
10 the operators. I have a couple things about the
11 administration of the licensing process that we'll
12 probably get into, but the key thing is is that we are
13 talking about another class of operators that we're
14 perceiving to me less qualified or less rigorously
15 trained than the SRO and RO. I don't think that's the
16 case. I think there will be fully-qualified operators
17 for what they need to do.

18 However, we're doing this because -- and
19 I think it was talked about by Brian as well, that
20 it's going to reduce the cost and increase
21 flexibility. I haven't seen a study or any kind of
22 analysis that shows what the cost savings would be
23 versus the potential I guess lack of increase in
24 safety. I don't want to say -- because I think the
25 words were that we didn't need as much training.

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1 But is there a study out there that -- I
2 mean, this is a good conversation and a lot of gut
3 feels and other things, but is there a study that
4 actually quantifies all these discussions that we're
5 having that shows that everything we're going through
6 to get a GLRO is worth it from the standpoint of a
7 cost savings?

8 MR. SEYMOUR: Yes. So there's a
9 regulatory analysis that we've been working through,
10 or have actually done some tabulation of that. And
11 when I get done here momentarily I'll see if Aaron
12 Sanders is willing to speak to that a little bit.

13 So one thing that we've done is we've gone
14 through and we have studied for plants that would have
15 SROs and ROs that would come in under this process and
16 just encounter the new flexibilities and so forth that
17 are involved here. What it projected, cost savings
18 over the course of -- a 60-year facility life would be
19 again 40 years plus a license extension.

20 And we've also gone through that
21 experiment to -- kind of thinking through for the
22 general licensed reactor operator facilities what that
23 type savings would amount to over the course of
24 facility life as well.

25 And again, I'll see if Aaron can speak to

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1 some of the data that turned up in that a little bit
2 more. And again, Theresa Buchanan and I worked with
3 him fairly extensively on that.

4 What I will say is that by and large just
5 by virtue of the flexibilities and some reductions in
6 the regulatory footprint at various points you do see
7 this aggregation of savings.

8 Now what I would characterize it as is for
9 plants with SROs and ROs there's a modest savings over
10 facility life. And for plants that qualify for
11 general licensed reactor operators I would
12 characterize that as being a significant savings over
13 the life of the facility.

14 Now it's important to realize that there
15 is some cost associated with the development of these
16 programs, right, because they have to be developed to
17 customize the facility. There's a little bit more
18 review work that's involved on the front end, whereas
19 a lot of the things that we're talking about in Part
20 53, if we say that there's a savings, a lot of times
21 it's pointing to perhaps savings on the front end.

22 With these costs what's important to
23 realize is it's a little bit different because these
24 are costs that are realized over the life of the
25 facility. And depending on the stakeholders involved,

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1 I think the discussion can sometimes go in different
2 directions. If you're talking to someone who's
3 interested in building the plant, designing it,
4 selling it to an owner-operator perhaps, they're
5 looking at those costs from a different angle. The
6 owner-operator is probably the party that's going to
7 benefit the most from that, right, again that modest
8 savings over the life of the facility for the ROs and
9 SROs. And again, a significant savings for the GLROs.

10 So again, that's where I think the key
11 point is that we approached this in a very methodical
12 way because by no means do we ever want to sacrifice
13 anything that's needed for providing for public health
14 and safety and ensuring that only suitably qualified
15 individuals get into these positions of great
16 responsibility.

17 MEMBER HALNON: Can you share cost study
18 with us?

19 MR. SEYMOUR: So, yes, Aaron Sanders, if
20 you're willing to speak to it? Again I'm not sure how
21 much you can get into in the specifics, but are you
22 able to discuss any of that?

23 MR. SANDERS: Yes, hi. So Aaron Sanders,
24 cost analyst at the NRC. So I'm the cost analyst for
25 this Part 53 rulemaking. And I want to be cautious

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1 here because there's a draft estimate still under
2 review. We haven't gone through concurrence yet and
3 we're still actually hashing things out as we finalize
4 the rule language.

5 But what I can tell you is that due to
6 scalable training program requirements for the RO/SRO
7 we're looking at about a half an FTE per year saved,
8 which comes to about \$1 million across the life of the
9 plant using a 7 percent net present value; a lot more
10 in un-discounted terms obviously.

11 And then for the GLRO Program it's much --
12 it's greatly simplified, if Jesse will allow me to
13 summarize it that way in layman's terms. And that's
14 more on the order of one-and-a-half FTE per year. So
15 you're looking at more like over \$3 million in savings
16 across the life of one of these plants while
17 operating. And again, that's 7 percent net present
18 value.

19 I'm not comfortable releasing more, but if
20 you have any questions about that, we can --

21 MEMBER HALNON: I don't think that's --
22 qualifies, Jesse, as significant. That's actually
23 within the noise of an organization, even a small
24 organization. I would submit that all the discussion
25 that we're having on GLRO and the discussions you're

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1 going to have on the next slide is moot because you're
2 really not showing any significant savings at all.
3 And in fact it sounds like we're -- and it feels like
4 we're backing away from the standards of the Part 55
5 that we've been enjoying so many years. And that's
6 just my opinion, but I'll let you go on and discuss
7 the next slide, see if anyone else has it.

8 But I do want to go back and reemphasize
9 two points: One, the self-reliant mitigation
10 facility. I mentioned yesterday that I think you
11 would benefit from getting a succinct definition under
12 the definition section so you can use that succinctly
13 throughout. And there are some nuances and some
14 confusing language that's in there right now.

15 And then the second is that the -- we need
16 to continue to separate the administration of the GLRO
17 Program discussion from what we've just been talking
18 about, which is the role and qualifications and levels
19 of licensing for the operators at these facilities.

20 So I would enjoy looking at the cost
21 analysis when you finally get it. A million-and-a-
22 half dollar savings or three million savings over a
23 60-year life or a 40-year life doesn't excite me all
24 that much.

25 MR. SEYMOUR: What I would contend is that

1 again what we have to keep in mind is the sheer range
2 of facilities that we're talking about under Part 53.
3 And we're talking about the generally licensed reactor
4 operator approach, just by virtue of the criteria that
5 are used to get there, in many cases the types of
6 facilities that we're probably thinking of -- and not
7 necessarily, right -- it's possible that larger
8 facilities could potentially get there as well, too.
9 But we're probably talking by and large mostly about
10 microreactors.

11 So again, when you're talking about
12 microreactor facilities, if we envision this
13 hypothetical microreactor that has maybe one or two
14 operators at it and just some type of a very scaled-
15 down reduction of support personnel associated with it
16 -- again for a large light water reactor, again \$3
17 million over plant life. And again, I used to work
18 for a utility. You're right, that would be a drop in
19 the bucket.

20 But when you're talking about a
21 microreactor again where you're running that place on
22 just a few FTE at best -- and again, I'll see if Bill
23 Reckley or one of the other folks can speak more to
24 this, because we have engaged in some work where we've
25 actually received some study numbers about what the

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1 FTE margin might be for such a hypothetical
2 microreactor facility. And it really is -- it's very,
3 very lean, right?

4 So again, when you're talking about three,
5 a little bit more million dollars aggregate over that
6 life, for a large light water reactor that's nothing,
7 but for a very small facility that's just running on
8 just a handful of FTE, to be quite frank, our
9 perspective is that could make or break the business
10 case, right? So what that does is it justifies us
11 taking a very deliberate look at is what we're
12 requiring necessary for safety, right? Because if it
13 is, then to be quite frank, the entities on the other
14 side of the table need to find a different business
15 model, right? We won't compromise on what's necessary
16 for safety.

17 However, if there's a reasonable spot that
18 we can get to where we don't compromise on safety and
19 we require what's truly necessary and it provides that
20 type of a reduction, then that could be a spot where
21 perhaps taking a fresh look at what's required within
22 those contexts could potentially influence I think the
23 commercial viability of some of these entities. Now
24 again, that's not our role, right? That's not my
25 perspective coming into this that I'm necessarily

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1 worried about whether these businesses succeed in that
2 regard. What I'm worried about is safety.

3 However again, once one of the
4 commissioners has said in the past that really stuck
5 with me is that we can't regulate ourselves to zero
6 risk, right? So again, what I want to do is take a
7 very balanced look and ask that challenging question
8 about what's necessary for reasonable assurance and
9 safety in this context.

10 And again, if there are places where we
11 can adjust those requirements what I don't want to do
12 is I don't want to say let's not make the change
13 because it's going to be an insignificant cost for a
14 large light water reactor, right? I don't want to do
15 that because again we're looking at a very, very wide
16 range of facilities that are out there.

17 But I did want to give a chance if Bill
18 Reckley --

19 MEMBER HALNON: I agree with what you just
20 said, however there's also a scalable savings for
21 large versus small and that's why looking at the
22 assumptions in the cost analysis would be crucial.

23 MEMBER BALLINGER: This is Ron Ballinger
24 again. I mean, we're getting into an apples and
25 oranges comparison now. There's a big difference

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1 between head count and GLROs in terms of cost. Is
2 that right, Greg?

3 MEMBER HALNON: Well, yes, that's what I'm
4 just saying, that there's a -- you have a scalable
5 cost or a savings. If you only have one or two FTE on
6 site on a microreactor, then the savings are going to
7 be much, much, much less than -- I mean from a dollar
8 -- that's a value of the dollar amount than it would
9 be from a large light water reactor that you're trying
10 to license 25 people.

11 So that's why looking at this cost
12 analysis to convince me that all this discussion and
13 the reduction in requirements for the operators and
14 the licensing aspect is actually worth it.

15 And just the qualitative discussion tells
16 me it doesn't sound like it's worth it and that we
17 should just go back -- and again, we're on pretty much
18 the next slide -- why shouldn't we just do like we do
19 now, which is different technologies and different
20 plants have different NUREGs that basically implement
21 Part 55, but the licensing aspect is the same.

22 So I just don't get the cost savings and
23 all the time and effort we're spending on this. And
24 I'm not sure why we're even going there. So we
25 weren't comfortable with the certified operator. You

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1 brought the GLRO in and basically gave us the same
2 program and just said we'll call them licensed. And
3 I think, as you can tell, we're still not comfortable
4 with the reasons of why we're doing this.

5 And I think that's what you were talking
6 about, Ron. I mean it doesn't seem like we're really
7 -- we're spending a lot of time and effort on an area
8 that's really going to make a big difference.

9 MEMBER BALLINGER: Yes.

10 MR. RECKLEY: This is Bill Reckley.

11 MEMBER SUNSERI: (Audio interference.)

12 MR. RECKLEY: Go ahead. I'm sorry, Dave.

13 MEMBER SUNSERI: Yes. No, this is Matt
14 Sunseri.

15 Hey, I just want to give kind of a --
16 maybe a little different perspective on this thing.
17 I've looked at this whole section, 70-53, 725 through
18 53, 830 and all the Reg Guides or ISGs that support
19 it, and there's a lot of detail in there and I think
20 Jesse's doing a good job of explaining the details
21 that are actually in these documents that does not
22 appear on these slides. And what's not appearing on
23 these slides is causing us a lot of concern, but if
24 you get into the details a lot of that concern goes
25 away.

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1 And I think when I look at the GLRO
2 Program, whatever -- however, the Generally Licensed
3 Operator Program, what the staff has done, at least in
4 my opinion, has followed their -- what I'll call
5 precedence of the past of creating specific Reg Guides
6 or NUREGs for the different types. You've got the
7 PWR, the BWR, the NPUF facilities, all that stuff. So
8 the process that they're outlining in these documents
9 for the GLR -- generally licensed operator is --
10 follows that process almost identically from a
11 systematic approach, the K&As and all that stuff.

12 What it only lacks is -- what Greg I think
13 was getting into earlier is the administration of it,
14 right? Who approves the license for the operator and
15 when does it get applied -- approved? Instead of
16 being individually licensed like the SRO and ROs are
17 you get a facility license through the process. But
18 at least from a safety perspective in my mind -- and
19 I'm going to not even get into the cost part of it,
20 but from a safety perspective it seems like all the
21 elements are there. And I'll just leave it at that.

22 MEMBER HALNON: And, Matt, I agree that
23 Jesse's made a good case of where the programs are
24 comparable, if not equivalent in many ways. And I
25 agree with you it's in the administration, and that's

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1 the same position we had with the certified operators.
2 It's in how it's administered by the licensee and
3 where the NRC is inserted or not.

4 So I think that's where we have the
5 biggest issue and I think could probably have more
6 dialog on administration of it.

7 Like I said, the ISGs and the K&A's and
8 all those other items, I have no issue with it. I
9 think the operators will be qualified for what they
10 need to be doing.

11 MEMBER SUNSERI: So I'll just add one more
12 piece and then I'll stop, but I think some of our
13 concerns about the way the Certified Program was going
14 to be administrated we were concerned about
15 accountability of the operators to their performance
16 and to the public in general. But so I think the
17 staff has addressed that. They put a lot of hooks in
18 there about what to do with the operators if they
19 don't perform well. It's written in there now, which
20 I didn't see before. But I'll leave it at that.

21 MEMBER HALNON: Yes, I think my only big
22 issue with it now from an administration is how do you
23 deem a licensed operator on the list? And, Jesse,
24 this is just a point that -- a comment that I think
25 that you should require at least NRC concurrence

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1 before a licensee says this person is generally
2 licensed or on the list for licensed operators. I
3 think that there should be some interaction and some
4 at least concurrence or verification by the NRC that
5 the program has been successfully completed, the
6 person's not on any other kind of, for lack of better
7 term, terrorist list or person of concern list and
8 what not.

9 So after the person gets through the
10 training and takes all the tests the licensee gives
11 them I feel like there should be some concurrence and
12 verification by the NRC prior to that person assuming
13 licensed duties. But that's a comment that I have
14 that I -- if you want to respond to that or just write
15 it down as a thought, that's fine.

16 MR. SEYMOUR: No, I will definitely
17 capture that. It's a good point. This is a delicate
18 balance we've been trying to strike here. Again, the
19 notion of general licensing of operators is not
20 something that we've historically done in the past.
21 And I made the comments at one point that this is the
22 first time since about 1956 that we've actually
23 modified kind of the hierarchy of the license levels
24 and so forth by considering a new one.

25 And what we currently have built in is

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1 that there's an annual reporting requirement to report
2 the names of operators who are under the general
3 license. But again, what that doesn't address is your
4 concern about that happening prior to them being able
5 to assume those duties.

6 I've captured that. That's something that
7 we'll have to think through. There are some legal
8 kind of aspects of a general license versus a specific
9 license and how that mechanism works, but again that's
10 just something I'll have to take for further kind of
11 review amongst the group and so forth. Again, it's a
12 point that's not lost on us.

13 I think something to keep in mind, too, is
14 also that there are other programmatic features
15 outside of operator licensing that do tend to
16 buttressing a little bit in that regard. One is that
17 you'll still have the -- your Part 26 and Part 73
18 requirements. So again, there will still be
19 provisions for behavioral observation, right, for
20 these individuals. So again, issues of aberrant
21 behavior and so on and so forth. And there will also
22 still be plant access requirements, right?

23 So again, in terms of again the terrorist
24 watch list, I mean it's a good example, right, of
25 okay, well, how do you account for that, right? And

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1 again, there are certain things that we do in the
2 current operator licensing process with specific
3 licenses. For example, when we go to issue a license,
4 one of the things that we have kind of a trigger to do
5 in NUREG-1021 is to check to see if that person has
6 had significant enforcement action against them in the
7 past, right? So again, that's something that's
8 embedded on their specific licensing. And we don't --
9 under a general license approach we will have the same
10 corollary there.

11 So again, all I can say is that I jotted
12 that down and that's something that we'll definitely
13 chew on and see what we can do it.

14 Okay. Yes, so if it's okay with the
15 Committee, I'm going to go ahead and just move onto
16 this next slide.

17 CHAIR PETTI: But I thought Bill wanted to
18 say something.

19 MR. SEYMOUR: Oh, sorry. Okay. Yes.

20 MEMBER RECKLEY: It's largely been said.
21 The only thing I was going to add; and this goes to
22 some of the previous comments about operating
23 experience and the entry into using some of these
24 provisions that Jesse's talked about, is keep in mind
25 the burden of proof would be on the applicant to

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1 actually show they meet these and that they've done
2 the testing of the machine to prove their point.

3 In that regard I think it's likely that
4 you would see a transition. And just like the example
5 that was brought up with driverless cars, you have a
6 transition. And we're not there yet, but we're going
7 through steps, right, where the machine takes on some
8 responsibility but you still have a person. Will we
9 get there? Most likely, but there will be a
10 transition. And I think just like any other
11 engineering exercise you could foresee something like
12 that happening here where you would not go basically
13 from -- in a binary step from what we have right now
14 to basically the full implementation of what we're
15 putting in Subpart F in Part 53.

16 So just something to keep in mind that
17 this -- these machines will have to be tested.
18 Operating experience will have to be gained. It's not
19 as if we have to be necessarily fearful that we have
20 one time to make a decision. And like I say, it's a
21 binary step. It's going to most likely evolve. The
22 rule is trying to be written such that it can reach
23 the end point, but that doesn't mean you reach the end
24 point on the first application that we receive.

25 So that's all I was going to add, Jesse.

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1 MR. SEYMOUR: Bill, if I could just ask
2 while we still have you, are we at liberty to discuss
3 the feedback that came via the recent study that we
4 did with MIT? Is that something that we can discuss
5 or --

6 MR. RECKLEY: Well, we can certainly say
7 we had a conversation and that there's a study
8 underway, so if you want to fill in some of that. But
9 the regulatory analysis, as Aaron mentioned, we're
10 working on. That will be part of the rulemaking
11 package to the Commission. We won't have it by the
12 Full Committee meeting.

13 But to Jesse's point, in terms of what's
14 a significant amount of money, if you're a 10-megawatt
15 microreactor and you're able to charge \$100 a megawatt
16 hour, that means you have an income of \$10 million a
17 year to pay for the machine, to pay for all the
18 people, to pay your taxes, to pay the NRC. So economy
19 of scale, there's a reason that the reactors went
20 bigger. The microreactor model is a very challenging
21 model, and this is financially. And this is what
22 Jesse was mentioning. There's a study underway. And
23 we talked to some of the people conducting that study
24 on the potential financial challenges of
25 microreactors.

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1 But, Jesse, you might recall --

2 CHAIR PETTI: And, Bill, they've also --
3 it probably predates you guys' interaction, but they
4 have published papers on the cost, kind of a work
5 backwards. This is what it needs to be for the whole
6 business case to hold together. And your comments are
7 spot on. It's the eye of the needle for them to be
8 able to make their business case. And O&M costs are
9 really critical. And that's been published. That's
10 on the literature.

11 MR. BLEY: Hey, Bill? I was going to
12 bring this up at some other point, but since we've
13 talked about the cost benefit analysis -- it jumped
14 out at me in the -- I guess it's in the preamble that
15 we just had blanks in there. Usually we get to look
16 at those and comment and sometimes we've found that to
17 be useful. Are we going to get a look at that at some
18 point so we can comment on it?

19 MR. RECKLEY: I'll go back on air. And I
20 guess I don't think we're going to have it ready by
21 the Full Committee meeting, so I --

22 MR. BLEY: Well, this kind of works into
23 the question a couple people asked yesterday of are we
24 going to get a chance to review some of the guidance
25 and other things that's coming out over the next many

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1 months before we get to a final draft rule stage? And
2 you know --

3 (Simultaneous speaking.)

4 MR. RECKLEY: Yes. Well, yes, that --

5 MR. BLEY: -- it could kind of work.

6 MR. RECKLEY: Right. Yes, that will be
7 the case. the regulatory analysis will be done, and
8 we could talk about it at that next stage after the
9 publication of the proposed rule. Yes, we could come
10 back. At that point it will be -- it will have been
11 issued. And that's likewise some of the guidance
12 documents. We just couldn't get it all done in the
13 schedule. But as we continue to work on it we'll be
14 continuing to bring it to ACRS. And quite honestly,
15 it's going to continue afterwards, right, even after
16 Part 53 is a final rule. Part 50 has been a final
17 rule for 60 --

18 MR. BLEY: Seventy years, right?

19 MR. RECKLEY: -- more than 60 years and
20 we're still preparing guidance. So it's not a --
21 we'll continue that forever.

22 MR. BLEY: Okay. That works. Thanks.

23 MR. SEYMOUR: Okay. Yes, so I wanted to
24 kind of circle around because, Bill, I know you had
25 mentioned if we could bring Aaron back in just to

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1 round out that comment.

2 But, Aaron, did you have anything that you
3 wanted to add?

4 MR. SANDERS: Yes, I thought I should. As
5 far as when the RA might be able to be seen by the
6 ACRS, I'm not familiar with that occurring before
7 essentially the package is ready for the Commission,
8 the specific timing. So the way that the schedule has
9 been working out I'd really rather have the PM speak
10 to that. But I don't think it would be in a finalized
11 enough state by the Full Committee meeting on the 2nd
12 of November, but I am working of course as fast as I
13 can, which is -- there's a lot of motion still on this
14 rulemaking.

15 As far as the numbers, I just wanted to go
16 back because when we're talking about \$10 million a
17 year in income, I realize that it's probably better
18 for me to speak to the un-discounted costs then.
19 Because if you're saying 10 million a year in income,
20 then what is the savings of the GLRO Program, which is
21 about a third of a million per year, which comes to
22 three-and-a-third percent of the income in that
23 example, which it's not mind-blowingly high. But it's
24 not dismiss-able either, especially since there are
25 lots of other costs that obviously come out of the

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1 income. So I just wanted to point that out. That's
2 a better way to think of it, is about three-and-a-
3 third percent of a \$10 million plant's income per
4 year.

5 MR. SEYMOUR: Okay. So --

6 MEMBER REMPE: So, this is Joy, and I
7 guess I'm thinking about sometimes when we hear
8 members comment about why are you guys doing this
9 research, and the response RES gives back saying,
10 well, we have to be ready. Even if we don't think
11 it's worthwhile, we've got to be ready. And I'm
12 wondering if the same argument should be mentioned
13 here that hey, folks are asking for something like
14 this and even if it's (audio interference) significant
15 benefit to them, that's their decision. We're just
16 trying to give them an option that's safe. Is that a
17 response back that could be mentioned here?

18 MR. SEYMOUR: Yes, and I do appreciate
19 that. One of the things that we've spoken to before
20 is that we desire to create a rule that's durable. So
21 what we want to avoid is as technologies evolve, as
22 concepts of operation evolve, as we get further down
23 the road and perhaps we move into reactors that are
24 operated remotely and so on and so forth, when we
25 cross that bridge, what we don't want to have to do

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1 for these operational requirements is have to go back
2 and engage in rulemaking because we didn't kind of
3 build these possible avenues into the structure.

4 And so what we're trying to do is we're
5 trying to think through those issues, and part of that
6 involves looking at kind of the future-focused
7 research-types of endeavors that we undertake where we
8 go and we look at various things that are out there;
9 just examples of that like remote operations, adaptive
10 automation, right? These are all things that our
11 Office of Research has dug into and done significant
12 work on and so forth.

13 And so what we've done is we've tried to
14 take those concepts and what we learn from that and
15 bake that into the mix, at least put that into the
16 thought process and say if something like this were to
17 emerge, even if requires an exemption to do it for a
18 given regulation, will the rest of the structure
19 accommodate that?

20 And so I think that speaks to that point,
21 but again having that -- I hate to use the term
22 crystal ball, but that's really what the research
23 does, like keeping your finger on the pulse of these
24 various industry initiatives, the technological
25 developments, and being forward thinking with the

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1 research lets us kind of see which way the wind is
2 blowing. And again, what we don't want to do is say
3 like, okay, we have to accommodate this, right?
4 Because again, we have a different mission, right?
5 Our mission is to be good stewards of the public
6 health and safety, right? That's our first and
7 foremost consideration.

8 But what it should do is say well, hey,
9 this may be an emergent technology or way of operating
10 these plants that comes up. Is there a way to
11 accommodate that while still being faithful to that
12 role that we have? And if so, what direction do we
13 need to think in to get there?

14 CHAIR PETTI: Okay. Jesse, we've been at
15 this for a while now. We're well behind. So I hope
16 we're going to be able to pick up the pace.

17 I just want to say that I still have an
18 issue but I don't want to deal with it here because of
19 the time, but when we get to Full Committee this --
20 your definition of the self-mitigating facility and
21 the AERI definition of what it takes to get in there,
22 there's an interplay there. And we were concerned
23 that it may have been overly restrictive.

24 So it would be worth in the Full Committee
25 at least being able to spend some time, because it

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1 seems to me that AERI and GLRO, there is some natural
2 synergies there, at least in the microreactor space,
3 and wanting to make sure that we're not unduly
4 constricting things. This is probably more from an
5 AERI perspective than from a GLRO perspective, but
6 given that they're now linked through this somewhat of
7 a definition we want to be able to go through that and
8 make sure that we have it set properly in our minds.

9 MR. SEYMOUR: Okay. Yes, definitely. And
10 I made a note on that yesterday, so I did capture the
11 point from the Committee about concerns that --
12 limiting things to inherent and certain pedigrees of
13 passive features that are -- perhaps the implications
14 of that may constrain things too much. So between now
15 and the Full Committee that's something that myself
16 and Marty Stutzke and the others will --

17 CHAIR PETTI: Right.

18 MR. SEYMOUR: -- continue to think
19 through.

20 CHAIR PETTI: Great. Great.

21 MR. SEYMOUR: Okay. So continuing on with
22 the next slide, I will try to pick things up a little
23 bit. I appreciate the prompt.

24 So during earlier presentations with the
25 Committee a common topic of discussion has been the

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1 approach taken regarding the traditional shift
2 technical advisor under Part 53. As noted in our more
3 recent discussions we have balanced the value afforded
4 by the availability of degreed expertise with
5 broadened flexibilities under our proposed engineering
6 expertise requirement.

7 Aside from some streamlining of the
8 associated requirements the overall engineering
9 expertise requirement remains unchanged from that that
10 we covered in our prior discussion and it remains a
11 required element of staffing plans for all facilities
12 under both Frameworks A and B including for those
13 facilities staffed by GLROs.

14 So again, when we're talking about the
15 self-reliant mitigation facility and staffing
16 considerations, something that's very important to
17 keep in mind is that even for those facilities this
18 requirement to account for engineering expertise would
19 remain as well. So again an important point that I
20 didn't touch upon earlier.

21 So in this way we see the engineering
22 expertise requirement as providing an important
23 counter against the potential uncertainties associated
24 with new designs. And again, that is specifically
25 because the engineering expertise role is explicitly

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1 there to assist the operators when they get into
2 situations that are not covered by their training and
3 procedures. So really when those unknown unknowns
4 emerge this will help to serve as a backstop there to
5 support them.

6 So with regards to generally licensed
7 reactor operators at the time of our previous
8 discussions we had not yet extended the allowance for
9 generally licensed reactor operators to facilities
10 under Framework B. Under the most recent version of
11 the preliminary rule language we have now done so
12 including for those plants under Framework B that use
13 an AERI approach to risk as well as those that instead
14 conduct a PRA. Thus, a structure established under
15 53.800 now exists to assess whether GLRO staffing is
16 appropriate for facilities under either framework and
17 using either approach to gaining risk insights.

18 While there are differences in how the
19 various criteria are structured and presented,
20 fundamentally each of these sets of criteria are
21 derived from a common set of considerations that
22 include no human action being needed to meet
23 radiological consequence criteria, no human action
24 being needed to address licensing basis events, safety
25 functions not being allocated to human action,

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1 reliance upon either inherent or robust passive
2 features with some provisions on when PRA is used to
3 go outside of that, and adequate defense-in-depth
4 being achieved without reliance on human action.

5 Additionally with regards to the criteria,
6 in response to concerns noted previously by the
7 Committee, wording modifications have also been made
8 to the GLRO criteria to clarify areas in which the
9 analysis should be limited to only addressing credited
10 human actions and defense-in-depth capabilities.

11 And again, that speaks to a good point
12 that was raised by the Committee about in the absence
13 of clarifying how far you have to go with that
14 analysis that you could potentially run something like
15 defense-in-depth out through many layers. And really
16 we just want to get through a credited level of really
17 hitting that first layer of defense-in-depth and also
18 getting through credited mitigative actions to say
19 that that analysis is satisfactory for that purpose.
20 And I think it's important to point out here, too,
21 that by no way, shape, or form do we want to constrain
22 the ability of operators to take prudent actions.

23 So what this criteria exists to do is to
24 say that you're able to get through these credited
25 analyses without reliance on human actions, not to

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1 preclude those operators from being able to take
2 action. So again, if you get into a circumstance at
3 these plants with GLROs, it would be wholly acceptable
4 for those operators to have actions to be taken for
5 defense-in-depth, so on and so forth to perhaps trip
6 the reactor and things of that nature.

7 The key difference is is that in allowing
8 that plant to have that type of treatment in the first
9 place we don't want that to be credited for safety,
10 right? So again, these would be backup actions.
11 These would be defense-in-depth actions. These would
12 be prudent actions to put the plant into a given state
13 before the automatic action happens, those types of
14 things. But again, from an accident standpoint and
15 from a fundamental kind of first layer defense-in-
16 depth standpoint we just don't want those things to be
17 credited.

18 For a non-AERI plant under Framework B the
19 GLRO criteria are comparable to the equivalent
20 criteria of Framework A as adapted to the differing
21 requirements of Framework B. So again, some
22 differences in pointers. A little bit of kind of
23 tweaks in the language and so forth to adapt the same
24 general approach of Framework A to Framework B. But
25 again, there are five criteria for both and in the end

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1 they're both accomplishing the same essential
2 functions.

3 As noted previously, the Framework B GLRO
4 criteria vary depending on whether an AERI is used.
5 Although irrespective of the use of AERI, defense-in-
6 depth without reliance on human action is a common
7 requirement across both Framework B approaches: AERI
8 and non-AERI.

9 That being said, for an AERI plant the
10 GLRO criteria are met by meeting the AERI criteria.
11 And yesterday during Marty Stutzke's presentation we
12 did get into what the criteria looks like. And again,
13 I did capture the point for the Full Committee
14 discussion about revisiting whether those criteria are
15 potentially too restrictive.

16 It should be emphasized that the AERI
17 criteria located at 53.4730(a)(34)(ii) restrict the
18 safety features that can be credited in meeting the
19 analysis to those that are either of a robust passive
20 or inherent nature that are resistant to the influence
21 of human error. And again, that's the specific point
22 that Marty and I will revisit between now and the Full
23 Committee.

24 In short, these various sets of criteria
25 have a common goal of identifying when operators are

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1 not expected to significantly influence safety
2 outcomes based on a design and to use this threshold
3 to identify when GLROs would constitute the acceptable
4 form of operator licensing for a given facility.

5 We can move to the next slide, please.
6 One further area that I would like to discuss in this
7 presentation before we move onto Theresa Buchanan and
8 the operator licensing guidance discussion is the
9 recommendation made in the Committee's most recent
10 letter that the associated guidance for implementing
11 10 CFR Part 55 could be amended to accommodate the
12 objectives of the proposed rule without the additional
13 volumes of text. And this was a recommendation that
14 we gave consideration to and carefully evaluated the
15 related pros and cons of as we considered our
16 response.

17 Ultimately we concluded that reliance upon
18 Part 55 for operator licensing within the context of
19 Part 53 could not yield equivalent flexibilities and
20 in attempting to achieve similar levels of
21 technological inclusivity would likely necessitate the
22 development and upkeep of an unmanageable inventory of
23 new guidance documentation for every new technology
24 that subsequently emerged. And a key example of that
25 point would be -- and again, this is just one example,

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1 but it's a big one -- would be the need to
2 preemptively develop and issue a NUREG series
3 knowledge and abilities catalog for each new
4 technology and to also accomplish that with sufficient
5 lead time so as not to delay the goal of licensing
6 operators should a Part 55-only approach be pursued.

7 In contrast the new framework for operator
8 licensing under Part 53 is technology-inclusive by
9 design and creates significant flexibilities compared
10 to Part 55. Most notably however the statutory
11 requirements of the Atomic Energy Act are such that
12 the innovative approach to general operator licensing
13 cannot occur absent rulemaking to create a defined
14 class of reactor that would have such operators.

15 Thus, GLROs cannot exist under a Part 55-
16 only approach unless a rulemaking were undertaken for
17 Part 55 and such an effort is beyond the scope of our
18 -- and by our I mean the staff's present tasking for
19 the Part 53 rulemaking. Or revised or new guidance
20 could be developed for use under Part 55. Applicants
21 would be required to seek exemptions and justify
22 pursuing alternative approaches where the existing
23 provisions of Part 55 and NUREG-1021 processes were
24 incompatible with new technologies and concepts of
25 operation.

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1 In contrast the preliminary proposed Part
2 53 will remove the need for such exemptions, allow for
3 the tailoring of examination processes based on
4 technology and operational approaches and enhanced
5 regulatory reliability and clarity.

6 So in light of these considerations our
7 perspective remains that the most appropriate approach
8 to operator licensing under Part 53 remains an
9 approach that borrows from yet remains independent of
10 Part 55.

11 And with that being said, I'd like to go
12 ahead if we could and move the discussion along to the
13 key Part 53 review guidance documents that we'll be
14 discussing today, and the first of those that we'll
15 transition into will be Theresa Buchanan discussing
16 the operator licensing programmatic guidance.

17 MS. BUCHANAN: Thank you, Jesse. Can I
18 just get a confirmation you can hear me?

19 MR. SEYMOUR: Yes, I can hear you.

20 MS. BUCHANAN: Okay. Thank you.

21 Good morning, everybody. My name is
22 Theresa Buchanan and I am going to be giving an
23 overview, pretty brief. The ISG itself is very
24 detailed. It's an overview of the Operator Licensing
25 Program review. I'm going to start with what's not in

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1 here in order to help manage some expectations.

2 This ISG does not contain how the staff
3 will review and approve the training programs, the
4 SAT-based training programs. The primary focus of
5 this ISG is on how to review and approve the
6 examination programs. And then there's a couple
7 little additional pieces that we put in here for lack
8 of a better place to put them.

9 Next slide, please. All right. So the
10 purpose of the ISG is to help the staff review
11 applications that come in under Part 53 related to the
12 Operator Licensing Exam Program, and particularly
13 reviewing the tailored approach to the exam programs
14 for both initial and re-qualification.

15 This is for both specifically licensed
16 operators and generally licensed operators.

17 Additionally it has an added thing about
18 addressing proficiency. That's how often you have to
19 stand watch in our licensed position in order to stay
20 active in our license. So we address proficiency for
21 the individually-licensed SROs and ROs as well as to
22 assist staff reviews for non-large light water power
23 reactor exam programs that might be coming in as
24 exemptions under 10 CFR Part 55, primarily for the
25 plants that are going to be coming in before the Part

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1 53 rulemaking is in place.

2 Next slide, please. So the goal of this
3 ISG is to enable facility applicants to identify; and
4 that was mentioned earlier, the KAs or KSAs, the
5 knowledge, skills and abilities that are needed for
6 safe operation as the basis for exam standards; very
7 similar to what we have currently, and establish
8 reliable guidelines for exam program development
9 that's based on current best practices from research
10 and expertise on measurement and testing of these
11 knowledge, skills and abilities.

12 So we worked with INL on the development
13 of this guidance. We also had a workshop earlier this
14 year where we included representatives from different
15 industries, other countries to help get what they saw
16 as their best practices in their industries for the
17 qualification of individuals to try and make sure that
18 we were casting a wide net so that we could get
19 current best practices to include into this ISG.

20 Next slide, please. So the first section
21 talks about the development of your knowledge, skills
22 and abilities for the exam program. So although they
23 are not two different lists I kind of conceptualize
24 them this way because it makes it easier for me to
25 think about it.

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1 So basically what happens is the SAT-based
2 training process, or SAT process that's used to
3 develop the training program is used to identify a
4 training list of knowledge, skills and abilities that
5 folks are going to train to. It's not going to be
6 solely limited to tasks that are associated to safe
7 plant operation. They'll include other things that
8 may be for economic purposes and things like that.

9 We have an ISG. It's 2023-04, Facility
10 Training Program IG. It's planned to provide
11 additional information in this area on how we would
12 review and approve the SAT-Based Training Program.
13 That ISG is not issued yet. It's in the process but
14 it's a little bit further behind in the process. So
15 we're working on getting that issued. But that will
16 cover that aspect.

17 So this ISG starts with the training KSA
18 list as the output. So it's an input to this program.
19 So the output from the training program becomes an
20 input to this program. And so they use this list as
21 a starting point. And we would expect facilities to
22 perform a screening to identify what tasks are
23 important to safe operation or -- and/or related to
24 the foundational theory of plant operations in order
25 to develop the list that would include what items

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1 would be tested on in an exam for licensing.

2 Depending on the original list you might
3 add items as well as remove items. There might be
4 things that are foundational that are important to
5 test on, but because of the nature of them they
6 screened out of needing to train on as part of the SAT
7 process. Well, they would need to get added here. So
8 this is why I kind of conceptualize it as like two
9 separate lists. They're very much related. There are
10 things that are going to be removed from the training
11 list for the exam list and things that might get added
12 to the exam list. So this section is one of the big
13 parts of the section because this determines the
14 entire content domain, the whole thing of what is
15 going to be tested on the exam.

16 Next slide, please. So this slide
17 basically just shows a little bit of a graphic that
18 kind of describes the process steps that would go
19 through and what's covered by this ISG versus what's
20 covered by the Facility Training Program ISG. So you
21 can see that your SAT tasks and task analysis is done
22 under the training program. And then it's going to
23 come into the exam program. And that's where they're
24 going to do your defense-in-depth reviews, theoretical
25 knowledge that maybe got screened out from the

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1 training list maybe gets screened back in for the exam
2 program list, additional reviews, screening what
3 doesn't need to be tested because it's not important
4 enough to safety, grouping them and then finalizing
5 the list. Okay. That's it for Section 1 about
6 developing the KSA list for the exam program.

7 Next slide, please. So Section 2 is all
8 about developing the test plan. Basically now that
9 you've got the list; that's great, how you are going
10 to test it? And guidance is provided to staff related
11 to what types of tests are most appropriate for the
12 different kinds of knowledge or ability measured. As
13 an example it talks about, hey, certain cognitive
14 tasks are better tested on a written exam-type format
15 versus other tasks might be better tested in a
16 performance or simulation -- simulated performance-
17 type format. And it kind of discusses the different
18 kinds of cognitive tasks and things and what the more
19 appropriate test measures are for them to help the
20 staff evaluate whether or not those were applied by
21 the facility in developing their exam program.

22 It also includes the format for the tests.
23 So an example would be is the written exam a multiple
24 choice, does it include matching, short answer, things
25 like that?

1 It also has the content specification, the
2 specific exam, the specific exam type cover. So what
3 specific KSAs, what specific knowledge and ability
4 statements are covered by a written? What
5 specifically would get covered by say an oral board or
6 a scenario GPM? How you're going to sample the KSAs
7 for each exam. Say you have a list that's -- I'm just
8 going to pull some numbers out of the hat. Say you
9 have a list that's 500 knowledge, skills and abilities
10 that would be sampled for the written exam. Well, how
11 are you going to sample them? How do you group them
12 to sample certain numbers or do you just sample out of
13 the whole 500? So there's discussions about that as
14 well as discussions on ensuring that -- how the test
15 items get reviewed to make sure that they're clear
16 quality questions and don't have other psychometric
17 issues.

18 The staff's assumption is due to the
19 diverse nature of KSAs that would be required to be
20 tested. In other words, you have certain things that
21 had cognitive requirements that would be better
22 testing on say a written or oral test and some that
23 would be better done through simulated performance.
24 We would expect facilities to be developing a test
25 plan that has multiple different test measures, or in

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1 other words different types of tests. Like I said,
2 written, scenario, et cetera.

3 Next slide, please. That was Section 2.
4 So then Section 3 discusses exam validity. So just
5 because they come up with an exam program doesn't mean
6 that it's going to be acceptable. They have to
7 basically prove it to us by describing how it is a
8 valid test, which means that the test works the way it
9 is intended. It's an accurate measure of the
10 individual's competence or lack thereof. And so it
11 discusses the different types -- the ISG discusses the
12 different types of validity: content validity,
13 concurrent validity, and what should be demonstrated
14 in order to demonstrate that the exam program would
15 provide for valid testing measures. And there are
16 further discussions and definitions for what those
17 validates are and the appropriate ways to demonstrate
18 those.

19 Next slide, please. Section 4 talks about
20 scoring specifications. In our ISG we state that
21 exams are going to be criterion-referenced. That
22 means that there is a score and you get above it or
23 below it and you pass or you fail, basically what we
24 do now. So it's not norm-referenced. There's no bell
25 curves and the score changes, the passing score

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1 changes depending on how folks perform. That's not
2 considered appropriate for a licensing exam and so we
3 define criterion-referenced in the ISG.

4 And one of the things we talk about is
5 describing how each test item is scored and how you
6 combine those scores to get to the total score. So
7 for example, under NUREG-1021, our current process
8 under Part 55, the written exam is a four-part
9 multiple choice and every question is one point and
10 only one point. And you add the points up to get to
11 your total score.

12 For our current operating test we have the
13 zero to three scale on the scenarios for each of the
14 competencies and rating factors. And there's specific
15 weighting that's done and you have to do these
16 calculations to come up with the final score. So
17 that's what we're talking about here is we need to
18 have in the exam program a description of how the test
19 item is scored and how they get those to get to a
20 total score. And then the cutoff score. What is the
21 passing score based on all of that?

22 Additionally if there is part of the exam
23 that's based on score observation there needs to be
24 steps described about how to eliminate any unconscious
25 bias and judgments. So that's kind of like what we

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1 have with JPMS and scenarios currently. There are
2 critical steps or critical tasks. They get them or
3 they don't get them. We try to make it as objective
4 as we can so that you don't get that bias and
5 judgments.

6 It's not a perfect example. The intent is
7 to ensure that you have consistency in grading. So
8 again, getting back to our mandate prescribing uniform
9 conditions for operator licensing, for these facility-
10 developed exam programs the underlying concept is what
11 we're looking for to ensure the uniform conditions.
12 Is what they're providing a consistent uniform
13 reliable way to measure individuals' knowledge and
14 ability such that only competent operators are
15 licensed?

16 Next slide, please. Section 5 talks about
17 reliability of the tests. So what's the difference
18 between reliability and validity? Jesse just shared
19 a quick quote with me which was very useful, but I'll
20 paraphrase it. Validity is making sure that you're
21 accurately determining whether someone's competent or
22 not; reliability is being able to do so consistently.
23 So they are related but slightly separate concepts.

24 So Section 5 talks about reliability of
25 the tests, which basically means if the individual

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1 were to repeat the test and managed to forget
2 everything that was on the test in between taking the
3 tests, that the result would be similar. So in other
4 words, the test is reliable. Consistency. Stability
5 of performance over time. And they have to provide
6 documentation justifying the use of that test for
7 operator licensing.

8 Next slide, please. Now all of this is
9 stuff that is currently baked in the NUREG-1021, so
10 the whole purpose of this is to allow folks -- the
11 facilities the flexibility to determine what's needed
12 for their plant designs, because what's in NUREG-1021
13 is very prescriptive and very much for large light
14 water reactors. So a 100-question written exam might
15 not be needed for a microreactor that has very few
16 KSAs that would need to be tested in a written exam-
17 type format. So this gives them the flexibility to
18 tailor it.

19 Section 6.0 talks about the test manual.
20 That is basically their equivalent to the NUREG-1021.
21 It provides detail related to the specific types of
22 tests as well as some administrative aspects to the
23 tests. So we would expect them to include in this
24 test manual how to administer the exam, the time
25 allowed to take the exam, what test takers are allowed

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1 to look at. Is it open reference, closed reference?
2 Are they given certain materials like steam tables or
3 something for the test? And then how to interpret the
4 test results.

5 So these items -- there is additional
6 guidance that would be expected to accompany each test
7 that is actually developed. I might refer to that as
8 test instance because there's a lot of test things
9 talked about: test manuals, test plans, and what's
10 what. Because there are items that can change from
11 test to test those aren't things that would be
12 appropriate to include in the test manual because the
13 test manual is expected to be more stable, more like
14 the NUREG-1021. So items that would be documented for
15 the program as part of the test development process.
16 There are also things that would be included with the
17 documentation for each test.

18 So this documentation provides the
19 licensing basis for operators so it's important to
20 ensure it's complete and accurate. So the test, each
21 test instance will include developers' names, when it
22 was done, any revisions, evidence of validity, any
23 information related to computer software if it was a
24 test that used computer software. That's all provided
25 as part of the basis for licensing operators. And

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1 those would be expected to be developed for each test
2 instance.

3 So Section 6, have to read it as both
4 talking about test manual and what needs to be in
5 that. That's kind of similar to like a NUREG-1021.
6 And then it talks about things that would need to be
7 included with each specific test that's developed or
8 test instance developed. So that would be like test
9 at facility A. Under NUREG-1021 it would have those
10 items.

11 Next slide, please. So Section 7 is just
12 some additional characteristics of high-quality test
13 materials primarily focused on written and computer-
14 based tests. And it gives some additional
15 characteristics associated with psychometrics, test
16 instructions, the scoring system, and standardization.

17 A key consideration for computer-based
18 tests is adaptive scoring. If adaptive scoring is
19 proposed there would need to be some kind of
20 justification as to how uniform conditions are still
21 being met for the individuals taking the test. So
22 that's that.

23 I think there's a hand raised. Vicki?

24 MEMBER BIER: Yes, thank you. This is
25 Vicki Bier. I just have a quick question about who

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1 would ordinarily be developing these tests, especially
2 at facilities that may have very small staffing.
3 Because as an educator myself I know that you can be
4 very expert on the material but not knowledgeable
5 about how to create reliable tests. And I've seen
6 plenty of tests that are -- with questions that are
7 easily subject to misinterpretation, where somebody
8 who knows the material could get it wrong for weird
9 reasons. So anyway, I'm just curious what's
10 envisioned especially at small facilities that may not
11 have like a dedicated training staff or whatever.

12 MS. BUCHANAN: That's a great question,
13 Vicki, and I'll let Jesse jump in here in a minute.
14 I'll go ahead and give my response, but I'm sure Jesse
15 will have some thoughts as well.

16 And I agree with. I vividly remember
17 being back in college and taking some exams where the
18 instructors were very knowledgeable in the subject
19 matter, but their exams were just terrible. And so I
20 totally understand that point and get it.

21 And my understanding is that the
22 expectation is in the development of this test manual
23 it will require the use of folks who are both subject
24 matter experts in the field; so on that design type,
25 as well as subject matter experts in the area of

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1 testing and measuring. And that's to develop the
2 program. So the program that would come to us for
3 review.

4 Part of the program would include how the
5 folks are qualified, and so that would -- that is
6 where I would see whatever would be required for exam
7 authors. That would get covered under the -- I think
8 that would get covered more under the Training Program
9 ISG than is covered under this ISG. But the
10 expectation is that there would be some level of
11 qualification for the exam authors to make sure that
12 they could write exams that are psychometrically
13 sound. I will as for the -- I'm taking a quick step
14 back -- for the specifically licensed operators we
15 both review and approve the program overall, but then
16 we also review and approve each test instance before
17 it's given. So there is a backstop for the
18 specifically licensed operators where the NRC would
19 have to say yes, you're right, this is
20 psychometrically sound.

21 For the generically licensed operators we
22 still do a review and approval of the test program,
23 which would include all of these requirements I'm
24 discussing here. And then for the test itself we'd be
25 doing more of like what we do with re-qualification

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1 now where we go out and do inspections and we say are
2 the tests that they're writing psychometrically sound
3 or not? And if they're not, then there's violations
4 and things that -- the findings that they can get. So
5 there's some regulatory pathways that we can follow.

6 But, Jesse, I didn't know if you had
7 anything you wanted to add onto that?

8 MR. SEYMOUR: Yes, thanks, Theresa.

9 And this is a place where it's a great
10 concern, it's a place where we end up striking this
11 balance between flexibilities and I think some of
12 those pragmatic realities, what happens when you have
13 facilities with small staffs.

14 So in terms of different ways that this
15 program could be developed we've contemplated that in
16 some cases it may be the owner-operator develops the
17 program them self, right? We've envisioned that it's
18 possible that the owner-operator may contract an
19 entity to come in and develop the program with the
20 understanding that that initial development would take
21 more resources than the ongoing administration of that
22 program once it's up and running.

23 Another thing that we've envisioned is
24 that some of the vendors may potentially elect to run
25 that program centrally, right, to basically kind of

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1 package that with their product line to go ahead and
2 do that as well, too.

3 So again, these are different variations.
4 The paradigm that we see in the existing fleets is
5 that the owner-operators will run those programs a
6 resource perspective. And again, keeping in mind that
7 this is using an established program. Typically what
8 we see is that there's a single exam author that works
9 on the exam projects and keeps that stuff going.
10 They'll pull in additional subject matter experts as
11 needed for validation purposes and things of that
12 nature, but generally it's like a one-person kind of
13 full-time project to run through that. So that's
14 historically what we see.

15 The other thing, too, that I'll add is
16 that what Theresa and I have tried to be very
17 deliberate with in this guidance is to -- and,
18 Theresa, forgive me, I'll use the term -- sometimes we
19 refer to it as the easy button. What we try to do is
20 allow for the flexibility for facilities to go through
21 and to really craft the exam methods that are used to
22 suit their specific needs. However, what we try to do
23 as well is to leave the door open, that if a plant
24 just wants to emulate the methodologies of NUREG-1021,
25 the established methodologies, that they can really

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1 pick those up and run with them. Again with the
2 review itself that we do accepting that this is a
3 known process that it will work well over time. And
4 versus going through and reinventing things they can
5 just run with that.

6 Now granted there are pros and cons to
7 doing that, but we try to leave that door open that if
8 the resources aren't there are if the facility
9 applicant/licensee doesn't want to put those resources
10 there, they can elect to adapt wholesale significant
11 portions of the NUREG-1021 process and sidestep a lot
12 of this kind of deep psychometric and assessment
13 testing work that would have to be done.

14 MEMBER BIER: So I actually like the
15 model. I mean obviously it's not up to us to dictate
16 what the model will be, but I like the model of the
17 vendor possibly providing testing materials or testing
18 program information because I can kind of envision
19 that at small unique facilities there may not be
20 somebody on staff who's knowledgeable how to write
21 good tests. And at the same time if you look at the
22 world of training consultants, there may not be a lot
23 of people who are knowledgeable the specifics of that
24 facility design. And the vendor would kind of bring
25 both, I would hope, but that's a good option at least

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1 to have in mind. Thank you.

2 MS. BUCHANAN: Thanks, Vicki. And that
3 actually was one of our main considerations when we
4 were drafting this was to give that flexibility
5 because we thought that would be folks who would use
6 that as almost like an economy of scale, have the
7 vendor do it so that the individual facilities might
8 be too small to be able to have the full-time staff.
9 So that's one of our thoughts.

10 Jesse, did you have something else you
11 wanted to add before I move on?

12 MR. SEYMOUR: No, I was just going to add
13 on that at the end of the day it kind of gets back to
14 what I said before, that we have a very distinct role
15 and our role is not to come up with a business case
16 that they should be using. But what we try to do is
17 think through what those business cases might be and
18 where things are acceptable, just to least those
19 flexibilities open. So again, we try to leave a door
20 open to going about it like this or that. And in the
21 end it will have to be a decision that's made by that
22 entity on how they want to approach it. We just want
23 to leave those flexibilities there for them so they
24 can select them.

25 MR. BLEY: This is Dennis Bley again.

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1 Have you had any conversations with EPRI or NEI or
2 other industry groups? They've been involved helping
3 set up owners' groups and that sort of thing that work
4 in these areas as well as in the engineering areas.
5 But is there any hints of what's going on on that side
6 of this process?

7 MR. SEYMOUR: Theresa, I can speak to
8 that, if you want me to.

9 MS. BUCHANAN: Okay.

10 MR. SEYMOUR: Okay.

11 MS. BUCHANAN: Yes, please. I'm not
12 really aware of any. I know that this ISG is pretty
13 new on the street. It only came out last month, so I
14 don't know that they've had a lot of time to really
15 digest everything that's in there.

16 But yes, Jesse, if you know something.

17 MR. BLEY: Well, was it all developed in
18 house or -- sometimes those kind of ISGs you cooperate
19 with EPRI and NEI in their development. It doesn't
20 sound like that was the case here.

21 MS. BUCHANAN: We work primarily with INL.
22 Jesse?

23 MR. SEYMOUR: Oh, yeah. Sorry, Theresa.
24 Yes. So, and I'll start with that point. So the way
25 that this guidance was developed, for the guidance

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1 documents that we're discussing today, only the
2 staffing guidance was developed exclusively in-house.

3 And what we did with, you know, the human
4 factors engineering guidance is we worked with
5 Brookhaven National Lab. And with the operating
6 licensing guidance we're discussing here, we worked
7 with Idaho National Lab. Now, Idaho National Lab, you
8 know, also, you know, worked in tandem with
9 individuals from Embry-Riddle Aeronautical University
10 with those.

11 So, specifically, you know, we had, you
12 know, academics involved. And notably, one of the key
13 subcontractors was actually someone who had experience
14 with, you know, the pilot certification testing that's
15 done by the FAA, if I remember right. So we tried to
16 reach out to other entities that were involved in
17 assessment testing of people that were, you know,
18 involved in, you know, applications where safety was
19 involved.

20 And so, beyond just, you know, the kind of
21 a contracted staff, one of the things that we did as
22 part of this development project is we actually had a
23 workshop that we hosted over I believe it was a two-
24 day span. And for that workshop, we actually invited
25 and we had attendance by a very wide range of

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1 individuals.

2 So we had international attendees, you
3 know, like Finland, for example, as I recall
4 correctly, you know, talking about how they approach,
5 you know, their programs. We had an individual from,
6 you know, the Federal Railroad Administration talking
7 about how railroad engineers and conductors are, you
8 know, certified, right, the regulatory requirements
9 that are there. We had individuals from aviation. We
10 had, you know, individuals involved in other aspects
11 of training.

12 And the key audience that we targeted for
13 that were, you know, instances where there was some
14 sort of a regulated or required certification process
15 that people were going through. And it was to let
16 them do a job where there would be safety impact,
17 because we wanted to get a very broad survey of how
18 that was being approached.

19 And in the course of doing that survey, we
20 pulled in information, even in that level, what the
21 passing scores were, you know. And, you know, so I'm
22 looking at, you know, like how do you figure out what
23 the test, what methods do you use to test, you know,
24 what are the passing scores, what are the
25 technologies, you know, for entities.

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1 Then I'll give the example of the Federal
2 Railroad Administration, you know, getting into the,
3 you know, where does the government, you know -- you
4 basically say, okay, we're going to regulate things
5 down to this level in terms of how this process works.
6 Actually, a lot of good synergy as we noticed there
7 between how they were approaching things and how we
8 were looking to as well, too.

9 You know, we had a retired individual from
10 the Federal Aviation Administration, if I remember
11 right, you know, talking about how they approached
12 things as well. So, again, you know, we pulled in a
13 very broad range of information in putting those
14 together.

15 And something that, you know, something
16 that we found to be quite interesting as we did this
17 was not only did you get into matters of, you know,
18 where there was established science, if you will,
19 right, in terms of, you know, assessment testing and
20 things that are very well established, you know,
21 again, you know, things like the concepts of validity
22 and reliability, you know, content domain, those types
23 of things, but also where, you know, we found that
24 fairly universally certain things are just left to
25 subject matter experts, elicitation and consensus,

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1 right.

2 So there's a number of end points here
3 where, you know, if you really ask a question of how
4 do we scientifically figure out what a passing score
5 needs to be, you're not really going to get a clean
6 answer on that, because it's going to come down to
7 what subject matter experts and incumbents in that
8 field reach a consensus on as to where that
9 performance cutoff is, right.

10 So, again, you know, there's a place
11 where, you know, kind of the science and the art come
12 together on something we learned here, too. So, as we
13 shape the guidance, we tried to be mindful to where
14 things really need to fall back on the subject matter
15 experts for, you know, for that new technology.

16 Now, the last thing I want to touch upon
17 is the working groups. And, you know, we have had
18 interactions, you know, recently with entities, yeah,
19 individuals from NEI, you know, our, you know,
20 interactions with NPO, right, that we have, you know,
21 have our, you know, we meet with them annually and so
22 on and so forth under a memorandum of agreement.

23 And what I can say is that there's other
24 working group efforts that are, you know, other, you
25 know, similar or kind of tangentially related to, you

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1 know, what's going on here. But for the purposes of
2 developing this guidance, again, you know, the pool of
3 information that we drew from was what I described.

4 And again, what we intend to do is, you
5 know, last week we had a stakeholder meeting, right,
6 where we presented very similar presentations on these
7 interim staff guidance documents. And we've made
8 those publicly available, and again, to get those out
9 to the stakeholders.

10 And what we anticipate going forward is
11 that, since these are included in the Part 53 rule
12 package, when we get into the public comment period
13 that, you know, that the public will not have had time
14 but the stakeholders will have had time with those
15 efforts that they're, you know, doing individually and
16 so forth to go through to consider what's here and to
17 make informed comments on this and refine what we're
18 doing.

19 Theresa, that's all I have.

20 MS. BUCHANAN: Thanks, Jesse. Yeah, I
21 think the key point is this is still a draft guidance,
22 so it was going to be subject to change. So we do
23 expect to get comments from NEI and those folks on
24 this guidance. All right. If there's nothing else,
25 can we go to the next slide, please?

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1 So Section 8 basically is a very short
2 section. It just references back to items in NUREG-
3 1021 that are universally applicable. So that really
4 related to plant designs, so, for example, things like
5 exam security or whether or not procedures are going
6 to get frozen or overview of certain generic
7 examination concepts.

8 You know, there's discussion. You know,
9 Appendix A of NUREG-1021 talks about, you know, the
10 generic exam, you know, concepts. And it includes an
11 additional discussion on validity and reliability and
12 things like that.

13 So, basically, what we say in the ISG is
14 that's all stuff that's universally applicable to
15 examination programs since it's not really related to
16 a specific plant design. So, instead of just copying
17 and pasting everything from the NUREG into this ISG,
18 we just reference it back to the NUREG. Next slide,
19 please.

20 So Section 9, this is the slide that we
21 had mentioned earlier. It talks about simulation
22 facilities. This is primarily associated to
23 simulation facilities used for the exams. So there --
24 and I'm sure Jesse or Maurin could talk about it.
25 There's different requirements for simulation

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1 facilities used for the HFE testing stuff. That's not
2 in -- that's beyond the scope of this ISG.

3 This ISG is related to, if you're going to
4 use a simulation facility on the exam, it has to have
5 sufficient level of fidelity in order to assess those
6 KSAs. I mean, that just makes sense. You would think
7 that would be what you need to do. So, but we put it
8 in here to make sure it's in writing.

9 So they have to show how, if they're going
10 to be testing things on a simulation facility, let's
11 say they're going to be doing JPMs as an example, they
12 have to show how the simulation facility can actually
13 test those JPMs and have an appropriate level of
14 fidelity so you're not getting into like negative
15 training and stuff.

16 Additionally, the simulation facility
17 should have the same cognitive requirement as the real
18 environment, so glass top to glass top, actual
19 hardware to hardware, so similar cognitive
20 requirements.

21 And if you have a simulation based
22 assessment, again, just like other assessments, you
23 have to have documentation on how that exam is valid.

24 That documentation would include what's
25 measured, who the intended population is here --

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1 that's fairly obvious, that would be the operators or
2 the applicants -- what the measurement tools are, and
3 includes things like identifying the jobs and tasks,
4 the specific scenario events, identifying metrics, in
5 other words, how you determine whether or not the
6 examinee achieved the objective, if they passed or
7 not, so what are the metrics, and additionally, just
8 feedback to the examinee on their performance.

9 So that's basically what this covers here.
10 And again, like I said, this covers simulation
11 facilities in the context of the exam program, since
12 that's what this ISG is primarily about. So it does
13 not cover simulation facilities from the context of
14 like HFE testing. Next slide, please.

15 So Section 10 now gets into administration
16 of the operating tests. Now, currently under Part 55,
17 we administer all the operating tests. So the NRC
18 does it. Under Part 53, we're looking at allowing the
19 facilities to administer operating tests while we do
20 inspection to make sure that they're administering
21 them correctly.

22 Regardless, the examination program needs
23 to have documentation and procedures similar to those
24 in NUREG-1021, specific to the type of test
25 administered, to ensure that examiners behave in

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1 accordance with the appropriate codes of conduct to
2 ensure exam integrity.

3 Again, examination integrity is still, you
4 know, a requirement under Part 53. So they need to
5 have measures in place in their program to ensure
6 that, so, when administering these tests and also
7 measures in place to retain required records
8 associated with the administration of these tests.

9 Again, these tests help form the licensing
10 basis for licensing these operators regardless of
11 whether you're specifically licensed or generally
12 licensed. And so the records need to be maintained.

13 But this is, administering the operating
14 tests is based on what you have in your operating
15 tests. So, if you have no JPMS, you don't need to
16 have instructions on how to administer JPMS. You
17 really only need to have instructions on how to
18 administer the aspects that are associated with the
19 facility's developed exam program.

20 So, if no scenarios, there's no
21 instructions on how to administer scenarios. But if
22 there are scenarios, you have to have instructions on
23 how you administer the scenarios and make sure that
24 you're retaining exam security. All right. Next
25 slide, please.

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1 Section 11 then covers the change
2 management process for the program. The programs that
3 are required to be reviewed and approved by the NRC
4 also are required to have some kind of change
5 management program, so what changes can be made that
6 the facility can make without having to come back to
7 the NRC and say, hey, we've made changes, you might
8 need to look at this, and what changes do require us
9 to come and take another look at it and say, okay, the
10 changes you've made are okay, you haven't
11 significantly changed the program or you haven't
12 changed the program in a way that would impact the
13 exam program or make the license decisions invalid.

14 So here are some of the examples, you
15 know, exemption from regulation, changing tech specs,
16 and then the last two is the negative impact to exam
17 security or integrity or a negative impact on the
18 consistency of the reliable, valid measure of the
19 exam.

20 An example is also provided in the ISG.
21 It's something that people might not originally think
22 of as a problem with adding it, you know, why would
23 you need to get NRC approval, and that's adding
24 knowledge, skills, and abilities to the exam list. So
25 you're going to be testing on additional things.

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1 So that's like, okay, well, that should be
2 fine. But you have to think beyond just adding
3 something to the testing pool. You have to think
4 about the, you know, unintended consequences of that,
5 you know. It could have a broader impact on the exam.

6 So questions that would need to be
7 addressed is should sampling be changed, do I now need
8 to sample more from this area versus this other area,
9 do I need to increase the number of my test items. If
10 I had a 500 KSA bank and let's say I added, you know,
11 I added a new system, so I added 20, 25, 50 KSAs,
12 well, now I have a bigger bank, you know. Do I need
13 to add questions now to my exam? Maybe my exam was 35
14 questions before. Maybe now it needs to be 40 or 50
15 questions.

16 So these are all things that -- just
17 adding items to the exam list has broader impacts than
18 just that list. And so that's an example of something
19 that would still need to be reviewed by the NRC to
20 ensure that all the potential impacts of the change
21 are properly considered prior to proceeding.

22 So the exam program itself that they would
23 submit to us for review and approval would have within
24 it how they propose to do the change management, what
25 things we would need to review and approve before

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1 doing and what things the facility could do. We
2 provide a list of both in the ISGs that would be
3 acceptable.

4 An example for the items that they
5 wouldn't need to come back to us on are things like,
6 you know, minor edits for clarity where they're not
7 really changing anything, they're just clarifying
8 things, stuff like that. So that's all in this
9 section of the ISG. Next slide, please.

10 MEMBER BIER: Excuse me. Another
11 question. Vicki Bier.

12 I appreciate the idea that adding items or
13 skills and knowledge to the test bank could require
14 NRC approval for the reasons you stated. But I also
15 wonder whether that creates a disincentive for the
16 licensee to add items when it might be advisable,
17 because they may say, well, but then we're going to
18 have to go through this whole NRC approval, maybe we
19 should just leave those items off and not add them.

20 MS. BUCHANAN: Now, that's a good point.
21 And, you know, my initial response is going to be,
22 well, the SAT process will catch you. But the SAT
23 process is associated with training and not
24 necessarily the exam.

25 So that might be something that we would

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1 need to take a look at to make sure that there's a
2 feedback loop, if you will, kind of like, you know,
3 how SAT process has that feedback loop where if you
4 identify something new that needs to be added to
5 training you get a start back in on your SAT process
6 to, you know, do the task analysis and all of that
7 kind of stuff.

8 So it kind of has this iterative,
9 constantly iterative approach of saying, hey, do I
10 need to add new things to my training program. And I
11 don't think we really have that right now in the exam
12 program. I don't know, Jesse, if you wanted to touch
13 in. But that is something that I think maybe we
14 should consider.

15 MR. SEYMOUR: Yes, Theresa, yeah. You
16 know, the systematic approach to training is a living
17 process, right. So, again, we mentioned that, you
18 know, there's another layer to, you know, the equation
19 here. And that's the broader, you know, training
20 program review guidance.

21 And, you know, the training program review
22 guidance, which is, you know, a separate guidance
23 document that we're working through, that really has
24 to be balanced against the potential that, you know,
25 some entities may elect to pursue accreditation of

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1 their training programs, right. And historically
2 where, you know, accreditation has been achieved, you
3 know, that's been seen as an acceptable way to meet
4 some of those programmatic requirements. So the depth
5 to which we look at those programs could vary
6 depending on the approach taken.

7 But the bottom line is that that's a
8 living program, right. So, as, you know, as you make
9 modifications to your facility, right, as you do
10 things that, you know, change tasks that need to be
11 done, right, that gets caught up in the analysis
12 phase, right. It would be a task analysis.

13 And that subsequently translate to
14 determining, you know, training needs, right, so
15 identifying learning objectives and so forth. So
16 that's really an upstream process.

17 Downstream of that you have, you know,
18 kind of this, you know, testable body of those
19 knowledge and ability items, you know, that they did
20 out of the task analysis that are of a high enough
21 importance, you know, to warrant, you know, testing
22 within the scope of these examinations.

23 So, for the, you know, for the entity to
24 just say like, well, hey, we're going to forego, you
25 know, making this change because we don't want to go

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1 through that, right, again, that's something that we
2 don't want to, you know, inadvertently get things into
3 that position.

4 So what we've been trying to do is strike
5 a balance between letting that SAT process be a living
6 process where, you know, the learning objectives and
7 so forth are, you know, updated and refreshed as they
8 need to be based upon changes to tasking, but at the
9 same time, allowing, you know, the knowledge and
10 ability list to undergo, you know, reasonable
11 modifications and updates, right, you know, in tandem
12 with that, but again, you know, trying to set, you
13 know, the boundaries to where those changes become of
14 a, you know, nature that's substantive enough, you
15 know, for us to have to, you know, provide approval.

16 And really it's when that balance starts
17 to get thrown off. And, you know, and I think Theresa
18 touched upon that, you know. You can really go in two
19 different ways.

20 I'll give an example. So, you know, one
21 of the things that we need to avoid is the potential
22 for a facility to do too shallow of a task analysis,
23 right. So they could come in and they could say,
24 well, you know, the operator is simply someone who
25 implements. They push buttons. They don't need to

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1 know the theory, the system operation, and so forth.
2 They simply pick up procedures, see light, push
3 button, right. And that's a gross oversimplification,
4 but that's it, right.

5 So, you know, a proper, a properly
6 rigorous, you know, SAT based process that, you know,
7 again, you know, descends into, you know, this
8 knowledge and ability catalog of testable items would
9 look at, you know, the full scope of, you know, the
10 cognitive aspects as well, right. So, and again, you
11 know, in our guidance, you know, if not here, over in
12 the training guidance, we do matters of like cognitive
13 task analysis, right.

14 So you have to have the underlying
15 understanding, you know, from the fundamentals on up,
16 you know, regarding those. And that's something in
17 the preamble that we talk about more, you know, what
18 the, you know, what we envision the required minimum
19 scope to be.

20 So, as, you know, as this process goes
21 through, there is the peril, you know, that we have to
22 safeguard against that there could be an inappropriate
23 change in the perceived job task scope that's allowed
24 to translate down to, you know, that list of KAs,
25 right. So someone could, you know, narrow the scope

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1 in an inappropriate way, and it starts coming out in
2 things like fundamentals and systems.

3 And then on the other end, right, and I
4 think Theresa spoke to this, you know, as you
5 incorporate these modifications into the plants,
6 right, now, at the level of just the training program,
7 of course, those tasks should be included in training,
8 right, and so on and so forth.

9 However, when it comes time for the
10 license exam, you know, again, we want to keep the
11 focus there on, you know, the safety functions, the
12 important administrative functions, you know, the
13 control reactivity, right, you know, that kind of, you
14 know, pool of things that are evaluated to be of
15 higher importance, right, for the job role.

16 And so what we don't want to do is dilute
17 that pool, right. So, again, you know, we don't want
18 to, you know, necessarily be testing, you know, some
19 ventilation system that's out in the field that's just
20 installed for comfort, right. That's not something
21 that should be showing up on the license exam.

22 So, again, it's a difficult balance to
23 strike. And what we, you know, absolutely want to
24 avoid is what you're pointing to, where somehow we
25 disincentivize, you know, the facility from, you know,

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1 being able to take this, you know, this very, you
2 know, kind of honest, forthright approach, and, you
3 know, just updating things in real time as they're
4 warranted, right, and then stalling modifications that
5 are prudent. So --

6 MS. BUCHANAN: Jesse, I just want to just
7 tag on a point that I think that Vicki was making,
8 and, please, Vicki, correct me I get this wrong.

9 But I think the point that I was hearing
10 is, you know, the way that our ISG is currently
11 written, it's kind of static. So the training program
12 based on being SAT is, indeed, iterative, continuous,
13 life cycling, however you want to call it. But the
14 way that the exam program is currently written, other
15 than for the section on making changes to it, it's
16 kind of static.

17 So, having a change to your training
18 program, I don't currently see in our ISG, and maybe
19 I'm wrong, but I don't currently see in our ISG a
20 kicker that says, hey, when your training list
21 changes, you need to go back through and redo the exam
22 program KSA list.

23 And I think that's what Vicki was kind of
24 asking, saying, hey, is there something that kicks in
25 into doing that, because if they have this change

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1 management and they're disincentivized from doing
2 that, they're not going to want to do that unless
3 they're being made to do that.

4 MEMBER BIER: So I will just say, you
5 know, I appreciate that it's a difficult balance,
6 right. If you mandate too many things, then you can
7 get just kind of compliance by checklist and somebody
8 mindlessly trying to fill all the requirements. And
9 on the other hand, if you have too few requirements,
10 then, you know, people can skate by and, you know, not
11 take certain things seriously that they should.

12 So I don't think there's necessarily a
13 right or wrong place to fall on that, but just that
14 that idea of are we inadvertently disincentivizing
15 licensees from adding things to the list of testable
16 items. So --

17 MS. BUCHANAN: Good point, yeah. All
18 right. Can we go ahead to the next slide, please?

19 CHAIR PETTI: Yeah, just, members, I'm
20 hoping that we'll take a break after this presentation
21 --

22 MS. BUCHANAN: Yeah. I've got five slides
23 left, so I'll try and get through them as quickly as
24 I can.

25 CHAIR PETTI: Great. Thanks.

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1 MS. BUCHANAN: Thanks. Okay. So Section
2 12 is on static, computer based testing. Basically,
3 we just say, hey, that's beyond the scope for right
4 now. But if they wanted, if the facility wanted to do
5 that, they'd have to provide documentation to describe
6 how that's equivalent to what we do have in the ISG.
7 Next slide, please.

8 This section provides some additional
9 guidance on requalification. As Jesse had mentioned,
10 this does specify the fact that, hey, if you fail, you
11 have to get remediated and retested before returning
12 to licensed duties. And we would expect to see that
13 in their program.

14 Periodicity, when I'm talking about
15 periodicity, I'm talking about the length of time that
16 the requalification program cycle runs. And for
17 specifically licensed ROs and SROs, it's the same as
18 what we have for Part 55, don't exceed 24 months.

19 For the generally licensed operators, we
20 allow the facility to define that. But if they're
21 going over 24 months, then they have to provide a
22 basis for why that's okay. And we provide some
23 examples. So we say that includes things like the SAT
24 process, operator performance trends, industry OE,
25 changes in the experience level or turnover of the

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1 staffing, significant changes to design and operation
2 of the facility.

3 So this periodicity is defined by the
4 program. But based on, as I said, some of the
5 examples we provided, there is a possibility that that
6 periodicity could actually change throughout the life
7 cycle of the facility. And it's going to be defined
8 by the program for the generally licensed operators.
9 Next slide, please.

10 Proficiency, again, I've already
11 previously mentioned that. That has to do with
12 actively performing the functions of a licensed
13 operator. And you have to maintain it and
14 instructions for how to reestablish proficiency that
15 cannot be maintained.

16 Basically, the difference is current Part
17 55 operators is currently defined in regulation. And
18 the difference here is that the facility can define
19 what it is for their facility. But it has to get
20 reviewed and approved by the NRC first.

21 So it's a little bit less proscriptive.
22 Like currently you have to have, you know, 5, like 5,
23 you know, 5 day, you know, 5 days, 12-hour shift
24 within every calendar quarter in order to maintain
25 your proficiency. And if you don't, you have to do

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1 all of these 40 hours under instruction with a
2 complete plant tour and all these other things. And
3 so we expect them to define that for their facilities.
4 Next slide, please.

5 Okay. Section 15 talks about waivers.
6 When I'm talking about waivers, what I'm talking about
7 here is waiving the requirements for the exams. So,
8 under -- and Jesse you know the rule language a lot
9 better than I do. I don't know the specific one.

10 But for specifically licensed operators,
11 it's in the rule about being able to waive the
12 requirement for an exam. And if I remember correctly,
13 and I could be wrong here, Jesse, correct me if I am,
14 it's similar to what we have currently for Part 55
15 operators in that, you know, there is criteria that
16 can be met that allows folks to request a waiver from
17 the exam.

18 So an example, they were licensed at that
19 facility. They left. They come back a year later.
20 You know, they get refreshed on changes that have been
21 made. And then they put in a request to us under Part
22 55, I think it's 55.47, to say, hey, I want to get
23 relicensed at this facility, but I don't want to have
24 to take the exam, and here's how I meet the waiver
25 requirements that's listed in the rule.

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1 So it's a similar process for the
2 specifically licensed operators. That's why there's
3 no information on that in this ISG. There doesn't
4 need to be. It's in the rule itself.

5 For the generally licensed operators,
6 there isn't any information in the rule specifically
7 on the exam piece of it. So they said, hey, if they
8 have appropriate criteria similar to what's in 55.47,
9 especially, that says, hey, if, as a generally
10 licensed operator, if you were generally licensed, you
11 know, at this facility and you meet these
12 requirements, you don't need to take the exam in order
13 to get relicensed at the facility.

14 If they want to propose alternate
15 criteria, then we'd have to review that. And they'd
16 have to establish a basis describing how the criteria
17 they are proposing ensures that the individuals are
18 going to be able to safely and confidently operate the
19 facility without having to pass another test.

20 MEMBER HALNON: So this is Greg. Just
21 real quick, this goes back to my comment about the NRC
22 having a point in this process to validate or verify
23 that operators have completed everything they need to
24 do before they assume licensed duties.

25 And this is another case where the

1 licensee can waive the requirements either through,
2 you know, very diligent compliance with the program
3 that you guys have already approved, or as we know
4 could happen, wordsmith is such that somebody who may
5 be marginal meets the criteria for a waiver. And
6 there's no check and balance by the NRC anywhere
7 before this person becomes licensed.

8 And I just think that this is another case
9 where the fox has the key to the hen house in some
10 respects. And it further validates why I think there
11 should be a point where the NRC verifies and validates
12 all the criteria met prior to licensed duties.

13 MR. SEYMOUR: Theresa, I can speak to this
14 if you want to --

15 MS. BUCHANAN: Okay.

16 MR. SEYMOUR: -- yield the floor for a
17 moment. So --

18 MS. BUCHANAN: I yield the floor to you
19 for two minutes. I'm going to time it.

20 MR. SEYMOUR: Thank you. I appreciate it.
21 You know, and again, I captured the point earlier on
22 this. It's a really good point. Like I said, you
23 know, it's something that we will, you know,
24 definitely, you know, consider further between now and
25 the full committee.

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1 What I can say is that, you know, there
2 are certain legal ramifications that we get into of,
3 you know, a general license and some of the mechanisms
4 that are in fault there. And there are some practical
5 considerations associated with that.

6 So what I wanted to point out, though, is
7 that in, you know, in some aspects, right, you know,
8 there's still enforcement action, you know, potential,
9 right, in some instances. Whereas, previously we
10 might have been in a circumstance where we'd be taking
11 two enforcement actions against both the individual
12 licensee and the facility licensee, which is quite
13 common in issues that happen with individual operator
14 licensing, right, specific operator licensing. We'll
15 actually issue violations against both in some cases.

16 What we would have here is a circumstance
17 where, you know, if we had an entity that, you know,
18 came in, you know, said here's the waiver process that
19 we'll use, presented something to us that, you know,
20 for the sake of discussion we'll say emulates, you
21 know, the structure of 55.47, and then inappropriately
22 applied that, right, well, we have every intention of,
23 you know, having, you know, ongoing inspection
24 activities of these programs, right.

25 Then again, that's a program that still

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1 needs to be flushed out, you know. It will be part of
2 the broader inspection methodology that's crafted for
3 Part 53.

4 But our intention, and, you know, I think
5 this is articulated in the preamble as well, is to,
6 you know, have an ongoing oversight of these programs,
7 so, you know, via, you know, regular inspection or via
8 reactive inspections, right, you know, again, post-
9 event type of circumstances.

10 If it came to light that there was an
11 inappropriate application of that process, again, you
12 know, this would be an approved program. And again,
13 there would be, you know, the potential there to take
14 enforcement action against the facility licensee.

15 Now, that's an after the fact thing. It
16 doesn't address, you know, your concern about how do
17 you address this on the front end.

18 However, what it does is it creates, you
19 know, a factor that should act as a deterrent against,
20 you know, that type of inappropriate, you know,
21 implementation of these programs, right, because
22 again, there is the potential there for enforcement
23 action and, you know, everything that's attendant with
24 that. So, again, I would just offer that.

25 In some cases, with the general licensed

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1 reactor operator program, the onus has shifted, you
2 know, versus just going away entirely, right. So here
3 is an area where, you know, the regulatory hook, you
4 know, is still with the facility licensee.

5 So, again, it's on us to review that
6 program and to make sure that it's appropriate before
7 we accept it. However, they will be on the hook to
8 implement it, you know, and it will be something that
9 we envision as being enforceable.

10 MEMBER HALNON: Yeah, I agree. There is
11 a level of comfort with the inspection program.

12 However, what we told you prior to this
13 and we reiterated it to the Commissioners during our
14 briefing is that the ability to assume licensed duties
15 by being a licensed operator is a really big deal, and
16 we want to keep that in front of us as being a really
17 big deal. And part of that is make sure that the
18 federal government agrees that that person is as
19 qualified as the licensee says they are.

20 So, but I do agree, Jesse. There is a
21 level of comfort that there is both enforcement
22 hanging over people, as well as you assume that
23 everyone is diligently and incredibly complying with
24 the program that you have already approved. So,
25 again, that's just, again, back to my original

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1 comment, I think there should be still a verification
2 of, prior to assuming licensed duties.

3 MS. BUCHANAN: And, Jesse, you said you'd
4 noted that down already?

5 MR. SEYMOUR: Yes.

6 MS. BUCHANAN: Okay. All right. Then I'm
7 not going to write it down a second time since you've
8 got it. Okay. Thank you, Gregory.

9 If we can go on to the next slide, this is
10 my last slide. So everybody can get excited. So this
11 is -- Appendix A to the ISG talks about currently
12 approved examination methods. Basically, what it says
13 is this is that easy button Jesse talked about. He
14 stole my thunder earlier.

15 So, if you have methods that are currently
16 approved in NUREG-1021, you can go ahead and use them
17 without needing to provide any further basis for their
18 use or us having to do any additional NRC review,
19 because we basically looked at it as, hey, this is
20 something that's already been reviewed and approved.

21 So, in other words, if you want to use a
22 four-part multiple choice written exam with an 80
23 percent cut score, you don't have to provide a basis
24 to us on why a four-part multiple choice written exam
25 with an 80 percent cut score is okay.

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1 You would still need to have a basis for
2 which KSAs are being tested using this method, the
3 sampling method that's being used for it, and as well
4 as the number of questions on the exam if you're not
5 doing a 100-question exam. All of those aspects would
6 still need to be justified.

7 But, you know, the fact that you had a
8 four-part multiple choice, you know, format with an 80
9 percent passing rate, that wouldn't need to be
10 justified. You could just use that as is because it's
11 basically been previously approved by the NRC by
12 virtue of being in NUREG-1021 currently. That's how
13 we kind of looked at that.

14 And that is that. That's all that I've
15 got for my presentation. And I know that it was said
16 that you all wanted to look at doing a break. So I
17 was aiming to get done by 11:00, and I managed to do
18 that. So I don't think I made up all the time that we
19 lost earlier, but I think I made up a little bit.

20 CHAIR PETTI: Great. Thanks. Any other
21 comments, members? Okay. Then let's take a 20-minute
22 break, come back at 20 minutes after the hour. Thank
23 you.

24 (Whereupon, the above-entitled matter went
25 off the record at 10:59 a.m. and resumed at 11:20

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1 a.m.)

2 CHAIR PETTI: Okay. We're back. So let's
3 keep on going. Thank you.

4 MS. SCHEETZ: All right. Good morning,
5 subcommittee. This is Maurin Scheetz. I'm an
6 operator licensing examiner and technical reviewer in
7 the NRC's Operator Licensing and Human Factors Branch.

8 Now I'm going to present on the draft
9 guidance for NRC review staffing plans under the
10 proposed Part 53 rule. This interim staff guidance
11 augments existing staff guidance in NUREG-1791 which
12 is titled Guidance for Assessing Exemption Requests
13 from the Nuclear Power Plant License Operator Staffing
14 Requirements Specified in 10 CFR 50.54(m). It's
15 augmenting this NUREG so that it can be used to review
16 staffing plans submitted under Part 53. Next slide,
17 please.

18 So this slide explains why we wrote the
19 draft review guidance to augment NUREG-1791. The
20 current staffing requirement for licensing Part 50.52
21 plants is very prescriptive, and it's specifically
22 written for up to three large light water reactor
23 units. The NRC can review exemptions to this
24 prescriptive staffing level using NUREG-1791.

25 NUREG-1791 was developed in 2005 in

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1 anticipation of advanced reactors and an increased use
2 of advanced automation. And it provides a
3 performance-based process for determining an
4 appropriate number of control room operators. It has
5 11 steps, including the review of a staffing plan
6 validation.

7 The staffing plan validation itself is a
8 performance-based test used to determine whether the
9 staffing plan meets performance requirements and
10 acceptably supports safe operation of the plant. The
11 staff used NUREG-1791 most recently to evaluate the
12 novel control room staffing models for the NuScale
13 small modular reactor design. So we are very familiar
14 with use of this review guidance.

15 However, NUREG-1791 cannot be used as
16 written for Part 53 purposes because it relies on the
17 exemption process, the exemptions to Part 50
18 requirements. So because of this, we chose to augment
19 the document for Part 53 purposes. Next slide,
20 please. So the next few slides provide an overview of
21 the Part 53 approach to staffing from the proposed
22 rule language.

23 The staffing rule in Part 53 is flexible
24 meaning that the applicant proposes a minimum staffing
25 level by submitting a staffing plan with their

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1 application. The rule considers differences in
2 staffing needs when operators have or do not have a
3 safety rule. If the applicant is going to use
4 specifically licensed operators, then the applicant
5 must provide additional details in their staff plan
6 submittal, and those details must be supported by
7 human factors, engineering, analysis, and assessments.

8 We also recognize that operators may fill
9 multiple roles at the plant. So the staffing plan
10 submittal has to include information about other
11 responsibilities the operators may have. The staff
12 will review and approve the staffing plan as part of
13 the licensing process.

14 Subsequent changes to approving staffing
15 plans are then subject to administrative controls.
16 Next slide, please. So this is the main excerpt from
17 Part 53.730(f) for the applicant to submit a staffing
18 plan. And that staffing plan focus is on the number,
19 positions, and qualifications of operators, either
20 specific or generally licensed across all modes of
21 plant operations and a description of how the numbers,
22 positions, and responsibilities of personnel in the
23 staffing plan would adequately support all necessary
24 functions in the areas of plant operations,
25 maintenance, radiological protection, chemistry, fire

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1 brigade, engineering, security, and emergency
2 response. Next slide, please.

3 The staffing plan must also include a
4 description of how engineering expertise will be
5 available to the on shift crew during all plant
6 conditions to assist in situations not covered by
7 procedures or training. This is at least one person
8 available to support the crew at all times. And this
9 person must be familiar with the operation of the
10 facility and have a technical degree or a professional
11 engineer license.

12 These are the same education requirements
13 that exist for shift technical advisors or STAs at
14 operating reactors. However the requirement for
15 engineering expertise is different than the
16 traditional STA because it allows for more flexibility
17 and where this person is located to do their job.
18 They could be onsite or offsite, and it could be a
19 single qualified individual providing coverage for
20 multiple facilities from offsite.

21 The overall purpose of this position is
22 also slightly different than the STA. The initial
23 purpose of the STA immediately following the accident
24 at Three Mile Island 2 was to provide additional
25 technical and analytical support and advise the shift

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1 supervisor on actions to terminate or mitigate the
2 consequences of abnormal events or accident
3 conditions. The Part 53 requirement for engineering
4 expertise is focused on supporting the crew in
5 situations not covered by procedures or training, also
6 known as uncertainties.

7 It's aligned with Commission policy for
8 education on shift as described in the 1989 Commission
9 policy statement titled Education for Senior Reactor
10 Operators and Shift Supervisors at Nuclear Power
11 Plants in which the Commission acknowledged the
12 potential for situations to arise which are not
13 covered through training or operating procedures. And
14 therefore, there's a need for some individuals on each
15 nuclear power plant shift who have an innate
16 understanding of systems level performance of a
17 nuclear power plant and knowledge of scientific and
18 engineering fundamentals and basic scientific
19 principles that govern the behavior of electrical,
20 mechanical, and other engineering systems. Education
21 and experience requirements for candidates for
22 operator licenses are traditionally dictated by a
23 facility license's training program requirements.

24 Specifically, reactor operator candidates
25 must have a high school diploma. And senior reactor

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1 operator candidates without previous experience as a
2 reactor operator on a commercial or military reactor
3 must have a bachelor's of science degree or equivalent
4 in engineering or engineering technology or related
5 science with some exceptions. This allows for the
6 control room operating crew to have a desirable mix of
7 education and experience requirements -- sorry, a mix
8 of education and experience backgrounds such as senior
9 reactor operators with technical degrees and reactor
10 operators with substantial hands on engineering --
11 sorry, hands on operating experience.

12 The staff anticipates that Part 53
13 applicants may seek alternatives to these traditional
14 categories of engineering and experience requirements
15 for operators. So the requirement for engineering
16 expertise ensures that at least one person is
17 available to provide an engineer's level of
18 understanding for potential confusing or unclear plant
19 parameters or response. Next slide, please. So this
20 slide goes more into an overview of the draft interim
21 staff guidance for reviewing Part 53 staffing plans.

22 So the objective of the staff guidance is
23 to guide the reviewer through a process of evaluating
24 staffing plans, their supporting analyses, and
25 determine whether the proposed minimum staffing level

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1 provides assurance that plant safety functions could
2 be maintained across all modes of plant operations.
3 It's intended for plants to have specifically licensed
4 operators. However, we do believe we could scale the
5 review using this guidance for plants with generally
6 licensed operators.

7 We are still trying to decide what we're
8 going to do with those generally licensed operator
9 staffing plants. This ISG is intended to be used in
10 conjunction with NUREG-1791. So you have to have both
11 of the documents open.

12 And it follows the same 11 steps with some
13 review criteria added or removed. For example, it
14 includes review guidance for this engineering
15 expertise requirement that's new to Part 53. And I'm
16 going to show that next.

17 Though it's developed as an interim staff
18 guide, we believe that once we have some experience
19 using it, we can update the parent document, NUREG-
20 1791, to include this guidance. Next slide, please.
21 So this is my last slide. And I know that the
22 Committee wanted to specifically look at what kind of
23 criteria we were going to use for review of the new
24 engineering expertise requirement.

25 So step 7.3 of our ISG addresses how the

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1 staff will review the applicant's method to meet this
2 proposed engineering expertise requirement. There's
3 review criterion --- there is a review criterion to
4 accompany each of the bullets on the slide for this
5 list of high level things we're going to look at. For
6 example, regarding training and qualification, the
7 training and qualification program for the person
8 fulfilling the engineering expertise requirement must
9 be derived from a systems approach to training.

10 The review guidance has the reviewer look
11 for a minimum set of training subjects for the initial
12 training of that engineer such as generic
13 fundamentals, plant systems, operating procedures and
14 their bases, analysis of transient events and
15 accidents, core damage, and others. An example of
16 data needs and offsite response time, if the engineer
17 is going to be located offsite, personnel fulfilling
18 the engineering expertise requirement have access to
19 the same suite of displays or a similar set of data
20 that's available to the on shift crew. And then we
21 have in there that they have to be able to respond to
22 requests for assistance in a timely manner not to
23 exceed ten minutes.

24 If the engineer is going to be located
25 onsite, same ten minute requirement. They have to

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1 show up in the location of the on shift crew to
2 provide technical assistance within ten minutes. So
3 those are just some examples of the more specific
4 criteria we're going to look for when we're looking at
5 this overall engineering expertise requirement and how
6 the applicant is meeting it. So this is the last
7 slide I have regarding the staffing ISG. I can take
8 questions now.

9 MEMBER BIER: Hi, this is Vicki Bier
10 again. I'm going to reprise Charlie's question from
11 earlier today about how do you know that offsite
12 engineering expertise will, in fact, have access to
13 the plant information electronically given the various
14 disruptions, whether it's cyber attacks or just
15 outages, et cetera, that could impair that.

16 MS. SCHEETZ: Okay. So there will be some
17 cyber security expectations for this data transfer,
18 also some expectations for data refresh date. That's
19 written in the guidance. So those are things we're
20 going to look at.

21 We're also going to have them demonstrate
22 -- one of the expectations is demonstrating this rule
23 in the validation activities. So we are looking for
24 those kind of things. I mean, maybe we look for a
25 backup plan if they lose all communications. But they

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1 have to have some kind of backup communication with
2 the -- so the primary and backup communication
3 expectation for -- between the offsite engineer and
4 the on shift crew.

5 (Simultaneous speaking.)

6 MS. SCHEETZ: Yes?

7 MR. SEYMOUR: I was going to say when
8 you're done, if you don't mind, there's a point that
9 I wanted to add here.

10 MS. SCHEETZ: Okay, go ahead. Yeah, I'm
11 just kind of going through --

12 (Simultaneous speaking.)

13 MR. SEYMOUR: Okay.

14 MEMBER BROWN: This is Charlie Brown
15 again. Thanks, Vicki. It's kind of a dual thing.
16 Cybersecurity is cybersecurity. You've got to deal
17 with that when you're going to be whatever.

18 The issue with any of the remote getting
19 offsite information is how do you make sure that the
20 systems that provide that are still okay if you've got
21 nobody onsite. If you've got people onsite, then
22 you've got somebody you can talk to, at least by phone
23 if nothing else. But the cybersecurity issues are
24 ones you have to deal with obviously.

25 But the equipment onsite that you have

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1 should be treated similar to, like, we have -- what's
2 an example? For example, say if a plant has to have
3 a reactor trip system. It may be safe, but it has to
4 have one. And what we do with the local plants is
5 they have no access from anything via the internet or
6 outside of the quote, defensive architecture.

7 In other words, it's all one way
8 communication from those. And the only place you can
9 control them is from a main control room onsite. Now
10 if you've got offsite stuff where you don't -- that
11 you're trying to control it, now you've made yourself
12 susceptible to the cyber issue. But you also have the
13 issue of how do you know the system is really
14 responding properly.

15 MS. SCHEETZ: Okay. So --

16 MEMBER BROWN: And that's very difficult
17 to do without people that are there onsite. So --

18 MS. SCHEETZ: I just want to clarify that
19 this engineering expertise is, like, technical
20 assistance. They have no control over any plant
21 function offsite. They're going to back up the crew,
22 provide assistance. They are not to direct actions
23 for the crew to take.

24 They can provide their independent
25 assessment of what's going on and what might need to

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1 happen. It's technical assistance, not any kind of
2 direction and absolutely no ability to control the
3 plant from offsite. That's not the purpose of this.

4 MEMBER BROWN: But the purpose is they
5 would provide guidance to those who may need
6 assistance in being told what they need to look for.

7 MS. SCHEETZ: Correct. Just like a
8 traditional shift technical advisor. They just don't
9 have to be in the control room. They have similar
10 data feeds offsite and they can advise the crew and
11 talk. There's an expectation that there's two-way
12 communications back and forth.

13 (Simultaneous speaking.)

14 MEMBER BROWN: With people onsite, I'm not
15 -- the training will be what the training will be.
16 Matt and Greg know far more about that than what's
17 needed. But it's not just the reactor plant that
18 needs to have onsite people.

19 I mean, you've got other plant systems.
20 And without people there, I'm worried about everybody
21 thinking you can have everybody offsite and nobody is
22 there. And you don't smell the plant. You don't hear
23 it.

24 Hearing is one of the main ways of making
25 sure you know your plant is operating correctly just

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1 like in your house. When you don't hear noises coming
2 from your refrigerator, you know it's not working. So
3 that's one of the biggest issues I have, and I've been
4 in many, many plants as well as Greg and Matt have.

5 And you're standing back at an engineering
6 space and people touring or they're walking around.
7 And all of a sudden, they don't hear things, say
8 what's going on. And it may not be obvious to
9 operators.

10 So having nobody in the plant is my
11 biggest concern, that we're giving seed corn for
12 people to go off and do that or operate that way and
13 have nobody onsite. I don't think that's practical
14 from an NRC safety standpoint in my particular
15 opinion. So as long as we got people there and they
16 can understand direction from somebody else, if Greg
17 and Matt are happy with that, I'll be happy with that.
18 I just don't --

19 MEMBER HALNON: Charlie, I'm keeping an
20 open mind. I always go back to the fact that the
21 staffing plan has to reflect this and it has to be
22 approved by the NRC. So they will have a bite at the
23 apple to see if it's adequate or not for the facility
24 -- specific facility. So I rest on the fact that it
25 will not just be willy-nilly done. There will be some

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1 aspect of review.

2 MEMBER BROWN: Yeah, I got that. I'm
3 always nervous even if the review tells me there's
4 unexpected things that we don't cover by reviews. I'm
5 very leery about having nobody onsite ever.

6 MEMBER HALNON: I agree.

7 MEMBER BROWN: That just doesn't make
8 sense to me.

9 MEMBER BALLINGER: This is Ron Ballinger.
10 These two slides of 135 and 133 are the equivalent
11 work in a previous presentation. And I didn't say
12 anything then.

13 But the balance between education
14 prerequisites and training or experience for this kind
15 of position is something which is to my mind very
16 important because I guess Dennis can chime in as well
17 because we've all operated plants, both of us. And we
18 know the difference. And to arbitrarily say that this
19 person's got to have a bachelor's degree in
20 engineering, under most circumstances, that's a good
21 thing.

22 But when it comes to knowing the plant and
23 experience, I'm not sure that requiring a bachelor's
24 degree wouldn't disqualify arbitrarily somebody who is
25 actually more qualified for that position based on

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1 experience and knowing the plant than somebody that
2 just has a bachelor's degree. Maybe I'm not putting
3 it in the right words. And maybe Dennis can say
4 something about that as well.

5 But that's where I was coming from. So
6 I'm curious as to whether the ISG can reword the
7 requirements with respect to the bachelor's degree to
8 put an or in there or something that allows for the
9 case where you've got a person who has got 25 years'
10 experience, knows the plant backwards and forwards,
11 and even knows what it sounds like as Charlie says.
12 And I definitely agree with him on that. Anyway, what
13 do you say, Dennis?

14 MR. BLEY: Yeah, I've been sitting here
15 thinking about all of this. Certainly I agree with
16 you and Charlie on that idea of the sounds in a plant
17 in the plants we know. Now some of these new, very
18 small facilities might not have any of the things that
19 make the noises that helped us a lot in the past.

20 MEMBER BALLINGER: How do you spell Davis-
21 Besse?

22 MR. BLEY: When we first came up after
23 TMI, when we first came up with having the STA, they
24 grabbed anybody with a degree and threw them in the
25 plants. And it took a good five years or more before

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1 anybody in the plant gave them any credence because
2 they didn't know what they were about when they got in
3 there. So just sticking somebody with a degree isn't
4 enough.

5 And over time, they became very valuable.
6 But at first, it was more -- well, it was a way to get
7 that kind of expertise in the plant. But it took a
8 while to develop it to be useful.

9 So I kind of agree with you, Ron. I'm
10 still thinking about what I mentioned a little while
11 ago is I hadn't really thought about the role of the
12 operator in one of these facilities compared to a
13 normal clean power plant. And it strikes me as quite
14 different because if we get what people are talking
15 about here, the automation is going to run just about
16 everything, including response to upsets.

17 So an operator who understands all the
18 procedures, well, there might not be any procedures
19 because you don't need people to do anything. It
20 strikes me the role of the operator in one of these
21 things if they're really run almost entirely by
22 automation. I'm sorry. I got something wrong with my
23 computer.

24 MS. SCHEETZ: Okay. So this is Maurin.
25 I'm just going to go back to the original purpose of

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1 the degree requirement. I hear what you're saying.
2 And yes, there could be somebody who's a really good
3 candidate for this role who doesn't have a technical
4 degree.

5 But we're going after the need for
6 understanding engineering fundamentals, something that
7 the Commission policy says is exactly what having an
8 engineering degree is going to provide you. And so
9 when the crew is dealing with situations that they
10 don't understand, that's where you're going to rely on
11 that engineering degree, those fundamentals that you
12 learn through an academic program. So that's the
13 purpose of this. I do agree that there could be
14 somebody else that would be really good at that. So
15 --

16 MEMBER BALLINGER: Is what you're saying
17 true? In other words, the fact that I know F equals
18 MA, when the plant is coming down around somebody's
19 ears, again, is what you're saying true?

20 MR. BLEY: This is Dennis. I turned off
21 the noise that was going on. I kind of think the role
22 of the operator in some of these facilities might end
23 up being more analogous to the role of the STA who
24 then has the ability do some operation or shutting
25 down than to the SRO, RO model because they're mostly

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1 going to be monitoring and have to understand if
2 things aren't going the way the automation expects it
3 to go and know how to intervene.

4 So it's something a little different. And
5 that kind of expertise helps. What we saw after TMI-2
6 was that operators at the time, a great many of them,
7 had come into the program and didn't understand the
8 thermal hydraulics of the plants. Now that's been
9 remedied since then. But it was a surprising number
10 to me. And having that kind of knowledge is important
11 if it's a thermal plan.

12 MS. SCHEETZ: Okay. Again, this is also
13 a mix. So we're looking for that mix of experience
14 and education background. So this helps on the
15 education side of that mix. Jesse, did you want to
16 say something? You had your hand up, but there's some
17 other hands.

18 MR. SEYMOUR: Yeah, I appreciate that,
19 Maurin. It's just a couple points I want to make just
20 to clarify. So a very, very fundamental difference
21 here that this team took in putting together this
22 language and this is something we approach very
23 deliberately.

24 And we went through a couple of iterations
25 getting to where we're at is that in contrast with

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1 Part 55, we elected to codify the shift technical
2 advisor equivalent, right, this engineering expertise
3 requirements within our language. And it's something
4 that gets overlooked a lot within Part 55 is that the
5 only place where the requirement associated with the
6 STA really appears is in the training rule
7 requirements, right? 51.20, right?

8 So if you go through the staffing portion
9 of 50.54, you don't see a place where it's saying, and
10 you need to have one STA on your crew, right? So it
11 is something that exists as a training program
12 requirement. And it's something lives in Commission
13 policy.

14 So the way that it was implemented for the
15 legacy plans that are out there is they were issued
16 orders in the aftermath of TMI. That's enough to get
17 this STA rule. So that's the way that we go there
18 now.

19 So we have to consider how we want to
20 approach this here. And so by design, we elected to
21 codify the staffing requirement. And one of the
22 reasons why we codified it, one, and the most
23 important reason was for clarity, right?

24 If we're expecting this rule, then put it
25 in the rule, right? So make it very clear so we got

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1 clarity, regulatory certainty. But the other reason
2 is this because what it does is it leaves the door
3 open for the submittal of exemption requests, right?

4 So again, getting back to the point about,
5 well, experience, operations, different
6 considerations, right, this myriad of things that
7 could come up. What if there was a really compelling
8 case where someone could take a different approach to
9 fulfilling this requirement than what we have embedded
10 in the rule here. Because it is codified or would be,
11 right?

12 It advances preliminary rule language.
13 The option would be there to submit an exemption
14 request, right? Now that exemption request would have
15 to meet all the requirements associated with
16 exemptions, right, authorized by law, so on and so
17 forth, right? They would have to clear all those
18 hurdles.

19 Now we see this requirement that we're
20 proposing here as being something that is reasonable,
21 that is flexible, and that we expect to be met.
22 However, just by design, the potential does exist that
23 someone could exempt -- could request an exemption if
24 they really could make a case like that. But getting
25 back to Maurin's point, why a degree requirement,

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1 again, the Commission has laid out in policy
2 statements this desire to have education being part of
3 that mix.

4 And yet what we do with the engineering
5 expertise requirement is we don't completely base the
6 qualification to fulfill that role in solely the
7 education. We also require familiarity with plant
8 operations. And so that is something that Maurin has
9 worked into the guidance as well too is those types of
10 topical areas that we would expect to see.

11 The closest analogy that I can give to the
12 Committee is that I was a non-licensed shift technical
13 advisor at one point in my career, then I was licensed
14 later on. And when I was a non-licensed shift
15 technical advisor, I went through an abbreviated
16 course. Again, it wasn't the 18-month licensed
17 operator in training.

18 It was more, like, an instructor
19 certification that ran for about eight months. And we
20 went through all the fundamental stuff, the systems,
21 right, the generic fundamentals, the emergency
22 operating procedures, functional restoration
23 procedures and so on and so forth, right? Mitigating
24 core damage?

25 We went through that whole suite of

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1 things. So again, there's ways outside of a license
2 to achieve that familiarity of plant operations from
3 a training standpoint, right? That's separate and
4 distinct from the college education. And that is
5 something that I think that we adhere to the spirit
6 fairly well within the guidance. So Maurin, that's
7 all I wanted to point out.

8 MEMBER HALNON: Jesse, this is Greg. That
9 STA training program is somewhat driven by INPO. And
10 we're not assuming that these plants are accredited
11 under INPO or the academy. So I think the point is,
12 is that they maybe need to see some kind of language
13 relative to the level of operator training or plant
14 training that's required in addition to the degree.

15 MR. SEYMOUR: So it's a good point, right?
16 And I am familiar with the same INPO, you know, and
17 academy documents and programmatic features that are
18 there. And everything essentially that we do here, we
19 have to always allow for the possibility that plants
20 could pursue accreditation or they might not.

21 So we have to leave the mechanisms in
22 place to approach all these things on our own. But
23 something I want to do is, Maurin, if you could, we
24 actually went ahead and articulated those topics
25 within our guidance, right? So again, this isn't

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1 derived from anything that would be proprietary or
2 anything like that.

3 This is based on our own analysis and
4 assessment and so forth. And again, Maurin, I don't
5 know, if you have that, could you just go through that
6 real quick? Maybe that will help to alleviate this.

7 MS. SCHEETZ: Right, I mentioned some of
8 them when I went through this slide. But it's in the
9 guidance. There's a list of topics for that initial
10 training program for the engineer.

11 And it's stuff that's very similar to
12 current STA training courses, mitigating core damage,
13 operating procedures, integrated procedures, generic
14 fundamentals. There's a whole thing of them. It's in
15 the ISG itself. You can see them.

16 MR. WIDMAYER: Hey, Dave. It looks like
17 Steve Schultz has a question.

18 CHAIR PETTI: Yeah, Steve. Go ahead.

19 MR. SCHULTZ: I have a couple comments,
20 and the second might turn into a question. The first
21 comment is that really appreciate the job that has
22 been done in providing the augmentation of NUREG-1791
23 in this regard. A very complete job has been done to
24 put that in place in the interim guidance.

25 And I think it will be quite -- it will be

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1 relatively straightforward to move it into additional
2 guidance in the future as a modified NUREG. The one
3 piece that needs to be addressed that would be very,
4 very helpful in moving forward next would be to
5 include the revised Appendix A for 1791. The review
6 checklist is not prepared yet. But that would be a
7 next step that would be very helpful in the review
8 guidance.

9 Second comment relates to this discussion
10 on engineering expertise. And where I start with this
11 is that the fleets of plants that are in process of
12 being developed have been designed -- they've been
13 engineered to reduce the need for operator action.
14 And yet it seems there that we kind of have an
15 imbalance here between the training and the focus on
16 operators and the training and qualification for the
17 engineering expertise. It seems as if the engineering
18 expertise needs to be there for sure.

19 But the role that is being proposed is
20 relatively minimal. And the training and
21 qualification discussions and focus again is almost
22 missing. It seems like engineering expertise that's
23 well trained with regard to the function, operation of
24 the facility, all of that needs to be really a major
25 focus. As Charlie indicated, the thing that was

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1 mostly likely needed in this area for engineering
2 expertise will be for the individual to know exactly
3 how the facility is designed, exactly how it's been
4 operated and only having educational prerequisites and
5 not having detailed training and qualification
6 associated with a facility is going to be something
7 that's really going to be missing.

8 All the other elements I think are
9 certainly needed. But I get a little concerned when
10 we're talking about some of these new designs. And
11 when we're focused on operator training, operator
12 training, operator training and don't focus on the
13 need for engineering expertise that's very well
14 trained to respond to things that operators will not
15 have knowledge of unless it -- because they're dealing
16 with something that has failed which has been
17 engineered into the plant, designed into the plant,
18 and needs to be addressed.

19 MS. SCHEETZ: So this is Maurin. Just to
20 reply to that, I think the vision behind this is that
21 they are trained in the operations of the plant. And
22 it's actually written in the rule language that
23 they're familiar with the operation of the plant.

24 So it's not just relying only on their
25 engineering degree. There is training and

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1 qualification expectations that are listed in the
2 interim staff guidance document. And it looks very
3 similar to operator trainers also, simulation
4 facility. They should be doing this training in a
5 simulation facility.

6 So I would say there's a lot of
7 equivalence between how the operators would also be
8 trained. And an applicant may just put them all
9 together and train them at the same time. That's
10 certainly one way to meet some of these training and
11 qualification criteria in our staffing guidance here.

12 So we're just trying to be very flexible
13 with how this is met and look at a bunch of different
14 ways that an applicant may come up with meeting this.
15 We're trying to be very inclusive. That's all. It's
16 not laid out specifically in the rule language. It's
17 over in guidance.

18 MR. SCHULTZ: I understand that, and I
19 appreciate it. But it does seem as things are
20 presented that the engineering expertise is an, oh, by
21 the way, we need to do that because it's been
22 suggested or it's been required. And I think it's
23 extremely important in the new designs that we're
24 describing and discussing.

25 CHAIR PETTI: So let me just give you sort

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1 of my perspective on some of this. When one looks at
2 some of these advanced reactors, there really is no
3 procedures that some of them can rely on because
4 they've never been built, right? So some of these
5 designs are going to have to have loops I can imagine
6 with molten salt, even with sodium because it's been
7 so long since a sodium reactor has operated in this
8 country and that they may actually do some hands-on
9 training, both at the engineering level and the
10 operator level on those loops so that they can get a
11 sense of what it's like.

12 Because it's not like a water loop
13 necessarily. And so I just think that we just have to
14 make sure we've got the flexibility in there that it's
15 going to look a little different because some of these
16 don't even what to go through prototypes. A lot of
17 stuff you learn if you actually had a prototype.

18 But some of them doing want to go through
19 that step. And so at the very beginning, things could
20 look a little bit different than a lot of the thought
21 process that goes into this stuff where we've got
22 experience out there on systems and similar systems.
23 Some of these are not going to look like anything else
24 that we've seen in the past.

25 Even in rad protection, in some of these,

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1 you're going to be dealing with tritium. It's a very
2 different thing than dealing with some of the rad
3 issues and light water reactor plants, for example.
4 I see Jesse has his hand up. Go ahead.

5 MR. SEYMOUR: Oh, yes. Thank you. I just
6 wanted to add to Maurin's point about the training and
7 qualification that we get to at the level of guidance
8 for the engineering expertise individuals because
9 there is that kind of detail about topical coverage
10 and so forth at the level of guidance. I also want to
11 point out that at the level of the rule under 53.830,
12 Part 53 contains its own corollary to the 51.20
13 training rule.

14 So essentially Part 53 has its own version
15 of the training rule embedded in there. And by and
16 large, it's very similar to the 51.20 training rule
17 with a few targeted differences. Namely, it allows
18 more flexibility and time frames.

19 It also approaches the categories of
20 personnel from a higher level and just to account for
21 differences in roles and so forth. And the reason why
22 I saw this is this. Included as an example of one of
23 the types of personnel that would be within the scope
24 of that is individuals who fulfill this engineering
25 expertise role.

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1 And what that means is that the
2 expectation for those individuals under 53.830 would
3 be that they would be part of a systematic approach of
4 base training program. So again, when we talk about
5 their ability to fulfill their roles and
6 responsibilities and so forth -- again, we're not
7 talking about guidance now. We're talking about rule
8 language, right?

9 They would be required to be covered by a
10 training program that is approached from a systematic
11 approach training standpoint. And what that would
12 entail is, again, all those things we talked about
13 before, a detailed review of the tasks associated with
14 their job, training, learning objectives, assessing
15 their mastery of those skills, right, remediating
16 deficiencies, right, again, going through that
17 process. And that is something that's not just a one-
18 time thing, right? That's an ongoing process.

19 So again, we swept up the engineering
20 expertise individuals in the pool of individuals that
21 we see as being covered under that training rule. So
22 I just want to say that even though at the level of
23 the rule and even in the preamble, we don't
24 necessarily get into the specific topical coverage.
25 We do cover that type of detail within the guidance

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1 that we would use to review that staffing plan. And
2 also, there will be a regulatory hook to ensure that
3 there is an acceptable training program that's being
4 implemented for these individuals.

5 CHAIR PETTI: Any more questions, members?

6 MEMBER BROWN: Yeah, just one observation.
7 We're talking -- this is Charlie again. We talk about
8 plant, plant, plant. And the focus seems to be pretty
9 much on the reactor plant, the advanced reactors, et
10 cetera, et cetera.

11 But all of these new plants also are
12 supposed to be generating electricity for somebody.
13 And the other half of the plant is a critical aspect
14 of that which is totally different from its modes of
15 operation relative to the reactor plant. And that
16 interaction with that new reactor plant is going to be
17 different.

18 If you look at how do they transfer heat
19 and how do they get the steam to run the TG subs. Or
20 how do they generate the heat such that they become a
21 hot plate for some thermoelectric converters or
22 whatever? But there's got to be something to convert
23 it.

24 And that interaction between those systems
25 and the reactor plan are also critical for this type

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1 of thing. And again, that's operations oriented
2 people familiar with what those things do. If you
3 generate a steam plant, there's a lot of systems that
4 go along with it to generate electricity. That's
5 their purpose, not just to produce neutrons. So we
6 seem to lose that in the discussion or it seems we
7 lose that in the discussion. That's the only thing
8 I'd like to remind us to think about as we're doing
9 this.

10 MS. SCHEETZ: So thank you, Member Brown.
11 I agree with you that that's important and shouldn't
12 be lost for this role of the engineering expertise.
13 So that's where the systematic approach to training
14 which is going to be required by regulation which
15 Jesse just talked about would catch that type of
16 integrated plant operation.

17 What does the engineer need to know about
18 the other side of the steam plant and what's being
19 generated. So that's where the systematic approach to
20 training, the expectation if you have an adequate SAT
21 process, it's going to track those types of tasks and
22 understanding knowledge and abilities for the
23 engineer's position. So that's kind of how this
24 fleshes out and gets implemented. That's all.

25 MEMBER BROWN: There's a lot of heat

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1 removal when a steam plant trips, you know it. And
2 you know how the water reacts. But the new advanced
3 plants based on -- I forget, sodium or this or
4 whatever, FLiBe or whatever they're supposed to be.

5 Heat removal goes away. How do they
6 respond to an instantaneous heat removal -- lack of
7 heat removal? I mean, there's got to be some way of
8 us really understanding what that interaction is.

9 We really haven't addressed that all that
10 much in our discussions. So thanks for your input.
11 That's what I'm interested in getting the point
12 across. So thanks.

13 CHAIR PETTI: Other comments? If not,
14 let's just go on to the next presentation.

15 MS. SCHEETZ: Okay. So that's the end of
16 my presentation. I'm going to turn it over to Dr.
17 Dave Desaulniers. He's going to talk about our last
18 ISG that we have for the subcommittee today.

19 MR. DESAULNIERS: Okay. Hello, everyone.
20 We're right at noon, so I'm a little conflicted if I
21 should be saying -- I guess good afternoon here at
22 12:05. I'm just putting my camera on for a moment
23 here. It's been a while since I've had an opportunity
24 to address some of the members.

25 My name is David Desaulniers. I'm the

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1 senior technical advisor for human factors and human
2 performance evaluation. I'm in the Office of Nuclear
3 Reactor Regulation.

4 And now I'll be providing an overview of
5 the third of the ISGs that we're talking about today.
6 And this one is on the development of scalable human
7 factors engineering review plans. So just in a
8 nutshell when we're talking about scalable human
9 factors engineering review plans, we're really talking
10 just simply about how the staff will tailor their
11 review plan to the specific application that's before
12 them for review.

13 And my presentation, I'll address this in
14 three parts essentially. I'm going to start out by
15 providing some background in terms of how we do these
16 reviews today and what our regulatory basis is for
17 that. The second part of my presentation, we'll just
18 focus generally on what is this process of scaling the
19 reviews.

20 And the in the third part of my
21 presentation, I'll go more into the details of the
22 actual guidance document that we've developed.
23 Wouldn't you know I get a call coming in now. I'm
24 like the Maytag repairman here, and I never get a call
25 until we're in the middle of a meeting. Pardon for

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1 that interruption. So we can go on to the next slide,
2 please.

3 So speaking to current practice, the
4 bullet at the top of your slide here is the Part 50
5 requirement pertaining to human factors engineering.
6 And it, in essence, requires that an applicant submit
7 for Commission review a control room design that
8 reflects state of the art human factors engineering.
9 When the staff gets applications for large light water
10 reactors under Part 50 or Part 52, our current
11 guidance is to turn to NUREG-0800, Chapter 18 which
12 covers human factors engineering.

13 And that guidance points more specifically
14 to guidance principally in NUREG-0711, although there
15 are other more detailed guidance documents that
16 references. 0711 really provides the overall
17 structure to our reviews. And that review guidance is
18 really based in systems engineering.

19 And the implication there is as we conduct
20 our reviews, what we're doing is we're looking at the
21 review from the design from its early conception
22 through the development of functional requirements
23 analysis and function allocation and to task analysis
24 and the development of a design, whether it's the
25 HSIs, the procedures, the training. And then through

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1 verification and validation of that design into the
2 design implementation and human performance
3 monitoring. Again, my apologies. Someone is
4 desperately trying to reach me.

5 The point I want to bring out from this is
6 that in doing this review which covers 12 different
7 program elements and involves consideration of more
8 than 300 review criteria, as you can imagine, this is
9 a rather resource intensive process. Through more
10 recent review activities, particularly those that were
11 done under Part 53, what we've seen is gained insights
12 that we believe we can be a little bit more targeted,
13 in the way we do our reviews to be more efficient.
14 And also we need to start thinking about the changing
15 role of the operator in the plants that our assumption
16 in the past that the most important actions were those
17 that were going to be performed by operators.

18 And those actions were to be performed by
19 individuals in a main control room. What we're
20 starting to see particularly with advanced reactor
21 technologies that are a conception of the role of
22 human performance, where it contributes, and where
23 it's being performed is beginning to change. And I'll
24 note, for instance, in that regard, intended increased
25 use of inherent safety characteristics and passive

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1 safety systems, the role of the operator may be
2 substantially reduced.

3 Yet those systems need to be maintained.
4 They need to be capable of performing their functions
5 when called upon. So activities such as
6 surveillances, non-destructive examinations, various
7 maintenance activities, verification of lineups could
8 in a relative sense start becoming the more important
9 human contribution to the safety of some of these new
10 plants.

11 And our review practices need to start
12 thinking in those terms. So if you we move on to the
13 next slide, please. So looking ahead to what we're
14 proposing in Part 53, rather than a focus on the main
15 control room for human factors engineering, the
16 requirement and I'll speak to it generally here and
17 more specifically later in the presentation is that
18 HFE would be required where necessary to support
19 important human actions.

20 And aligning with that, our review process
21 would be that we would scale our reviews considering
22 the characteristics of the facility design and its
23 operation. Next slide, please. So I mentioned the
24 Part 53 requirement for HFE. The second bullet that
25 you're looking at on this slide should've been in

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1 italics to emphasize really this is an exception from
2 the rule in terms of what is being proposed as the
3 human factors engineering requirement.

4 And you can see it that it parallels
5 what's currently in Part 50 rather closely but has
6 some important differences. It must reflect state of
7 the art human factors principles for safe and reliable
8 performance in all locations that human activities are
9 expected for performing or supporting the continued
10 availability of plant safety or emergency response
11 functions. So it's a non-prescriptive requirement.

12 It provides the ability for the applicant
13 to design their facilities such that there's not an
14 assumption of control functions being performed in any
15 particular location. But wherever those activities
16 are performed, that's where HFE needs to be focused.
17 Next slide, please. So the objective of the guide
18 that we've developed, the interim staff guidance, is
19 to guide the reviewer through the process of
20 developing an application-specific review plan and
21 identifying appropriate HFE review guidance to conduct
22 that plan.

23 So I just want to emphasize that point
24 that unlike the ISGs that you were hearing about
25 earlier this morning where we were talking about

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1 guidance or actually conducting the reviews. Here
2 we're talking about really a process for developing
3 the review plan. It doesn't get into specifically
4 conducting the review.

5 So in essence, it will be used in place of
6 NUREG-0800, Chapter 18. And like the other guidance
7 documents that you heard about this morning, this is
8 being developed as an interim staff guidance document.
9 We're taking on although this is -- you will see an
10 evolution from our use of NUREG-0711. I won't say
11 it's completely revolutionary.

12 It is a new process. We expect we'll be
13 learning the process of implementing the ISG. And so
14 that at some point once we gain that experience in its
15 use, we would be looking to integrate those lessons
16 learned and transfer this ISG guidance into a NUREG.
17 Next slide, please.

18 So this just gives you a quick high level
19 snapshot of the overall process in terms of timing.
20 We proposed to begin scaling the review plan during
21 pre-application engagements. And it's noted if
22 conducted, pre-application engagements are not
23 required. But of course, the agency highly encourages
24 applicants to engage with the agency prior to
25 submittal of their application.

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1 And our experience is that we're seeing
2 applicants doing that and that it's been very helpful
3 for both the applicant and the staff to understand the
4 application, the timing of the submittals what may be
5 missing that the staff may need to be part of that
6 application. So we would be -- beginning our
7 development during that pre-application period and
8 concluding it with the completion of the application
9 acceptance review. And that timing also is useful in
10 that this process as I hope you'll see will provide
11 the staff a good mechanism to really looking at an
12 application to assess it for its acceptability to
13 ensure that it's complete in providing the information
14 that will support the staff's review according to the
15 agreed upon timeline.

16 And in general, this process is conducted
17 in five steps that lead in the end to the staff
18 assembling a review plan that's specific to that
19 particular application. And in my next slides, I'll
20 go into that process now a little bit more in detail.
21 So next slide, please. So what you have here on your
22 screen is the five steps to the scaling process.

23 The first step -- and I'll note I'm going
24 to go through these. I'm going to return to each of
25 these steps later in my presentation when we talk

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1 about the supporting guidance. So this is basically
2 just an introduction to the process.

3 The characterization phase is noted here,
4 a way of establishing a documented understanding of
5 the design and its operation from a human factors
6 engineering perspective. And this is going to be
7 important because as we've been hearing in the
8 discussions throughout the morning, these facilities
9 are going to be potentially much different than what
10 we've looked at in large light water reactors. The
11 assumptions that we've made in the past or could
12 reasonably make can largely be set aside.

13 We need to as a human factors reviewer
14 understand the overall operation of this facility so
15 obviously the HFE reviewer is not responsible for
16 reviewing all aspects. But they need an integrated
17 understanding of the operation of that facility. What
18 is its mission?

19 It may be electricity production. It may
20 be some other mission. Maybe it's hydrogen
21 production. Need to understand the general size of
22 this facility. Are we talking something closer to the
23 scale of a large light water reactor? Or are we
24 talking about something that's a micro reactor? Is it
25 a multi-module facility.

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1 These broad observations need to be
2 considered to provide the context for the human
3 factors reviewer to be able to conduct the subsequent
4 stages. And I'll come back to it again, as I said, to
5 some of these things if there's more question that
6 what's involved in these steps. Targeting now is
7 where the second stage where the HFE reviewer is
8 beginning to focus on those specific human system
9 interfaces or operations, specific actions that are
10 required of individuals in the facility to identify
11 what this review is going to begin to focus on.

12 This is the beginning of really the
13 scoping of the review. And the third phase,
14 screening, it's also a process -- oops, please go back
15 to the slide that you were on. Thank you. And
16 screening, now rather than focusing on the human
17 system interfaces or the actions of the individuals,
18 we're looking at the human factors engineering program
19 that the applicant has used what particular activities
20 have they conducted in order to be able to develop a
21 design that supports the human performance role and
22 the safe operation of that facility.

23 We need to understand what activities they
24 have conducted, what activities have they yet to
25 conduct but are maybe ongoing during the process of

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1 our review and how they really relate to each of the
2 targets that we're potentially look at. In the fourth
3 stage, grading, we're now starting to look at what are
4 the specific standards and guidance documents that we
5 would apply to the review. You will note or perhaps
6 recall that when I was talking about 0711 and the 300
7 criteria that were built in to that guidance document,
8 what we're doing now in this process is basically
9 separating out the specific review criteria from the
10 process.

11 So we'll be looking in the grading process
12 potentially to the criterion 0711, perhaps the
13 guidance in 0700, perhaps the other standards out
14 there. But we will be selecting those based on the
15 particular facility that's before us for review in
16 terms of what would be the most appropriate guidance
17 available at that time. And then in the fifth part of
18 this process, we're putting this review plan together
19 in an integrated fashion considering the preceding
20 four steps such that we bring together a plan that's
21 sufficient to support a reasonable assurance
22 determination but looks at the overall process to
23 ensure that we're gaining efficiencies where we can
24 and that we're doing this in a risk informed manner
25 where we're taking advantage of the available safety

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1 and risk insights that are provided through the
2 application. Next slide, please.

3 So 20,000 foot level moving on to
4 considering the specific guidance document, it is
5 really set up in two major pieces. The main body of
6 the guidance provides the essential guidance for the
7 reviewer to develop the review plan. And then there
8 are a series of appendices to that document that
9 provides supporting guidance.

10 And those appendices are structured such
11 that they relate to each of the five steps of the
12 process that I just described on the proceeding slide.
13 Next slid, please. This slide provides an overview of
14 the main structure of the main body of the guidance
15 document. Some of the key features that you would see
16 as you flip through that guidance document is of
17 course its applicability.

18 What types of applications does this
19 guidance apply to? And in this case, we're talking
20 about standard design approvals, design
21 certifications, combined licenses, and operating
22 licenses. It also goes into the rationale for scaling
23 the reviews which I spoke to in brief earlier in this
24 presentation talking about a need to have a process
25 that really is capable of addressing a diversity of

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1 designs in a focused and efficient manner.

2 The guidance also lists the regulatory
3 basis for conducting the review. And while I noted in
4 this presentation in the particular requirement that
5 underpins the HFE requirement, Part 53 has a number of
6 other requirements that are also supporting the HFE
7 review. Some of these, we've already touched upon a
8 requirement to submit a staffing analysis, a
9 requirement to submit a concept of operations
10 document, a requirement to submit a functional
11 requirements analysis, and so forth as well as Jesse
12 also noted there are various requirements that were
13 analogous to those that you would find in Part 50 as
14 the post-TMI instrumentation requirements.

15 So those are all provided to the review as
16 part of the regulatory basis for doing the review.
17 And then the body of the guidance follows a standard
18 format, taking the reviewer through each step where
19 the objective of the step is presented. The process
20 for implementing that step is provided and concluding
21 with the reviewer responsibilities for completing that
22 particular step of the process.

23 Overall, what this guidance is doing is
24 essentially focusing on what to do or how to
25 accomplish scaling a review which is a little bit of

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1 a distinction I'll make from the focus in the
2 appendices which I believe we'll be turning to on the
3 next slide. So now we're getting into the appendices.
4 And this is supporting guidance.

5 So rather than focusing on what to do,
6 this is getting more into methods as to how to
7 implement each of these steps of the scaling process.
8 They're recommended methods. They're not -- the
9 reviewer is not bound to using the particular guidance
10 in the appendices.

11 But it provides a starting point for a way
12 to think about implementing each of these steps of the
13 process. Also, in general, these appendices will
14 provide pointers to other sources of additional
15 guidance. What you'll find here is we drew upon the
16 body of research and guidance that's been developed by
17 our Office of Research over the years relating to
18 modular reactors and advanced reactor designs to point
19 the reviewer to more detailed guidance documents that
20 may support the review. Next slide, please.

21 So coming back to the characterization,
22 what you're getting into now here in more detail for
23 the Appendix A of this ISG is an overview of the
24 characterization process that walks the reviewer into
25 considerations of what really needs to be in the

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1 characterization. What are the essential elements?
2 And some of those are the concept of operations for
3 the facility, the safety analysis methods and their
4 results that we would be providing the risk and safety
5 insights to help guide the review, the identification
6 of important human actions, the design process,
7 specifically, the human factors engineering design
8 processes that the applicant used, their scope and the
9 timing of those activities.

10 And also things like the compliance with
11 requirements. Is this application looking to take any
12 exemptions from relevant requirements? So all these
13 are the types of things that the reviewer would be
14 pointed to, to ensure to include in the
15 characterization.

16 The guidance also addresses how to
17 organize this characterization. And in essence what
18 we encourage a reviewer to do is to use the concept of
19 operations to organize this characterization. It also
20 finally touches upon noting that this characterization
21 can be an aid in coordinating reviews.

22 You heard earlier this morning about
23 staffing and operator licensing. These reviews are
24 all going to interplay because as you've heard,
25 there's a fair bit of flexibility and what the

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1 applicants can be proposing. And so again, we can't
2 be making assumptions that, oh, we're going to have an
3 traditional control room and it will have this man ROs
4 and this many SROs and this is what the training
5 program will look like.

6 These are variables that we need to
7 consider and have as context for the HFE review. And
8 the characterization can be used as a tool to ensure
9 that we help coordinate our reviews and inform each
10 other as new insights are developing during the course
11 of the review. I think we'll go to the next slide,
12 please.

13 Targeting guidance, so that's in Appendix
14 B. And here we speak to the general principles for
15 target selection. And the guidance that we provide
16 there is fairly fundamental in thinking about targets.
17 Specifically the three criteria that we recommend for
18 target selection are safety significance, risk
19 importance, and uncertainty.

20 And I'll just take a moment to comment on
21 that last one for a moment because as was commented
22 earlier in the discussions today, these new designs we
23 are looking at less operating experience for many of
24 these designs we anticipate than what we have for
25 large lights. So that introduces a certain amount of

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1 uncertainty. So there may be uncertainty associated
2 with the technology, uncertainty associated with
3 perhaps a new type of HSI or a new type of concept of
4 operations in terms of how perhaps a crew would
5 operate or be configured in terms of its staffing.

6 There's also uncertainty potentially
7 introduced by the level of design development that we
8 have at the time the application comes on our desk and
9 how that might be evolving during the process. So
10 these are considerations that are touched upon in the
11 targeting guidance. Going along with that, we provide
12 rather a list of 38 prospective characteristics of
13 advanced reactor designs and operations that should be
14 considerations for targeting if they present
15 themselves in the application.

16 And again, these are just examples. This
17 list is not meant to be all inclusive. It just pulls
18 upon the existing body of research that we have
19 available to the staff in terms of issues that we've
20 seen that could be potentially important to safe
21 operation for some of these new facilities.

22 So these summaries in the targeting
23 guidance touch upon the human performance implications
24 of some of these aspects of the designs or operations
25 and also provides a characterization of the available

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1 guidance for use in conducting the reviews. Next
2 slide, please. Appendix C is for the screening
3 process. And again, this is the process of
4 determining which particular human factors engineering
5 activities that we would be looking at.

6 And again, we're talking about things like
7 operating experience review, task analysis, integrated
8 system validation, and so forth, the general program
9 elements of 0711. Or if they're using a different
10 model, the analogous types of processes that the
11 applicant would be using. Determining which
12 strategies -- excuse me. Determining which of these
13 activities would screen in or screen out of the review
14 process to provide some guidance with respect to
15 conducting that process.

16 Here the staff is essentially using
17 fundamentally a be risk smart type of approach,
18 thinking, all right, what are the potential -- what
19 could go wrong if we leave out one of these activities
20 out of the scope of our review? What are the
21 consequences of that and how likely is that to be?
22 Some of that thinking has to take into consideration
23 there's a balance in looking at some of the
24 developmental activities relative to some of the
25 verification and validation activities.

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1 If we don't look at something during the
2 development phase, do we have good opportunity to get
3 understanding of the effectiveness of the applicant
4 and that design activity when we go through the
5 verification and validation? The screening guidance
6 also addresses particular implications and challenges
7 of advanced reactor design reviews and their
8 characteristics. As noted, we're looking more now
9 rather than active safety systems.

10 We're looking at passive systems or
11 potentially inherently safe -- excuse me -- inherently
12 safe designs. What are those implications for
13 identifying important human actions? What are the
14 implications of using probabilistic risk assessment
15 let's say as opposed to integrated safety analyses?
16 So the guidance touches upon some of those
17 considerations as well. Next slide, please.

18 So Appendix D addresses grading. And
19 again, grading is this process of selecting the
20 particular standards and guidance documents that'll be
21 used during the course of the review. Now typically
22 an applicant is going to be identifying the standards
23 that were used in the development of their design.

24 And the reviewer's responsibility there
25 would be to verify that choice of document was

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1 appropriate. But there may be cases where either the
2 -- well, I'll take the case where the applicant has
3 cited a guidance document that lacks prior NRC
4 endorsement. That's not prohibited clearly, but it's
5 something that we need to consider.

6 So there's guidance to consider if we're
7 going to be conducting a review using a standard
8 perhaps that has not had prior NRC endorsement. And
9 we have to anticipate this with advanced technologies.
10 As we know, it's been difficult for the standards
11 community to keep pace with the development in the
12 development of the reactor technologies.

13 So we'll be seeing cases where standards
14 may have been just recently released but not have come
15 before the NRC for endorsement. To provide a resource
16 for the reviewer in these cases, Appendix D does
17 provide a table that provides references to many
18 different HFE guidance documents. There we've
19 included documents that were developed specifically
20 for the nuclear industry as well as those that were
21 developed in non-nuclear domains but may touch upon
22 technologies that we see likely to be used in the
23 nuclear industry. Next slide, please.

24 So the final appendix is for assembling
25 the review plan. In here what the guidance focuses on

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1 is how to guide the -- the reviewer should take a look
2 at the results of the prior steps to develop an
3 integrated review plan focusing on ensuring that there
4 is adequate coverage to in the end be able to support
5 a reasonable assurance determination. And this
6 guidance also addresses just the format for developing
7 the review plan.

8 So there's, in fact, a template that the
9 reviewer can consider in terms of presenting the plan,
10 ensuring that it addresses the resources that are
11 needed, the timing of the activities and so forth. I
12 think that's my last slide. So with that, I'll
13 conclude my presentation.

14 CHAIR PETTI: Thank you. Members,
15 questions, comments?

16 MEMBER SUNSERI: Hey, Dave. This is Matt.
17 I'd just like to say I think the staff has done a
18 pretty reasonable job on a couple of things here.
19 I've spent a fair amount of time leading up to this
20 meeting looking at the proposed ISGs, the revised rule
21 language back and I looked through our letters.

22 And generally, I find that at least once
23 again in this member's perspective that the staff has
24 been pretty responsive to our previous feedback.
25 They've addressed things such as engineering

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1 experience, where the operator licensing requirements
2 should be whether in the rule or in guidance, and
3 such. And while -- like many things, when we look at
4 them again and again, we can always find maybe some
5 additional points to make and there's probably a
6 couple that we can make now. I'd just like to say I
7 think by and large what I've been seeing at least
8 through these ISGs has been an improvement before
9 this. So that's my view.

10 CHAIR PETTI: Thanks.

11 MR. DESAULNIERS: Thank you. I appreciate
12 hearing that.

13 CHAIR PETTI: Other comments from other
14 members? Okay. Well, we get an extra 20 minutes
15 before lunch then as I read the agenda.

16 MR. SCHULTZ: Dave?

17 CHAIR PETTI: Yeah.

18 MR. SCHULTZ: Just a comment for David.
19 The work that you've done here and the staff has done
20 here, it really provides a very thorough and
21 comprehensive approach to developing the review plan.
22 When I went through the document as well as the
23 appendices, it struck me -- I'm not an expert in the
24 area.

25 But it struck me that there was a lot of

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1 information -- and maybe this is necessary -- a lot of
2 information associated with the plan development that
3 included also as you've noted here guidance that is
4 related to performing the review itself. And so it
5 was difficult although you got very detailed
6 description of the steps that need to be done to
7 establish the review plan, it seemed like the tasks
8 associated with addressing those steps were mixing the
9 review requirements with the way in which the review
10 would be performed itself. In other words, there was
11 a lot of information in the ISG that focused on both
12 setting it up the review and the planning stage and
13 then also what the review would entail.

14 And I saw that the appendices just
15 somewhat augmented that. I think in the application
16 of the plan, I think it's a good document. But I feel
17 that in the application of this ISG, you're likely to
18 find that you'll be able to simplify the planning
19 stage piece of the document. And you probably have
20 sufficient information within the document itself to
21 actually provide -- it already provides the
22 documentation and the guidance to perform the review
23 itself.

24 MR. DESAULNIERS: Okay. Thank you for
25 that observation. I think that that's probably -- I'd

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1 have to agree -- a fair assessment in that it may be
2 somewhat of an artifact of the nature of the guidance
3 documents that we drew upon in order to be able to
4 pull together this particular ISG, tend to be more
5 focused down into the level of conducting the actual
6 review because that's normally where we spend most of
7 our time. I think that in looking at some of that
8 material, we did struggle in terms of thinking about,
9 well, how much detail that we should leave in here or
10 relegate to other documents.

11 And our inclination at this time was to
12 keep it intact such that although, yes, some of that
13 guidance in the appendices gets more into actually
14 conducting the review, understanding that what it's
15 going to be entailed does feed into developing a
16 review plan in terms of understanding the resources
17 that would need to be involved to conduct that
18 activity, what level of guidance is available to
19 support it. And so I think these, while they're
20 necessary for conducting the review, they do inform
21 how we develop the review plan. But it is a balance.
22 It's something that we'll certainly keep an eye
23 towards how we can improve this guidance as we go
24 forward.

25 MR. SCHULTZ: Thanks for the response,

1 David. Yeah, I saw the same challenge that you had.
2 I reviewed the NUREGs that supported these activities
3 in the past and needed to be incorporated in this
4 documentation as well. And I think you did an
5 excellent job pulling out that information which
6 pertains to the new commercial reactors review. But
7 again, it seemed like there was a lot of information
8 there that as it's presented would perhaps someone
9 might believe it all had to be incorporated into the
10 planning stage when, in fact, it really could be
11 relegated to the review stage. Thank you.

12 MR. DESAULNIERS: Thank you.

13 MR. GREEN: If I can just add onto this,
14 this is Brian Green, the human factors team lead.
15 Myself and some of the others who worked on the
16 NuScale review had provided a lot of input about that
17 planning stage because the idea of scaling a review
18 has gone back some time. And we had considered it,
19 trying to do it in the past.

20 And without a guidance document like this,
21 we realized we weren't going to be able to do it in a
22 consistent and reliable manner. So we had kind of
23 backed away. And we'd had a lot of discussions
24 internally about at the beginning of the review if we
25 knew what we knew at the end of the review, it

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1 would've been easy.

2 But that's not necessarily the case. So
3 we had pushed for a lot of the detail to be added in
4 to help us make those decisions and put those
5 guardrails in so that we don't make bad decisions
6 early on. And I think that a lot of the detail you
7 see in the draft is to help us establish what those
8 guardrails should be.

9 MR. SCHULTZ: Brian, this is Steve. I did
10 see that in the guidance as it was developed. And I
11 do appreciate -- I felt that's exactly where it was
12 coming from and where it needs to go. Thank you.

13 MR. GREEN: Great. Thank you.

14 CHAIR PETTI: Any other comments? Well,
15 then with that, we'll recess and be back at 2:00
16 Eastern Time. Thank you, everyone.

17 (Whereupon, the above-entitled matter went
18 off the record at 12:48 p.m. and resumed at 2:02 p.m.)

19 CHAIR PETTI: Why don't we just start now
20 here after lunch, Bill?

21 MR. RECKLEY: Okay. Thank you, Dave.

22 So, what we're going to talk about this
23 afternoon, we're going to go through some of our
24 previous interactions and the letter, and by and
25 large, that will be through the letters, the Interim

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1 Letters that the ACRS provided us; talk about, also,
2 some of the other feedback we have, and then, most
3 likely, just have some additional time, if there's
4 more questions or discussion.

5 So, Billy, if we want to go to slide 153?

6 MEMBER BALLINGER: This is Ron.

7 Before you get started, I'd like to make
8 just a little bit of a statement.

9 I was saying this evolution has been going
10 on a very long time. And I, for one, have been
11 extremely impressed with the evolution and the
12 response that you folks have made to our suggestions.
13 So, I just want to, before I forget and lose my mind,
14 I wanted to make sure I got that out.

15 MR. RECKLEY: Thank you.

16 And the first slide here is probably an
17 indication of that to some degree. You can see your
18 first Interim Letter was two years ago. And we've
19 been working with stakeholders and a lot of
20 discussions with the staff. I don't want to
21 underestimate how much of the iterations have just
22 been due to the discussions and the give-and-take
23 between the staff. You see many of them on these
24 meetings. So, it has evolved over the course of the
25 last two, two and a half years.

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1 So, thank you. And I really think we've
2 gotten a lot of out of the interactions with the
3 public, the interactions with the ACRS, and again, our
4 own interactions with each other.

5 Just I'll kind of quickly go through these
6 because of them we would have talked about during
7 these last two years, as you've seen the package
8 evolve.

9 So, in the October letter, October 2020
10 letter, at that point we were just kicking off,
11 talking about the general Framework, this notion of
12 laying it out in the form of a life cycle. And
13 basically, that's not changed much over that time
14 period.

15 One of the first comments -- and this is
16 also a comment we got in other interactions related to
17 advanced reactors and some of the other activities in
18 the interactions between the staff and the ACRS -- was
19 this notion of a need for systematic assessments of
20 hazards, initiating events, event scenarios. And so,
21 that's been a repeating topic over the last couple of
22 years.

23 We've responded to that. I think we have
24 fairly specific requirements in both Framework A to do
25 a systematic assessment that's largely based on the

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1 Probabilistic Risk Assessment within Framework A.
2 Boyce Travis talked to you yesterday about Framework
3 B and the safety analysis and the need to address
4 different categories of events.

5 And then, yesterday you also heard the
6 discussions of DG-1413, which is applicable to not
7 only Part 53, but also would be useful to other areas
8 of the NRC.

9 So, that topic has played out over the
10 last couple of years.

11 The third comment in that first Interim
12 Letter was to support prototype testing. We have
13 included the same provisions of 50.43(e) in both
14 Framework A, in Section 440, and in Framework B, in
15 4730, and there is a typo there. It says, in
16 Framework A, it's a typo, it says, "53.440." That's
17 actually the requirements in Framework A. The general
18 requirements are in 53.90, which is termed Standards
19 for Review.

20 But all of those provisions are there, and
21 we even in the preamble tried to stress that the
22 notion of 50.43(e), and the repetition here in several
23 places in Part 53, that the performance of safety
24 systems needs to be demonstrated through combinations
25 of tests and experiments, analysis, and if needed,

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1 prototype testing.

2 So, that is, basically, unchanged from
3 when that proposal was first put in Part 50, when we
4 started to see safety systems that were different from
5 those that were addressed in the general design
6 criteria or the initial plant designs, the Generation
7 II and Generation III plants.

8 So, that was the first letter. Billy, if
9 we can go to the next slide?

10 The next Interim Letter we got was in May
11 of 2021. Again, the first comment was on this overall
12 structure and dividing the Subparts, largely to align
13 with the life cycle of a plant, sort of a systems
14 engineering approach.

15 The second comment -- and this, you've
16 requested many times; I know we were relatively slow
17 in getting this to you -- was a request to have a good
18 explanation. We tried, to some degree, to do that, as
19 we released the text in the form of the discussion
20 tables, but, really, now is about the first time that
21 we're really putting that together and providing it to
22 you in the form of the whole rulemaking package with
23 both the language and the preamble.

24 So, Billy, we can go to the next slide.

25 A couple of other points that were made in

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1 the May letter. In that timeframe, we were still
2 toying with the first iterations where we had a two-
3 tiered structure, and that's the language we used.
4 Basically, for design basis accidents and licensing
5 basis events other than design basis accidents, we
6 refer to them in the tiers. Obviously, now we have
7 dropped that several iterations ago.

8 We still do differentiate in the safety
9 objectives, two objectives. One, no immediate threat
10 to public health and safety, and then, the second,
11 actions as deemed appropriate considering risks to
12 public health and safety.

13 And that was a way to still distinguish
14 between the requirements largely for safety-related
15 equipment and things that would be addressed under
16 strict controls, like technical specifications, and
17 those things that we would provide more flexibility,
18 the risk-informed approaches, things that would be
19 addressed more through reliability targets, and so
20 forth.

21 So, we still maintain in Framework A, and
22 also, as does the current requirements carried over
23 Framework B, a distinction between equipment and the
24 role that it plays. But, all that said, we did drop
25 what almost universally was observed to be confusing

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1 using the two-tiered structure.

2 The Item C was a request, generally, or an
3 observation that it was useful to have something like
4 the general design criteria or, in fact, the general
5 design criteria in one place. We've talked about this
6 several times. Framework B uses or refers to the
7 general design criteria for light water reactors, and
8 then, the expectation that the principal design
9 criteria would be developed based on the general
10 design criteria or using them as a guide for non-light
11 water reactors.

12 But, for Framework A, again, we've tried
13 to explain it. It takes a top-down approach. As
14 opposed to starting with those design rules, it's top-
15 down starting with the safety criteria, then safety
16 functions, then the design features, and ultimately,
17 the functional design criteria for those SSCs. And
18 you, as we've talked even yesterday, will often end up
19 in the same place, but you've gotten there through a
20 slightly different path, being you've gone through
21 that logic as opposed to starting with the design
22 rules, such as laid out in the general design
23 criteria.

24 Item D was an observation that or a
25 request in that May letter related to anticipated

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1 operational occurrences, and to maintain a barrier
2 base. This was, if you remember still going over the
3 Licensing Modernization Project, the idea of using a
4 frequency consequence target-type approach, even down
5 into the AAO range, where they would be based on the
6 Part 20-type limits.

7 So, that gets picked up in large part in
8 Framework B. Again, the requirements for an applicant
9 to identify acceptance criteria for AAOs under that
10 deterministic construct, that will often be a barrier-
11 based approach similar to what's used now for fuel
12 cladding or reactor coolant pressure boundary.

13 But, in Framework A, we allow that; we
14 expect it to actually be the case that in the analysis
15 that an applicant would take a barrier approach
16 because it's a simpler analysis to perform. But it's
17 left under 53.450(e) that the applicant can, or under
18 that requirement, the applicant must identify the
19 evaluation criteria for each individual anticipated
20 event sequence or AAO, or the whole category. And
21 again, that could be a barrier-based approach or it
22 could be, since we've already endorsed it, the
23 approach in Reg Guide 1.223, which uses a frequency
24 consequence target in terms of public dose -- again,
25 comparable to Part 20 or Subpart I for those

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1 anticipated sequences.

2 E was a discussion -- again, back in this
3 timeframe there was only Framework A. And so, I'll
4 ask Boyce or Bill Jessup to chime in if there's any
5 observation or if I mischaracterize something in
6 Framework B.

7 But the letter, again, in the context of
8 Framework A at that time, mentioned that DBAs, the
9 rule should require that the end state be a safe,
10 stable, and subcritical condition. So, the changes we
11 made there was we added "safe, stable" to the
12 requirement for DBAs. The end state of the DBAs under
13 53.450(f) has to be safe, stable end state.

14 And we addressed both subcriticality and
15 long-term cooling by the addition of design
16 requirements in 440(g), 53.440(g), which is a design
17 requirement. So, we think we ended up in a comparable
18 place that you were suggesting. We just used two
19 different sections of the rule to get there.

20 CHAIR PETTI: Bill?

21 MR. RECKLEY: Yes, Dave?

22 CHAIR PETTI: Just a question. I couldn't
23 remember this when it came up.

24 Somewhere in a subsidiary document, some
25 sort of guidance, you know, cold shutdown and hot

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1 shutdown have unique meanings for the current fleet.
2 Those won't work for the advanced reactors because
3 some of the coolants will freeze, will take forever to
4 cool down an HTGR, given all the graphite.

5 So, is there a place where some of that
6 stuff gets worked out and recognized by the staff in
7 guidance when they do a review?

8 MR. RECKLEY: It will be, yes, I think
9 there will be an opportunity for technology-specific
10 guidance. Some of that might even come in the context
11 of, let's say, codes and standards. Like the ANS
12 Design Standards --

13 CHAIR PETTI: Oh, okay.

14 MR. RECKLEY: -- could include something
15 like that. And then, we could endorse it.

16 But it's acknowledged, you're exactly
17 right, it will be somewhat different than light water
18 reactors because of the coolants, because of the other
19 constraints. What is the safe, stable end state will
20 vary.

21 CHAIR PETTI: Right. Yes. Okay. Thanks.

22 MR. RECKLEY: Okay. And again, Boyce
23 talked yesterday about how the safety analysis works
24 in Framework B. It's very similar to the current
25 construct.

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1 So, Billy, if we want to go to the next
2 slide?

3 Other issues that were brought out in that
4 May 2021 letter was to clarify the DBAs. We think
5 we've done that to some degree, and it's addressed in
6 guidance. For Framework A, it's in the guidance in
7 Reg Guide 1.223, NEI 18-04.

8 In terms of the single failure, we tried
9 to address that in the preamble discussion in
10 referring to some of the previous Commission
11 decisions, such as SECY-03-0047, where some of this --
12 really, another thing, Ron was talking about the
13 evolution. For those of us that have been around a
14 long time, some of this was started, and is a
15 continuing of the evolution of the work that was done
16 back in the Advanced Notice of Proposed Rulemaking and
17 papers such as SECY-03-0047, back in that timeframe.

18 So, some of these issues were resolved
19 back then, and we brought that up in the preamble for
20 things like Framework A, not including the use of the
21 single failure criteria, but including an increased
22 focus on making sure that the performance of the SSCs
23 are established and maintained.

24 So, again, in Subpart F, you look at the
25 non-safety-related, but safety-significant SSCs.

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1 There's requirements in the rule for the reliability
2 of those systems to be maintained. The reason for
3 that is, basically, to support the logic that was laid
4 out in SECY-03-0047 to replace or to use as an
5 alternative the reliability approach as opposed to the
6 single failure approach.

7 So, then, Item 5, from the May 2021 letter
8 was, basically, a repeat, as a matter of emphasis to
9 do this systematic approach. So, we talked about that
10 from the October 2020 letter. We have, we think,
11 specific requirements to do systematic approaches to
12 identify the event sequences. And in addition to
13 that, the guidance issued in the Draft Guidance at
14 this point in DG-1413 that was talked about yesterday.

15 So, Billy, I think we can go to the next
16 letter.

17 And the February 17th, 2022 letter was
18 dedicated to operator staffing. And so, I wasn't
19 really going to talk about that letter. We responded
20 to it. And obviously, we've had a couple of meetings
21 with Subcommittee and full Committee even in regards
22 to this topic, including all morning. So, I really
23 hadn't planned to go through what we did with these.
24 Much of it is a little bit -- again, unless there's a
25 desire to go through them, Billy, I think we can just

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1 go to the next slide.

2 Which brings us to your most recent
3 letter, the August 2nd, 2022 letter, for which we sent
4 a response a couple of weeks ago. And to go through
5 the items in that letter, I'm going to turn it over to
6 Bill Jessup.

7 MR. JESSUP: Okay. Thanks. Thanks, Bill.

8 This is Bill Jessup from the NRC staff
9 again.

10 And I'm going to cover the staff's
11 responses to the eight recommendations and
12 observations that were in the fourth Interim Letter
13 from the ACRS on Part 53. As Bill mentioned, that's
14 the most recent of the ACRS Interim Letters on this
15 topic.

16 Kind of like Bill did on the previous
17 letter, the third Interim Letter, I'd offer -- and you
18 can see on this slide, in particular, is one example
19 -- a lot of the recommendations the staff has talked
20 about on how we've considered the feedback in the
21 current draft of the rule package, including today and
22 yesterday. So, I don't plan on going into that much
23 detail on some of the recommendations and
24 observations, but we did want to at least acknowledge
25 all eight here and make sure we open up the floor for

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1 some dialog, feedback, and more questions.

2 So, the slide on the screen right now,
3 this was the first observation, and it focused on the
4 role of the QHOs. I think we had a really robust
5 discussion again on this topic yesterday. And I think
6 as Bill acknowledged yesterday, it's a bit more
7 prominent in Framework A, but certainly relevant to
8 the entire part.

9 So, we did discuss it at length yesterday.
10 I don't have anything else to add beyond that, but,
11 again, wanted to acknowledge the feedback and see if
12 there were more questions or feedback beyond what we
13 talked about yesterday.

14 MEMBER DIMITRIJEVIC: So, I would like to
15 provide, because I have thought about that in more
16 detail since our discussion yesterday. This is Vesna
17 Dimitrijevic.

18 And I said yesterday my main problem is
19 that we often say the QHOs are -- let me find it in
20 the preamble -- are well-established risk measures
21 using risk-informed decision-making.

22 And as I said yesterday, I don't perceive
23 that risk to be true. So, I was going to, you know,
24 to propose something for consideration. Can you
25 acknowledge that we don't have enough experience with

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1 using QHOs because we use the substitutes, which are
2 CDF and LERF?

3 And then, because, you know, 1.174 is
4 becoming prominent residence there, I went to Reg
5 Guide 1.174, which has the QHOs mentioned a couple of
6 times. But in one very interesting paragraph on page
7 10, this is what 1.174 said:

8 "The use of CDF and LERF as bases for PRA
9 acceptance guidelines is an acceptable approach for
10 addressing Principle 4. Use of the Commission's
11 Safety Goal QHOs in lieu of CDF and LERF is acceptable
12 in principle" -- that's 1.174 -- "and licensees may
13 propose their use." QHOs. "However, in practice,
14 implementing such an approach would require an
15 extension to a Level 3 PRA, in which case the methods
16 and assumptions used in the Level 3 analysis, and
17 associated uncertainties, would require additional
18 attention."

19 So, I propose that this in some way,
20 instead of saying, "Oh, we should state that we have
21 a very limited experience with use of QHOs," that with
22 the QHOs, that most of the experience, risk of
23 replication today is based on such use of CDF or LERF,
24 and that introduction of using QHOs directly
25 introduces -- it will require use of Level 3 PRA,

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1 which introduces all the new issues associated with
2 the methods with the Level 3 PRA.

3 I think it will be fair to acknowledge
4 that, instead of just ignoring that, pretending that
5 we have experience with QHOs, which we don't. We have
6 a very limited experience, even with the spent fuel
7 pool, things we discussed yesterday.

8 So, also, the one additional thing which
9 I wanted to mention is that QHOs are, basically, as
10 defined in the Commission's statements, they are sort
11 of quantitative objectives used to gauge achievement
12 of the safety goals.

13 And as I proposed in my additional
14 comments, which maybe I didn't formulate so well, it
15 is, if you go to the safety goals back, you know, when
16 you were just talking about, you know, increasing the
17 risk in the qualitative bases, then you can open the
18 door for somebody else to come with different
19 quantitative objectives. Because, for example, the
20 new applicants can consider the CDF is not necessary,
21 when we can actually consider all the risks to the
22 large releases. Or they can propose, you know,
23 different safety study measures.

24 Okay. This is my discussion. My main
25 point is I'd like to acknowledge that we don't have

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1 experience with QHOs; that all of our risk-informed
2 experience is based on substitutes, and the use of
3 QHOs introduces the new issues. That's it.

4 MR. JESSUP: Thanks. I'll probably defer
5 to Bill Reckley on that point.

6 MR. BLEY: Bill, before you go ahead, let
7 me --

8 MR. RECKLEY: Yes. Yes, Dennis.

9 MR. BLEY: -- add a little question to
10 that.

11 In your response to our last letter, you
12 didn't defense use of the QHOs very strongly. You
13 fell back on the 1.174 idea that it's part of an
14 integrated decision process. So, it's one out of four
15 or five criteria one looks at.

16 You buried us in material. So, I haven't
17 found my way through to see if you actually say that
18 somewhere in the rule language. I didn't remember it
19 having been there.

20 Are those arguments somewhere in the rule
21 now or in the statements of consideration?

22 MR. RECKLEY: Yes, that discussion is in
23 the preamble. We can take a look. Again, we'll
24 acknowledge, as the discussion was yesterday, the
25 further you go into these modelings, every time you

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1 introduce one, you're increasing the uncertainties.
2 So, generally, the lower the frequency, the higher the
3 uncertainty and the higher the consequence, the higher
4 the uncertainties.

5 But we will take a --

6 MEMBER DIMITRIJEVIC: All right, but this
7 presentation, I mean, a lot of the goal of 10 to the
8 minus 6 is equally low. This uncertainty comes from
9 totally different matters using Level 3. So, that's
10 my point.

11 MR. RECKLEY: Right, right.

12 MEMBER DIMITRIJEVIC: This is general
13 uncertainty of the lower numbers in the PRA. As I
14 said yesterday, this is very well-stated in 1.174, and
15 I was very nicely surprised when I found it last
16 night. It exactly says that you are introducing new
17 methods, new uncertainties. Please keep that in mind.
18 So, if you want to propose using QHOs as one of the
19 options, then we should acknowledge that.

20 MR. RECKLEY: Yes, we'll take a look. In
21 my mind, we addressed this because we talk about the
22 need to address the uncertainties. And that would be
23 the uncertainties that's introduced by not only
24 modeling the plant and the frequencies, but also when
25 you get to offsite doses, the uncertainties associated

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1 with that.

2 But the --

3 MEMBER DIMITRIJEVIC: But you also state
4 in the preamble that these are well-established
5 cumulative risk measures, which is not true.

6 MR. RECKLEY: Well, the risk measures
7 themselves have been around since the 1980s. So --

8 MEMBER DIMITRIJEVIC: Risk measures of CDF
9 and LERF, but not QHOs.

10 MR. RECKLEY: Well, the QHOs have been
11 around since the 1980s.

12 MEMBER DIMITRIJEVIC: They have not. They
13 have been introduced in this NEI statements of, you
14 know, this 2 to the minus 6 and everything.

15 MR. RECKLEY: No, no, no. No, no, that --

16 MEMBER DIMITRIJEVIC: But the safety
17 goal -- this is where we have a major disagreement.
18 I say one thing; you say the other thing.

19 MR. RECKLEY: No, no. And I'll just say
20 NUREG-0880 -- I think the number is right; Marty, come
21 to my rescue if I've got the number wrong --

22 MEMBER DIMITRIJEVIC: No, this is very
23 true, but they're not in the -- well, you know,
24 they're not in the safety goal, as you point out.
25 You make them as to be a Bible to this thing. And I'm

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1 just saying something which I think you do have to
2 agree with me: that 99 percent of our risk-informed
3 experience up to this moment is based on substitute
4 measures, CDF and LERF.

5 MR. RECKLEY: Yes. Yes, totally agree
6 with you, that's what's --

7 MEMBER DIMITRIJEVIC: And the substitute
8 measures have been there before QHOs. Do you agree
9 with that?

10 MR. RECKLEY: The use of CDF and LERF
11 was --

12 MEMBER DIMITRIJEVIC: Yes. This was 1400,
13 which is 1974.

14 MR. RECKLEY: Sure.

15 MEMBER DIMITRIJEVIC: So, you do agree
16 with me there. There wasn't the QHOs, and then came
17 CDF and LERF. It was CDF and LERF, and then,
18 connection was made in that NUREG, which I questioned
19 logical that connection, so yes.

20 MR. RECKLEY: No, no, we're talking
21 different NUREGs. NUREG-1860 did --

22 MEMBER DIMITRIJEVIC: Right.

23 MR. RECKLEY: -- the exercise that we
24 talked about. I'm just saying the qualitative goals
25 themselves, the 2 times 10 to the minus 6 and 5 times

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1 10 to the minus 7 for prompt fatalities, those
2 numerical measures were in the 1980s. They were
3 calculated in a NUREG that came out in parallel with
4 the Safety Goal Policy Statement.

5 And so, those numbers -- I'm not arguing
6 with you that doing the analysis to compare to those
7 numbers is difficult. Fully agree with you.

8 MEMBER DIMITRIJEVIC: I just, not to say
9 they have actually proved their base that 10 to the
10 minus 4 CDF, right, which was used before, and they
11 want to say that corresponds to possible, you know,
12 the cancer deaths. Even I'm just totally questioning
13 the connection between CDF and cancer deaths.

14 But this is irrelevant. Let's not go into
15 the details. I'm sure that both of us are ready for
16 minutia what was done in --

17 MR. RECKLEY: Right. At this point --

18 MEMBER DIMITRIJEVIC: It was in 1980, it
19 says .1 of the risk. You know, it doesn't say 2 to
20 the minus 6, those things.

21 MR. RECKLEY: Right. Right. But the
22 NUREG that came out in parallel with the Policy
23 Statement took that 1/10th of 1 percent, which is in
24 the actual Policy Statement; you multiplied that
25 number by the risk of getting cancer from any other

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1 reason, or the reason to die by accident for any other
2 reason, and it gets you the 2 times 10 to the minus 6,
3 or 1 times 10 to the minus 7 numbers.

4 I'm just saying those numbers themselves,
5 I'm agreeing with you they weren't used very much
6 because we were dealing with light water reactors and
7 the measures were core damage frequency and
8 conditional containment failures, yes, but the numbers
9 themselves came out in parallel with the Safety Goal
10 Policy Statement.

11 MEMBER DIMITRIJEVIC: All right. So, I
12 don't want to argue this with you. I have an idea
13 about that.

14 MR. RECKLEY: Right.

15 MEMBER DIMITRIJEVIC: But I'm trying to
16 make a different argument. My argument here is, if
17 somebody now wants to use dose numbers because it
18 doesn't have a CDF and LERF as substitute measures,
19 then it introduces all new methods. And these
20 methods, we don't have experience with. So,
21 therefore, that should be considered in all of this,
22 you know, when it comes to the technical adequacy of
23 the risk analysis and everything.

24 So, my only point is, let's admit that we
25 don't have experience with QHOs; that they will

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1 introduce new methods. Because that's what the true
2 statement is.

3 CHAIR PETTI: Okay. I think we understand
4 ourselves. I mean, let's move on, or Bill will be
5 here forever.

6 (Laughter.)

7 I do appreciate, though, Vesna -- I mean,
8 when you quoted 1.174, I kind of looked at our comment
9 and said, "That's sort of saying the same thing."

10 MEMBER DIMITRIJEVIC: Yes, absolutely.

11 CHAIR PETTI: Yes.

12 MEMBER DIMITRIJEVIC: Absolutely.

13 CHAIR PETTI: So, go ahead, Bill.

14 MR. RECKLEY: All right. I was just going
15 to point out, as you go through and try to make it
16 technology-inclusive and look over to the non-light
17 water reactor PRA standard, which doesn't use the same
18 terminology -- and again, Marty, weigh in, as needed
19 -- but it does talk about using these other measures
20 in that standard that we've endorsed in a Reg Guide
21 for trial use.

22 MEMBER DIMITRIJEVIC: I was just going
23 through that to find the references, and I will finish
24 looking while we are talking.

25 MR. RECKLEY: Okay.

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1 All right, Billy -- Bill. Sorry.

2 MR. JESSUP: Yes. Thanks. Good
3 discussion.

4 Yes, thank you, Billy.

5 So, the second recommendation here from
6 the fourth Interim Letter, it focused on the role of
7 safety functions in both Frameworks. We touched on
8 this a few times yesterday and noted that, in response
9 to the recommendation, we did propose a definition for
10 the term "safety function." We agreed that it's a
11 very important concept that we wanted to ensure that
12 we were clear on. And that definition, you know, it's
13 found in Section 53.20 now, as Jordan Hoellman
14 discussed yesterday.

15 And we also made some changes to the rule
16 text that would add some more clarity around how
17 safety functions are defined in each Framework, and
18 those changes were really focused on Framework B,
19 where we see them implicitly addressed through the
20 principal design criteria. But, again, as I mentioned
21 yesterday, we worked to make that relationship more
22 explicit, so, again, that we could add some clarity
23 around this.

24 I don't have much --

25 CHAIR PETTI: I liked what was done, Bill.

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1 I thought it helped on the clarity side.

2 MR. JESSUP: Okay. Now, thank you for
3 that feedback, Dave.

4 I'll add that we did spend a lot of time
5 with this recommendation because we appreciated it,
6 but trying to find the right way to do it, we think we
7 struck the right balance and tried to get the point
8 across.

9 So, Billy, if you want to move to the
10 third item, the next slide? Okay, thanks.

11 So, this recommendation focused on pre-
12 application engagement, and it recommended several
13 activities to be required as part of pre-application
14 engagement and the process that we use to engage with
15 reactor vendors and prospective applicants.

16 But, as the letter indicated, the staff is
17 working on guidance in this area. We do have a draft
18 white paper that is publicly available, and it
19 summarizes the recommended pre-application engagement
20 activities and the topics that we think are important
21 enough, such that they should be discussed with the
22 staff early in the process.

23 And a lot of those topics are aligned very
24 closely with what the Committee had recommended, and
25 you see a handful of them on this slide. These are

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1 from that draft white paper on pre-application
2 engagement, principal design criteria, selection of
3 licensing basis events, SSC classification,
4 Probabilistic Risk Assessment, among others.

5 And we did add a note that we agreed with
6 the ACRS on this topic, but noted, again, that pre-app
7 engagement, it can't be required of the developers and
8 the prospective applicants, but that draft white paper
9 certainly encourages it, and we use it quite often in
10 discussions with these groups, when they're coming.
11 And I personally use it a lot in these engagements.

12 MR. BLEY: All the applications we've
13 received, you've had extensive pre-application
14 interactions, isn't it true? That's with smaller
15 reactors, yes?

16 MR. JESSUP: I would offer, Dennis, that
17 it's varied. You know, there's a couple in-house
18 right now and it's varied, and it continues to vary
19 with prospective applicants today, not the ones that
20 are in-house that you just referred to. But it
21 varies.

22 It's very helpful. As I indicated, it
23 helps us get through a lot of tough technical and
24 policy issues, not necessarily resolve them, but at
25 least identify some of the sticking points early.

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1 MR. BLEY: Okay. You envision you might
2 get some applications with, essentially, no pre-
3 application engagement? Is that what you're saying?

4 MR. JESSUP: I would say it's possible
5 because it's not required.

6 MR. BLEY: Yes.

7 MR. JESSUP: And I think that, right now,
8 that draft white paper, it really outlines not only
9 some of these technical topics, but the benefits and
10 potential schedule impacts are addressed in there as
11 well.

12 CHAIR PETTI: So, Bill, the draft white
13 paper, is it available to applicants? Is it on our
14 website somewhere?

15 MR. JESSUP: It is, Dave. Actually, I
16 Google it sometimes when I can't find it right off the
17 bat. Yes, it's on the NRC's Advanced Reactor Pre-
18 application website, public website.

19 CHAIR PETTI: Okay. Good.

20 MR. JESSUP: And if you don't have the
21 Accession Number, we can get it to you.

22 CHAIR PETTI: I mean, here is a case, yes,
23 I don't want to get hung up on what it should require.
24 You guys understood our intent. I think you were on
25 the same page. The fact that there's a white paper

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1 out there for applicants to avail themselves of, you
2 know, that's getting 90 percent of the way there, in
3 my opinion.

4 So, thanks.

5 MR. JESSUP: We were definitely in
6 agreement with ACRS on this.

7 Billy, can you move to the next slide,
8 please? Our slides are hung up. Okay, there we go.

9 So, the fourth recommendation, it focused
10 on ensuring that fire protection requirements in both
11 Frameworks were technology-inclusive. This is a
12 pretty straightforward response. We agreed with this
13 recommendation, appreciated it. It brought up some
14 good points.

15 And I touched on some of the actions taken
16 in this area yesterday, specifically, the fact that
17 major changes were made to the Framework B preliminary
18 proposed requirements in this area. They align a lot
19 more closely with Framework A. And those changes,
20 they inherently address the recommendation, and we
21 feel confident that what's currently proposed in both
22 Frameworks is now technology-inclusive.

23 So, Billy, can you go to the next slide,
24 please?

25 So, this was the kind of fifth

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1 observation, I'd call it. And it focused on the
2 length of the preliminary proposed rule text and noted
3 that some of the text could be placed in guidance, and
4 also pointed out the optics associated with the length
5 of the rule, and that this could cause future issues
6 around usability.

7 I think we touched on this briefly
8 yesterday morning during kind of what I would call the
9 general session. I'd say we've worked diligently to
10 identify areas where some of the rule text may be more
11 appropriately addressed through regulatory guidance.
12 I mean, fire protection in Framework B is just one
13 example.

14 And I think the discussions today and
15 yesterday reflect that consideration, and I mean,
16 probably over 50 percent of the time we spent talking
17 about guidance. And we definitely agree that having
18 a rule that's as streamlined and efficient as possible
19 is a prime objective.

20 I think I want to come back to an item
21 that Jordan Hoellman discussed yesterday regarding
22 Section 53.10. And that's a new section relative to
23 the previously issued iterations of the rule text.
24 That section, it's small, but it's important, and it
25 establishes the independence of the Frameworks. And

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1 I think it reinforces the need to look at the
2 Frameworks independently, notwithstanding that there
3 are a few ties between the Frameworks, but not a lot.
4 And that was done intentionally because of that
5 tradeoff between, you know, what I would call volume
6 and usability or clarity that we've worked through.

7 And then, you know, if you get to the last
8 bullet here, if you look at both Frameworks
9 independently and you consider the preliminary
10 proposed rule text in Part 53, it would, essentially,
11 provide an alternative or provide alternatives to the
12 regulations in Parts 50, 52, 55, and 100, then you see
13 that either Framework actually is substantially
14 smaller than that existing set of requirements.

15 And so, I think, to sum it up, we agree
16 that the rule needs to be efficient, needs to be
17 clear, usable, but we also note that, if you look at
18 each Framework independently, again, it suggests that
19 what's been developed so far, it should be considered
20 quite compact, given the appropriate context and, you
21 know, appreciating the fact that it would provide an
22 alternative to a large body of existing requirements.

23 CHAIR PETTI: And, Bill, I think in this
24 area, you know, the response to the letter just didn't
25 speak to me as well as the meeting we're having here,

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1 where, in fact, you guys kind of have your hat on,
2 looking for inefficiencies and duplication. Just, in
3 fact, that all of the stuff that Jesse talked about in
4 Subpart P just as one sentence saying, "Go back to
5 Subpart F for the requirements," I mean, you're
6 looking for ways to try to streamline it, and that
7 didn't come through in the response to the letter.
8 So, I think you understand our concern and you're on
9 the lookout, if you will, to try to do that, in light
10 of the other constraints you have.

11 MR. JESSUP: Agree, Dave. I appreciate
12 that feedback, not only the positive feedback, but
13 also maybe that the letter didn't come through as
14 clear.

15 And I'll say it probably for the third
16 time, we did look at various ways to try, when we
17 introduced Framework B, in particular, to try and make
18 it as streamlined as possible, all the way to, do you
19 just make several forks in the road in Framework A, or
20 do you, like I said, try to increase the usability,
21 the clarity, by some duplication, but, again, you have
22 kind of a standalone set of requirements now in those
23 Frameworks.

24 So, appreciate the feedback.

25 Billy, can you go to the next slide,

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1 please? Thanks.

2 So, the sixth recommendation, this focused
3 on the generally licensed reactor operator concept and
4 how operating licensing requirements have been
5 proposed in Part 53. I think Jesse Seymour covered
6 this better than I would this morning. I think Jesse
7 had a dedicated slide on this. So, I wasn't going to
8 go into any great detail on this, except to point out
9 some of the highlights that, again, are probably
10 duplicative of what Jesse said this morning.

11 What's been proposed, they're technology-
12 inclusive. They have significantly more flexibility
13 than what's currently out there, and I think the last
14 bullet is what always sticks with me, in that it
15 should reduce the need for exemptions from what folks
16 would have to take to the current requirements while
17 enhancing reliability and clarity.

18 So, I don't want to repeat what Jesse
19 said. And, Jesse, feel free to jump in, if you're on.

20 But I'm glad to take more questions on
21 this one, if needed.

22 MR. SEYMOUR: No, Bill, again, I think we
23 talked through those items today, and also, we've
24 responded to them directly, some of the earlier items,
25 in past discussions. So, unless there's further

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1 questions, I think we've covered it.

2 MR. JESSUP: Thanks, Jesse.

3 Billy, you can go to the next slide.
4 Okay.

5 So, the seventh item here, a
6 recommendation/observation. This was focused on SSC
7 classification, and the feedback was that, through the
8 use of PRA, perhaps only two classes of SSCs should be
9 developed.

10 We thought the discussions during the
11 summer meetings on this topic were really good, and we
12 appreciated the insights, but I think, as you saw in
13 the letter, after we went back through the feedback we
14 got and saw the letter, the staff thought that two
15 classes may be a little too limiting, in light of the
16 fact, especially, if you see the last major bullet
17 there, that there are some non-safety-related SSCs
18 that may warrant some type of special treatment due to
19 their role either in providing increased defense-in-
20 depth or that they're otherwise risk-significant. And
21 this generally gets reflected in a third class of
22 SSCs.

23 And we noted here on the slide how those
24 considerations, they're reflected in the current rule
25 language or the proposed rule language, where

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1 Framework A, it's somewhat more explicit, in that,
2 with that third class, the non-safety-related with
3 special treatment, but it's also reflected in
4 Framework B in a couple of ways.

5 You see important to safety on here, but
6 also in some specific areas, such as the SSCs that are
7 used to mitigate additional licensing basis events
8 that Boyce discussed yesterday. So, the treatment of
9 that third class or third tier in Framework B,
10 although not explicit, is fairly consistent with the
11 existing requirements that we have today.

12 And I skipped the second major bullet that
13 we had a note here about safety-related SSCs, where we
14 pointed out that both of the Frameworks, they address
15 this class of SSCs generally in a manner that's
16 consistent with what's in the current regulatory
17 requirements. The wording is a little bit different,
18 obviously, between the Frameworks, but, in any case,
19 we think they're fairly consistent.

20 MEMBER DIMITRIJEVIC: So, let me just ask
21 you a question for Framework A, which is totally PRA-
22 integrated. Are the PRA results considered in this
23 safety classification?

24 MR. RECKLEY: Primarily -- the answer is
25 yes -- and primarily in the second category, the non-

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1 safety-related, let's say, safety-significant or using
2 the NEI 18-4 terminology, non-safety-related and
3 special treatment.

4 MEMBER DIMITRIJEVIC: But my question is,
5 when you do safety classification within safety-
6 related and non-safety-related, was the PRA considered
7 as part of that classification?

8 MR. RECKLEY: It is somewhat indirectly.
9 The PRA under Framework A, as it is under the
10 Licensing Modernization, the PRA would inform how you
11 pick the design basis accident. Once you've picked a
12 design basis accident, the requirement is the same,
13 that you use safety-related SSCs. But the actual
14 design basis accident is a stylized evaluation similar
15 to what is done now. So, it kind of becomes separated
16 from the PRA, but the PRA is used to inform the
17 selection of the DBA.

18 MEMBER DIMITRIJEVIC: But that's where our
19 comment comes. If you use our PRA, you shouldn't have
20 something important for safety which is non-safety-
21 related. That's when if you have -- in a perfect
22 world, this would be the case.

23 My other question is, if you are not
24 having a perfect world, what is the position on
25 safety-related which are not important for safety in

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1 the Framework A?

2 MR. RECKLEY: The general notion in
3 Framework A -- and this is talked about in LMP -- is
4 you should avoid that. You should be able to avoid
5 that case. And there's a whole part of the Licensing
6 Modernization Project that is separate from the NRC in
7 terms of its implementation and just reflected in
8 white papers, basically, to help users implement it.

9 But there's a whole section on smartly
10 picking your safety-related SSCs specifically to avoid
11 what you're suggesting. And so, I think --

12 MEMBER DIMITRIJEVIC: Well, see, my
13 position is -- and this is just my, but, actually, the
14 Committee has some similar position -- that in the
15 Framework A, there should be only two categories. You
16 should do this integration during the safety
17 classification. In that Framework B, you should have
18 all four categories.

19 And then, let me ask you something totally
20 separate from the categorization. Did you define
21 "special treatment" in the QA programs?

22 MR. RECKLEY: The special treatment can,
23 but does not necessarily have to include QA
24 requirements. Special treatment could be additional
25 monitoring. It could be -- it's really up to the

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1 designer to evaluate what that --

2 MEMBER DIMITRIJEVIC: So, do you have
3 discussion of this in Subpart F? I couldn't find it?
4 You know, in the part of the --

5 MR. RECKLEY: The details of this show up
6 in the Regulatory Guide, in 1.223 and NEI 18-04, in
7 the guidance documents.

8 MEMBER DIMITRIJEVIC: I just thought there
9 is -- did they make it to the other parts of 53?

10 MR. RECKLEY: No. That's in --

11 MEMBER DIMITRIJEVIC: All right.

12 MR. RECKLEY: It's primarily in the
13 guidance. And this does largely fall out of the -- if
14 you look, for example, at NUREG-1860, or some other
15 thoughts about how you grade the requirements base on
16 the risk or safety significance of SSCs -- but when
17 you introduce Appendix B and safety-related and a
18 traditional approach for some subset of SSCs to fall
19 into that category, as Bill Jessup had mentioned, it
20 will largely result in the need to have an additional
21 category where we say, we acknowledge its importance,
22 but it doesn't need to fall into the requirements of
23 the QA program in terms of the procurement and all of
24 the other criteria that are listed in order to serve
25 its function in terms of providing defense-in-depth.

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1 The trap is, if you have only two
2 categories and safety-related is one, and you apply
3 Appendix B to all of that equipment, that has
4 ramifications in terms of the regulatory impact and
5 the cost of the regulation for those designs. So,
6 that's why we generally introduce the third category,
7 is to address risk in a more efficient manner.

8 MEMBER DIMITRIJEVIC: Well, as you're
9 familiar in application of 50.69, the cost is actually
10 reduced because there is much more SSCs in the
11 category which is not safety -- which is safety-
12 related, but not safety-significant. And this is why
13 this, to me, looks like a chair with, you know, three
14 legs, what you have here. This is totally, you know,
15 it looks like -- it lacks total knowledge, what we are
16 doing here.

17 I mean, you know, because if you look at
18 in the reg of 50.69 application, most of the current
19 safety components, you know, there is some of them
20 which are non-safety, but safety-significant, but a
21 much larger number is the safety, non-risk-
22 significant, which, in general, reduces the cost. And
23 this is why so many plants are interested in using
24 50.69.

25 What you have here is some hybrid, shaky

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1 hybrid. I mean, it doesn't make sense to me. So --

2 CHAIR PETTI: So, Bill, I'll give you the
3 counter to that, because you probably heard lots of
4 discussions we had in August on this. July we had the
5 meeting.

6 My view is the goal would be to try to
7 have a system that didn't get you into the situation
8 where the classification rule set made you classify
9 something as having some safety significance, but it
10 really had no risk significance, when one looks at it
11 through a PRA lens. And there's costs associated,
12 obviously, with seeing something as safety
13 significance when, in fact, it may not have any risk
14 significance.

15 In my mind, this is all about we need a
16 system that optimizes the safety footprint for these
17 newer reactors, but we've got no operating experience
18 in many cases, or limited in others.

19 How do you know what's important? How do
20 you know what to worry about, so that both the
21 licensee and the regulator can focus on the right
22 stuff and not peripheral things? And that's really,
23 I think, sort of what the intent of what we're -- at
24 least when I looked at the finding that we put in,
25 that's what I where I was going. That was the

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1 important sort of thought process.

2 MR. RECKLEY: Yes, and I think the way I
3 would answer, the way we're trying to do that is the
4 way we've laid out the requirements in both
5 Frameworks. But in Framework A, to do the PRA, in
6 order to search for that, to do -- again, it goes back
7 to the observations that have been offered by the ACRS
8 numerous times about doing these systematic
9 assessments. And both Frameworks have to do that.
10 They do it slightly differently, but you do these
11 systematic assessments, and then, with the whole goal
12 of identifying what's important to managing the risks
13 associated with those facilities.

14 And again, once you then say you're going
15 to address at least a subset of those using a
16 traditional approach, and bringing in the quality
17 assurance requirements, and so forth, and that's the
18 safety-related component, but experience has shown you
19 also have SSCs that are contributing to the risk
20 profile, that you want to have some controls over --
21 and again, Boyce talked about, under Framework B, the
22 historical for light water reactors of being a few
23 events, and then, supplementing that with severe
24 accidents, and so forth.

25 All of those things were done under this

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1 third category, if you will, of special treatment, but
2 not running up the cost by designating them as being
3 safety-related.

4 And the same thing is done in Framework A
5 where you look at the risk and you say, if it's
6 contributing to the risk profile, controlling the
7 frequency or the consequences of event sequences other
8 than the DBAs, or providing defense-in-depth, then it
9 warrants some kind of special treatment.

10 CHAIR PETTI: Yes, I'm worried about that
11 fourth option in 50.69, and maybe that's just an
12 historical artifact because PRA wasn't around when
13 many of the plants did their classifications years
14 ago.

15 MR. RECKLEY: Well, yes, you do have to be
16 a little careful. 50.69 is built for plants that were
17 designed and built already, using a set of
18 requirements, and then, saying, "Now, let's do an
19 overlay considering risk and see if we can justify a
20 slightly different treatment."

21 And so, you do get to a different place
22 when you apply these kinds of methodologies for plants
23 that have already been designed and built compared to
24 those that you're designing from scratch. And
25 hopefully, you can avoid some of the pitfalls, like

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1 having safety-related, but non-risk-significant SSCs.

2 CHAIR PETTI: Right. No, that was my
3 point, was I couldn't, in my mind, understand why,
4 except that it existed, why you decided to take the
5 classification for 50.69, given that historical
6 context, for Framework B, when you're looking forward,
7 when you've got these things occurring at the same
8 time, right? The PRA and the classification can be
9 used in concert, so that you don't have that problem.
10 That's what, mentally, I couldn't get around, why
11 carry that forward, except that it's something that's
12 been around and people know about.

13 But this discussion helps.

14 MR. RECKLEY: Bill Jessup, sorry, back to
15 you, well, both for that last question or observation
16 and back to the presentation.

17 MR. JESSUP: Okay. I don't think I've got
18 anything else to add, though it's good feedback. It's
19 an area that we, obviously, have thought a lot about.

20 But, Billy, I guess you can go to the last
21 recommendation on the next slide. Okay.

22 Yes, so the last recommendation from the
23 fourth Interim Letter, this related to documentation
24 of the basis for the AERI entry criteria. And this
25 was pretty straightforward.

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1 The staff agreed with the recommendation.
2 We're currently working on identifying the right
3 format for documenting that basis, and that would
4 include the MACCS validation that was discussed
5 yesterday during the afternoon presentation.

6 So, that covers the eight
7 observations/recommendations from the fourth Interim
8 Letter. Absent any other questions, I'll turn it over
9 to Jordan Hoellman on the next slide.

10 MR. HOELLMAN: All right. Good afternoon,
11 everyone.

12 This is Jordan Hoellman, Project Manager
13 in the Advanced Reactor Policy Branch.

14 I'm going to cover major industry feedback
15 received on Part 53 so far and guidance initiatives,
16 and then, sort of how they fall in the process to try
17 to add some more clarity around where we're going with
18 certain guidance documents.

19 So, this slide is similar to one that we
20 presented to the ACRS in May of this year. It details
21 some of the comments we received from industry, some
22 of which overlaps with the feedback we received from
23 the ACRS. And it mostly covers topics where we've
24 made an active change and tried to address the
25 feedback. So, we talked a little bit about these

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1 throughout the presentations the past two days, but
2 I'll try to cover it quickly here.

3 So, we got some feedback that there are
4 programs that are duplicative of each other and
5 sometimes overlapping. What we've done is we've
6 provided some additional flexibility for licensees or
7 applicants to organize and combine programs, as
8 appropriate to avoid duplication.

9 With manufacturing licenses, from talking
10 to some potential applicants, we recognize the
11 potential for using a manufacturer's license to
12 fabricate a nuclear reactor and the potential for fuel
13 loading in the factory. So, we've enabled that in
14 both Frameworks.

15 We've already talked about the two-tier
16 safety criteria that was causing confusion amongst a
17 lot of stakeholders. So, we've eliminated that, and
18 we discussed that before.

19 For quality assurance requirements, each
20 Framework has their own Subpart that covers QA, and
21 we've consolidated them in their respective Subpart in
22 each Framework and aligned them with Appendix B to
23 Part 50.

24 Industry stressed a number of times that
25 consistency in the QA requirements was essential for

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1 suppliers that already comply with the requirements of
2 Appendix B. So, we wanted to acknowledge that and
3 ensure that consistency continues Part 50, Part 52,
4 and Part 53.

5 Another things just with codes and
6 standards in general is we've enabled some flexibility
7 in using codes and standards. We defined consensus
8 codes and standards in Subpart A and sort of allow
9 for, you know, require the use of generally-accepted
10 acceptance codes and standards, but don't specify them
11 as is done in Part 50.

12 For normal operations, towards the
13 beginning of our development of Part 53, some of the
14 requirements for normal operations were sort of
15 intertwined with the requirements for licensing basis
16 events. So, we do couple them to provide some
17 clarity.

18 And then, we've already discussed the
19 safe, stable end state conditions which was one of
20 ACRS's recommendations and, also, a comment received
21 from industry. So, we've added that requirement and
22 made clarifications, as appropriate, in the preamble.

23 So, Billy, if there's no questions, let's
24 move to slide 167.

25 The first item here is the comment we've

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1 been receiving that Part 53 should only contain one
2 Framework that is methodology-neutral. What we've
3 done in Part 53 for the Draft Proposed Rulemaking
4 Package is created two distinct Frameworks within Part
5 53 that we think provide clarity and predictability
6 for applicants using a variety of approaches.

7 We've developed the Draft Guide 1413,
8 which, hopefully, provides potential applicants some
9 additional guidance on choosing which Framework to
10 pursue and, also, developed the AERI approach and the
11 accompanying guidance for that methodology.

12 Some external stakeholders questioned
13 ALARA in the regulations and as a design requirement.
14 The staff has included Part 20 references in Part 53.
15 We tried to recognize that we're looking for a
16 combination of design features and programmatic
17 controls to fulfill ALARA requirements.

18 And also, as the Advanced Reactor Content
19 Application Project continues, we've tried to provide
20 guidance and ISGs associated with that. That makes
21 that more clear and sort of gets -- well, it hopefully
22 addresses some of industry's concerns about our
23 overburdening them in the review, I guess.

24 For special treatment, this is what we
25 were just discussing some moments ago. So, I'm not

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1 sure I need to cover that more.

2 Facility Safety Program, this is a new
3 program with no equivalent requirement under the
4 existing regulations. Industry had commented that
5 this is an increased burden and unnecessary.

6 The staff views the Facility Safety
7 Program as a potential operational benefit. It allows
8 the continued use of PRA for evaluating changes,
9 managing risk, and improving the relationship between
10 NRC's licensing and reactor oversight programs.

11 Because we've gotten many comments on the
12 Facility Safety Program, we did provide questions in
13 The Federal Register Notice, and specifically, request
14 for comments, to see what additional insights we can
15 get during the public comment period.

16 And then, lastly, more guidance is needed
17 to clarify the regulations.

18 So, the staff agrees and we've been trying
19 to align with industry on future guidance needs to
20 ensure we know what different industry groups are
21 pursuing and may request NRC endorsement of. And we
22 continue to do that in our periodic advanced reactor
23 stakeholder meetings.

24 For example, we have prioritized the
25 Technology-inclusive Content Application Project and

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1 Southern Nuclear-led effort for technology-inclusive,
2 risk-informed, change evaluation process, which are
3 the follow-on phases to the Licensing Modernization
4 Project methodology.

5 We've also gotten comments around chemical
6 hazards. And so, that's an area where we think we
7 need additional guidance. And as we discussed
8 yesterday, areas surrounding manufacturing and
9 manufacturing licenses is an area where we think
10 additional guidance would be beneficial.

11 CHAIR PETTI: So, Jordan, just a question
12 back on the Facility Safety Program. You say it
13 allows continued use of the PRA, et cetera, et cetera.
14 You could do that today without the Facility Safety
15 Program, is that true?

16 MR. HOELLMAN: It is true. I think what
17 we thought, in at least Framework A, because the PRA
18 provides such a leading role in the licensing, and
19 with the required upgrades to the PRA, we thought, you
20 know, potentially, as the number of reactors
21 potentially can increase from the hundred maybe we
22 have now to potentially many more than that of these
23 advanced reactor designs, we thought that allowing an
24 applicant to implement this program, instead of having
25 the NRC have to take generic actions and assess things

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1 generically across the operating fleet, it would be
2 potentially a more efficient way to address risks as
3 things are identified.

4 And we do have efforts underway to sort of
5 modernize our construction oversight and inspection
6 programs. And so, that's one of the areas I think
7 we're thinking about, as we're soliciting specific
8 Requests for Comments on the concept.

9 CHAIR PETTI: Yes. When you say that, I
10 remember Bill Reckley telling us this sometime in the
11 past. To me, that's probably the stronger rationale
12 for it than what's in the slide. At least the slide
13 doesn't speak to me like what you just said. That's
14 all.

15 Thanks.

16 MR. HOELLMAN: No, I'm glad I could
17 clarify that for you.

18 So, if there's no more questions, I guess
19 we'll move to the next slide, 168.

20 So, this is industry feedback we received
21 on Framework B, or more recently this summer after
22 Framework B was released. Some of this is not only
23 applicable to Framework B, but to the entirety of Part
24 53.

25 So, we got some comments that chemical

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1 hazard requirements are unclear. We've tried to
2 amplify this in the preamble. And chemical hazards in
3 question would include substances commingled with the
4 licensed material or those produced by a reaction with
5 licensed material consistent with similar requirements
6 in Part 70.

7 So, we think the Standard Review Plan for
8 fuel cycle facility license applications in NUREG-1520
9 provides a good basis for how we would anticipate
10 addressing this. And like I mentioned on the previous
11 slide, when we talk about additional guidance, it is
12 an area that we're thinking we'll need to develop in
13 the future.

14 We got some comments that the rule
15 language is not technology-inclusive in some areas.
16 And so, you know, as one of the main objectives of the
17 Part 53 rulemaking, we appreciated that comment and
18 took actions in certain places to revise sections to
19 make it technology-inclusive. And that one is more
20 specific to Framework B, where our starting point was
21 the existing requirements in Part 50. So, there were
22 some places where I guess we missed some of the light-
23 water-reactor-specific elements.

24 We got comments that PRA development --
25 oops, Dennis, did you have something?

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1 MR. BLEY: No, sorry, I left my mic on by
2 accident.

3 MR. HOELLMAN: Oh, okay, no worries.

4 So, on the third line there, we got
5 comments that PRA development at the construction
6 permit stage is not reasonable. Here, we intended to
7 align with the Parts 50-52 rulemaking. We do
8 recognize that -- and industry reiterated at our
9 periodic advanced reactor stakeholder meeting last
10 week that -- this is a major industry comment for both
11 the Parts 50-52 rulemaking and Part 53.

12 So, we're trying to maintain consistency
13 with the 50-52 rulemaking and other Commission
14 policies. And, you know, depending on what the
15 Commission decides on 50-52 and Part 53, we'll
16 continue to follow Commission direction there.

17 I would note that we are developing
18 guidance. It's going to be called -- or it's related
19 to the non-light water reactor PRA standard, and we
20 are developing guidance that sort of walks through the
21 requirements of the standard and sort of tries to
22 clarify when certain requirements of the standard are
23 applicable at different stages of the licensing
24 process. So, it would provide at least a staff
25 position and be subject to public comment, like all of

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1 our documents, but add a little bit of clarity on what
2 we think is expected and can be done at a CP stage
3 versus an OL stage, and all the other licensing
4 processes as well.

5 But that, just to get it on your guys'
6 radar, I guess, because, like all of our guidance
7 documents, we need to coordinate with you and see if
8 that's something that you're interested in reviewing.

9 And then, we got comments on the proposed
10 entry conditions for AERI, that they are too
11 conservative or too restrictive. As was mentioned
12 yesterday, the main point here is that AERI entry
13 conditions are intended to distinguish between plants
14 with a relatively straightforward design versus plants
15 with more complicated designs. So --

16 CHAIR PETTI: So, Jordan, just a question
17 on that. That industry feedback was before the new
18 language in Framework B, where there's now this
19 discussion of passive and inherent features that we
20 have to be able to deal with? When they said that,
21 were they just worried about the 1 rem, that being too
22 conservative? Had they seen the other language?

23 MR. HOELLMAN: They have seen the other
24 language, and I'll let Bill or Marty correct me, if
25 I'm wrong. But I still think that we're getting this

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1 feedback. So, I don't know. Marty or Bill, do you
2 want --

3 CHAIR PETTI: No, that's all right. I
4 just wanted to understand because, you know,
5 everything's on a timeline here.

6 MR. HOELLMAN: Yes, right, right.

7 CHAIR PETTI: Yes.

8 MR. HOELLMAN: But this is the slide
9 consistent with what we've presented at the advanced
10 reactor stakeholder meeting last week, which occurred
11 after the release of the Draft Proposed Rulemaking
12 Package.

13 CHAIR PETTI: Thanks.

14 MR. HOELLMAN: Mm-hmm. Any other questions
15 here? Okay. Let's move on to 169, which is sort of
16 the guidance landscape that we're sort of dealing with
17 in Part 53 space.

18 So, for everyone's reference, if you
19 haven't got a chance to look at it yet, applicability
20 of guidance can be found in Enclosure 1B to the
21 Rulemaking Package.

22 Under existing guidance -- I'm not going
23 to spend a whole lot of time going back and discussing
24 the non-light water reactor vision and strategy
25 document and the implementation and action plans that

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1 were developed in the 2016 and 2017 time period.

2 But, if you recall, at the time we were
3 focusing on licensing non-light water reactors under
4 the existing regulations. So, I think we discussed a
5 little bit yesterday that's why, you know, some of the
6 documents, the applicability is limited to non-light
7 water reactors and things like that.

8 Per recommendations -- oh, Dennis?

9 MR. BLEY: Yes, the ones that are labeled
10 "near-term" --

11 MR. HOELLMAN: Mm-hmm.

12 MR. BLEY: -- how near-term do you think
13 those are? Or is it spread all over the map?

14 MR. HOELLMAN: It's spread all over the
15 map, but relatively near-term. Like TICAP/ARCAP, I
16 think that the latest expectation for that to be
17 issued for public comment is either this month or
18 early next month.

19 For the non-light water reactor PRA
20 standard, we have the trial Reg Guide available. I
21 mentioned the non-light water reactor PRA standard
22 applicability ISG. That is under development and
23 undergoing some preliminary management reviews now.

24 For the endorsement of ASME Section III,
25 Division 5, we presented to ACRS on that last summer.

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1 That's working through the final stages to be issued
2 as a final Reg Guide 1.87, Revision 2. That should
3 happen either this month or next month.

4 The endorsement of ASME Section XI,
5 Division 2, which Ron was talking about yesterday,
6 we're just sort of in a waiting period with OMB for
7 that one, where they've got to clear the 50.55(a)
8 rulemaking because that one sort of touches on
9 50.55(a) and the revision to that rule.

10 The molten salt reactor fuel
11 qualification, that one I think ACRS reviewed the
12 draft of that NUREG last fall, I want to say, similar
13 to the NUREG-2246. I think it was in the same time
14 period. So, that one is scheduled for issuance the
15 end of this year.

16 Seismic design and seismic isolators,
17 we've just issued as a draft white paper to engage
18 stakeholders last week.

19 MR. BLEY: That's interesting. We had
20 drafts a while back. So, that's gone out to
21 stakeholders. Are you bringing that one to us anytime
22 soon? We had some interest in that.

23 MR. HOELLMAN: We need to get on your
24 calendar, yes.

25 (Laughter.)

1 MR. BLEY: Okay. Because there's quite a
2 bit of interest in that one, I think.

3 MR. HOELLMAN: Mm-hmm, yes.

4 For emergency planning, we provided, I
5 guess it's the final rule, to the Commission at the
6 beginning of the calendar year.

7 The change evaluation is sort of phase 3
8 to the Licensing Modernization Project. That one, NEI
9 -- or I mean Southern provided us a draft. I think
10 they plan to request NRC endorsement next calendar
11 year, but that will be similar to the LMP and TICAP
12 effort, where they're provide to us as an NEI document
13 for endorsement and an NRC-issued Reg Guide.

14 QA alternatives is something NEI has taken
15 the lead on to try to -- and this is sort of generic
16 to Appendix B -- but to look at the ISO standards and
17 sort of help -- well, provide guidance on how the ISO
18 standards can be used to meet Appendix B.

19 MR. BLEY: Have you been -- that's one I
20 haven't heard a whole lot about; I've heard a little
21 about. Are you going for --

22 MR. HOELLMAN: Yes, I haven't been
23 direct -- oh, I'm sorry, Dennis, I'm talking over you.
24 Go ahead.

25 MR. BLEY: No, go ahead. I said I haven't

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1 heard much of anything on that one, except the concept
2 floated out there.

3 MR. HOELLMAN: Right. I mean, so this was
4 an interesting comment that we, I think, have been
5 almost receiving from the beginning of the Part 53
6 rulemaking effort. I haven't been directly involved
7 in it, either. So, I'm not sure I'm the best to
8 answer any questions regarding it.

9 But I would assume that whenever they get
10 to a place where it's ready to be submitted to us for
11 potential endorsement, we'd get there. But it's more
12 generic to touch Part 50, Appendix B, you know, along
13 with --

14 MR. BLEY: It's going to replace that
15 or --

16 MR. HOELLMAN: I'm sorry, what's that?

17 MR. BLEY: This work might lead to
18 something instead of Appendix B, an alternative? It
19 is an alternative, then, to Appendix B?

20 MR. HOELLMAN: I don't know if it, I don't
21 know if it's an alternative.

22 Bill, do you know?

23 MR. RECKLEY: Dennis, it would be an
24 alternative to NQA-1, not to Appendix B.

25 MR. BLEY: Oh, okay.

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1 And I think I'm going to ask about this
2 schedule. The third one from the top, I didn't
3 interrupt you there; I should have. The non-LWR PRA
4 standard applicability ISG, that's separate from some
5 draft guidance you have out on that? I mean, we saw
6 draft guidance, right?

7 MR. HOELLMAN: You saw the Reg Guide
8 endorsing the standard. What this ISG would do -- and
9 I'm not an expert, but from what I understand and what
10 I've seen -- the ISG would walk through the
11 requirements of the PRA standard and sort of
12 differentiate which requirements of the standard would
13 apply at different stages of the licensing process or
14 apply at the different -- like, for example, a
15 construction permit applicant would be required, or we
16 think that they should meet these requirements of the
17 standard at the construction permit stage versus all
18 of them at the operating license stage.

19 MR. BLEY: Okay. And the idea of getting
20 it out as an ISG, instead of a Reg Guide, is to get it
21 out quickly, so people will be able to look at it?
22 And eventually, it will turn into a Reg Guide?

23 MR. HOELLMAN: Yes, it's --

24 MR. BLEY: NUREG?

25 MR. HOELLMAN: -- following a similar

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1 process to what we've done with the ARCAP ISGs. I
2 think, you know, there's some thought or expectation
3 that at some point we would compile all this stuff
4 into something like a Reg Guide or a NUREG, like the
5 Standard Review Plan, something like that.

6 It's just that overarching vehicle hasn't
7 been selected yet. So, as we're getting some of these
8 things out in the near-term, we're issuing them as
9 ISGs, and then, the idea would be to compile them all
10 into something like the Standard Review Plan.

11 MR. BLEY: Okay. Two quick points.

12 It looks like the ones that will really,
13 could really affect Part 53 are pretty well along, and
14 the others maybe have a longer near-term development.
15 And I think you had a couple left at the bottom before
16 I cut in on you. Please go ahead.

17 MR. HOELLMAN: Yes, thanks, Dennis.

18 So, the Facility Training Program is
19 another ISG. This one addresses -- I guess training
20 programs are SAT-based training programs and intended
21 to support early movers. So, from what I understand,
22 we're expecting a Topical Report from X-energy in the
23 near-term on not following INPO accreditation, and
24 whatnot.

25 If there's additional questions, you know

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1 we have our Human Factors Operator Licensing folks
2 online.

3 But that one should be -- that one is
4 around the corner, too. I think we're planning on
5 discussing that at the next stakeholder meeting in
6 December.

7 And then, the material compatibility ISG
8 sort of covers some of the environmental conditions
9 and different radiological concerns that ASME Section
10 III, Division 5, just doesn't touch on generically.
11 So, it's more specific to, or it's more design-
12 specific. So, it goes into, like for a sodium fast
13 reactor, consider these interactions, these
14 environmental effects, that kind of stuff.

15 MEMBER BALLINGER: This is Ron.

16 What's the status of that?

17 MR. HOELLMAN: So, we plan to issue it as
18 a preliminary Draft ISG in the near-term. Here, we're
19 trying to get the final Reg Guide for the endorsement
20 of ASME Section III, Division 5, issued before we
21 issue that. But that's one where we want to get on
22 ACRS's radar pretty soon, potentially, for a
23 discussion early next year or next calendar year.

24 MEMBER BALLINGER: Yes, okay, but get with
25 Chris Brown and get it on the schedule, because things

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1 are filling up after -- after January is fine, I
2 think, but --

3 MR. HOELLMAN: Okay.

4 MEMBER HALNON: Jordan, will you be adding
5 Reg Guide 1.233 to the Part 53 box?

6 MR. HOELLMAN: Yes. So, this is sort of
7 the complicated -- the situation we're in, I guess, at
8 this point. The things in the existing guidance box,
9 the darker blue color on the left, those are all
10 guidance documents that have been issued. They're
11 being used and implemented for applicants under Parts
12 50 and 52.

13 What we had planned to do with those is to
14 make an update after the proposed rule is issued. It
15 would then be issued for public comment. That would
16 update the applicability for Part 53. We would bring
17 it to ACRS, if you guys are interested in looking at
18 it, and then, we would issue it for public comment.
19 It would happen before the final rule is issued, so
20 that the guidance document could be issued final with
21 the final rule, if that makes sense.

22 Does that help, Greg?

23 MEMBER HALNON: Yes. So, in other words,
24 don't look at the existing boxes being static? It's
25 going to work with the rule.

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1 MR. HOELLMAN: Yes, and the same thing
2 applies to the near-term box as well.

3 As we work through the near-term guidance,
4 one of the issues we found ourselves in is if we put
5 applicability for Part 53 in these guidance documents,
6 we cannot issue them as final guidance documents
7 until the Part 53 rule goes final.

8 And we need these guidance documents to
9 support our reviews under Parts 50 and 52 while Part
10 53 makes it through the process.

11 MEMBER HALNON: Good luck on keeping track
12 of it all.

13 MEMBER BALLINGER: This is Ron. Going
14 back to Section 3, Division 5, when we review that,
15 Alloy 617 was not included and I pushed people on that
16 because there is a code case for that now.

17 But I'm curious as to, as we go along, the
18 number of materials that will be needed to be used at
19 high temperature will increase. And these are not
20 identified in Division 5 right now but they would be
21 as soon as they get approved for use in Section 2.

22 So, how does that work?

23 MR. HOELLMAN: Ron, what we did, and just
24 so you're aware, we did take on the review of Alloy
25 617. We issued Reg Guide 1.87 Revision 2 as a

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1 supplement earlier this year that incorporated the
2 Alloy 617 code cases.

3 So, when that Reg Guide gets issued
4 finally, it will include those code cases and I would
5 envision we do something similar as new materials are
6 identified.

7 So, what we did with Alloy 617, we worked
8 with a contractor, we reviewed the code cases, and
9 then we incorporated the code cases into the Reg Guide
10 issued for public comment, addressed public comments,
11 and now we're getting ready to issue it finally.

12 So, it would I guess just continue to
13 revise Reg Guide 187.

14 MEMBER BALLINGER: I'm ignorant, I have to
15 go get that Revision 2. Okay, thanks.

16 MR. HOELLMAN: No problem.

17 I don't know if we alerted you
18 specifically to that but I do remember in our
19 presentation to ACRS last summer that was a comment I
20 remember you making, and I remember we were in the
21 process of pursuing the technical review of those code
22 cases in parallel with the NUREG and Reg Guide issued.

23 MEMBER BALLINGER: Thanks, I've got to be
24 a little bit more attentive.

25 MR. HOELLMAN: No problem.

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1 Let's see, I talked about the near-term
2 stuff, I talked about the existing guidance. I guess
3 one thing to note is there are hundreds of guidance
4 documents that exist for the current fleet of
5 operating reactors.

6 While some of the guidance is specific to
7 light water reactor technology, other guidance is
8 technology-inclusive in nature and we think should be
9 considered as applicants come in under the existing
10 regulations.

11 For Part 53 guidance, we talked about the
12 top ones today.

13 In addition to that, we're developing
14 draft guides to support the rule text associated with
15 Part 26 for the fitness for duty programs and fatigue
16 management and for Part 73 on access authorization
17 cybersecurity and security programs.

18 And then I alluded to with future
19 guidance, we've identified some areas where we think
20 guidance would be useful and needed. We've been
21 aligning with industry to make sure we're not missing
22 anything and try to make sure we're not duplicating
23 efforts in developing guidance.

24 I think that covers the slide unless there
25 are specific questions?

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1 MEMBER BALLINGER: This is Ron again. Now
2 I'm going to jump on your case. I just went on the
3 website and Revision 2 is not there. I was on the
4 public website so maybe it's somewhere else but right
5 now the only thing that's there is Revision 1.

6 MR. HOELLMAN: Revision 1 to the draft reg
7 guide?

8 MEMBER BALLINGER: Okay, to the Reg Guide
9 itself. I've got to look at draft guides.

10 MR. HOELLMAN: Draft Guide 1380 and it
11 probably should be Revision 1 because Revision 0 would
12 have went out without Alloy 617.

13 MEMBER BALLINGER: Draft Guide 1380, I'll
14 continue my quest.

15 MR. HOELLMAN: I really hope you find it.

16 MEMBER BALLINGER: I'll find it eventually
17 or else somebody smarter than me will.

18 MR. HOELLMAN: If not I can send it to
19 you.

20 MEMBER BALLINGER: No, I'll get it.

21 MR. HOELLMAN: Are there any other
22 questions on guidance? I know I've been looking
23 through some of the old letters from ACRS. I remember
24 seeing something that talked about the associated
25 design-specific guidance would be difficult to track.

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1 And so this is sort of our effort of
2 hoping to keep everyone on track.

3 MR. BLEY: Thank you.

4 MEMBER BROWN: Dennis, are you done?

5 MEMBER BALLINGER: I stand corrected, I
6 found it.

7 MR. HOELLMAN: Great.

8 MEMBER BROWN: This is Charlie Brown, I
9 guess I just realized something.

10 As we've gone through there I was going
11 through the two frameworks again. We've talked about
12 how they have to develop principal or functional
13 design criteria, however those are defined.

14 And I'm kind of parochial, as most of you
15 probably know by now, there's not a single reference
16 in either one of these documents that provides any
17 design criteria or standards or references any
18 standards like the old IAAA standard 603 1991 for the
19 fundamental principles of designing INC equipment for
20 digital INC or any other type for these things.

21 So, it's all up in the air, the only
22 references to those documents are relative to quality
23 and quality control and qualification standards for
24 those two sections in 279 and 603-1991.

25 So, I guess it's the intent of you all to

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1 have absolutely no guidance at all, you're just going
2 to fight it out when they come in with something made
3 out of peanut butter and toothpaste?

4 I'm being sarcastic right now a little
5 bit.

6 MR. HOELLMAN: I understand, Charlie.

7 MEMBER BROWN: I understand but there's
8 nothing in there.

9 MR. HOELLMAN: As you recall probably, we
10 came to ACRS maybe two years ago to talk about the
11 design review guide for non-light water reactor
12 technologies.

13 Maybe this is a good time to move to the
14 next slide because the TICAP and ARCAP guidance that
15 really point to this integrated webbing of the various
16 guidance we've developed over the years, and I guess
17 more specifically since the issuance of division
18 strategy and implementation action plans.

19 Within the ARCAP ISGs, there is an ARCAP
20 roadmap ISG that includes references to various
21 guidance documents that are out there and that design
22 review guide is specifically referenced in the INC
23 portion of the application.

24 MEMBER BROWN: In the INC part of the
25 application, what do you mean, their application, the

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1 Applicant's application?

2 MR. HOELLMAN: Yes.

3 MEMBER BROWN: There's nothing in the
4 rules anymore, is that correct? Two years ago, I have
5 to admit, it's been far better coordinated based on
6 what we're seeing now and the presentation as you've
7 got it today, yesterday and today.

8 It was somewhat more disjointed two years
9 ago. You all were developing it, we were reviewing it
10 on the fly is what I would say, which I'm not
11 complaining about it, that's where we were at the
12 time.

13 And so I totally forgot that now we're
14 relying on these other documents somehow. I didn't go
15 try to key word all the TICAP and ARCAP, are they
16 referenced throughout this? I didn't do that again.

17 MR. HOELLMAN: They're not referenced
18 specifically --

19 MEMBER BROWN: In the rules.

20 MR. HOELLMAN: They're referenced in the
21 applicability of guidance as eventually TICAP and
22 ARCAP will provide key guidance for Part 53. This
23 kind of goes back to what I was trying to explain and
24 maybe I wasn't doing a very good job.

25 MEMBER BROWN: But it's not in the rule.

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1 Is that in the rule, in the preamble or something like
2 that? I missed it.

3 MR. HOELLMAN: It's in Enclosure 1B, is
4 the availability of guidance discussion.

5 It just touches on TICAP and ARCAP for now
6 but we do recognize that the content of applications
7 is a key guidance document under the existing
8 regulations and we expect it to continue to be an
9 important guidance document for the develop and review
10 of applications.

11 Where INC falls in under this chart here
12 was --

13 MEMBER BROWN: 1B, are you talking about
14 1B right now?

15 MR. HOELLMAN: I'm talking about the
16 slide. Where INC is referenced would be under the
17 safety functions, design criteria, and SSE safety
18 classification, and under the safety-related SSE
19 criteria.

20 MEMBER BROWN: Which part of this block?
21 Is it the upper left-hand?

22 MR. HOELLMAN: Green box, Items 5 and 6.
23 Those are TICAP chapters that have been issued in NEI
24 2107 Revision 1 I believe. And like I said, we're in
25 the process of working through the internal

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1 concurrences for the TICAP draft guide and ARCAP ISGs.

2 And they should be issued for public
3 comment in the next couple weeks here. Hopefully,
4 we'll get a chance to brief ACRS on the contents of
5 those documents before we issue them final next year.

6 But that's really where the roadmap maybe
7 exists on how everything works.

8 And so TICAP is really the next phase of
9 the licensing modernization project and so it assumes
10 that the designer is implementing NEI 1804 and Reg
11 Guide 1.233, and structures the safety analysis report
12 a little differently to more align with that
13 methodology.

14 MEMBER BROWN: But ARCAP and TICAP are not
15 referenced at all in the rules, Framework A or B, it's
16 only in the side documents.

17 MR. HOELLMAN: That's correct.

18 MEMBER BROWN: So, like I say, there's
19 nothing aiding people that they have to meet some
20 minimal design fundamentals for critical stuff, safety
21 systems.

22 It's all up in the air, that's the way I
23 read this. It's guidance and we can argue about it
24 later as opposed to having them come in with a
25 structured approach.

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1 MR. HOELLMAN: There are requirements for
2 safety-related and non-safety-related but safety-
3 significant SSCs to be designed using generally
4 accepted codes and standards, which maybe touches on
5 some of the IEEE items you were mentioning, I don't
6 know if we're still specifically talking about IEEE
7 and INC equipment.

8 MEMBER BROWN: Right now for Part 50 and
9 52 the guidance is very clear relative to the
10 fundamentals. They were written back in the analog
11 days before digital stuff came up but those principles
12 apply regardless.

13 I just hate to be parochial but it seems
14 like I wasn't --

15 MR. BLEY: My memory is that those things
16 are in the SRP and in some of the I&C ISGs.

17 MEMBER BROWN: Yes, but they're not part
18 of the rule anymore.

19 MR. BLEY: They weren't part of the rule
20 in the SRP and ISGs. They're not there currently.

21 MEMBER BROWN: No, IEEE-603 is in Part 50,
22 52 at 55AH, people's feet are held to the fire because
23 it's in the rule and those principles are pretty much
24 what we've talked about anytime we've reviewed either
25 new systems for replacement or in the design

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1 applications for new plans.

2 So, the only ones that have really been
3 the one of issue is controlled access, which was
4 largely physical access back in the 1990s. You didn't
5 have to deal with electronic access from external
6 sources.

7 So, we've fundamentally eliminated them
8 from the rule now. ISG and the other ones are not
9 part of the rule, neither are the SRPs.

10 MR. BLEY: Yes, I was saying they never
11 have been --

12 (Simultaneous speaking.)

13 MEMBER BROWN: Dennis, the principles have
14 been in IEEE 603-1991, they are dictated by 55AH.
15 I've read it 400 times over the last 14 years.
16 Obviously, my concern is going to be my concern.

17 I think I mentioned this a couple years
18 ago about how those were going to be done and I missed
19 whatever followed on from that.

20 MR. BLEY: I understand your line or
21 reasoning but if an applicant comes in and doesn't use
22 the guidance, the Staff always has to come. We think
23 it's just going to be a check the box, the Staff can
24 say that's not acceptable, right?

25 MEMBER BROWN: Those are not in the

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1 guidance.

2 MR. BLEY: They will be in the guidance in
3 TICAP and ARCAP and then in the advanced reactor
4 design criteria that information is there.

5 The Applicant comes in and decides they
6 want to use peanut butter and toothpaste, the NRC
7 Staff can say no. I think we sometimes forget about
8 the back part of the overall process, where they can
9 say no, that doesn't meet the requirement.

10 (Simultaneous speaking.)

11 MR. BLEY: Any time an Applicant would not
12 use the guidance they have a pretty tall mountain to
13 climb to get through the scale for two.

14 CHAIR PETTI: I just had a process
15 question, Jordan, we're going to get TICAP and ARCAP
16 at the same time, correct?

17 MR. HOELLMAN: Yes, you mean both TICAP
18 and ARCAP and Part 53, right?

19 CHAIR PETTI: I think we need to review
20 those together, that's all.

21 MR. HOELLMAN: That would be better, that
22 would make sense. And like I said, we're expecting to
23 issue it for public comment in the near-term here. It
24 walks or sort of discusses how to develop principal
25 design criteria or use that reg guide as well.

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1 So, maybe once you see it, Charlie, it
2 will ease some of your concerns a little bit
3 hopefully. Well, the Staff in many circumstances has
4 noted that's not covered, therefore, we can't really
5 say anything about that.

6 That happened 14, 13 years ago. We've
7 come past that. So, the argument that the staff can
8 say no anytime they want to, it really turns into a
9 real log jam legally.

10 So, that's the foundation of having those
11 principles in the rule itself, not the details but
12 just the fundamentals, has been pretty instrumental in
13 being able to ensure the systems that have come in the
14 software-based, digital, computer-based world have
15 pretty much complied with those and we've been able to
16 accept them.

17 But without the rule I'm not so sure that
18 would have worked out so well. I got the picture.

19 MR. HOELLMAN: I don't know if there's a
20 whole lot of more to cover here. I'll just recap
21 what's in that Enclosure 1B. So, we're engaged with
22 the Department of Energy and Industry to develop this
23 application of the content of application guidance for
24 advanced reactors.

25 And like I said, it's been initially

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1 developed as the Board applications under Parts 50 and
2 52.

3 The guidance documents TICAP and ARCAP
4 will support developers in developing advanced reactor
5 applications and facilitate the NRC Staff's review of
6 applications for the variety of different application
7 type, CP, OLs, COLs, manufacturing licenses, standard
8 design approvals and design certifications.

9 The guidance documents provide an overview
10 of information that should be included in an
11 application, a review roadmap for NRC Staff with the
12 principle purpose of ensuring consistency, quality,
13 and uniformity of NRC Staff reviews and a well-defined
14 base from which the NRC Staff can evaluate proposed
15 changes to the scope and requirements of reviews.

16 While specific sections of the information
17 are primarily aligned with the licensing and
18 modernization project methodology, the concept and
19 general information may be used to inform the review
20 of applications to using other traditional licensing
21 approaches and methodologies.

22 We think this is a first good shot at
23 trying to take what industry has provided, endorse it,
24 and practice it, learn from it, adjust it as necessary
25 to support the final Part 53 rule.

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1 Any other questions on guidance before we
2 move to the last two slides? Dennis, do you have a
3 question? It was a little fuzzy on my end at least.

4 MEMBER BROWN: Dennis, you're breaking up.

5 MR. BLEY: I'll be quiet.

6 CHAIR PETTI: Continue Jordan.

7 MR. HOELLMAN: I'm sorry. Dennis, if you
8 get back on and are able to clear up the fuzziness,
9 feel free to ask.

10 This is just the Section 7 of the FRN, a
11 number of issues have been raised over the past two-
12 plus years as we've been discussing that preliminary
13 proposed rule language with ACRS and stakeholders.

14 ACRS has acknowledged that the extensive
15 real-time interaction with stakeholders and ACRS
16 presented the Staff with a very difficult challenge
17 and commended the Staff's ability to graciously accept
18 comments from all sources and to seek resolution of
19 competing requests.

20 A number of these topics address specific
21 areas that we've discussed throughout the meeting
22 yesterday and today from the overall structure of the
23 rule and the two frameworks to the use of the QHOs,
24 the role ALARA plays within the rule, construction and
25 manufacturing requirements, and topics surrounding

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1 staffing generally, license reactor operator's
2 training and simulation facilities.

3 Some of the questions were specifically
4 developed to solicit additional feedback on areas
5 where industry continues to have concerns. Other
6 specific requests are related to specific Commission
7 direction such as the financial qualifications.

8 To touch on something Greg mentioned
9 yesterday, at the beginning of the rulemaking after
10 the Commission issued the SRM and in our response to
11 the SRM we did identify the 60-day public comment
12 period associated with the rulemaking as a key
13 uncertainty in meeting the Commission's directed
14 schedule at the time of October 2024 for the final
15 rule.

16 The staff continues to see the comment
17 period as an uncertainty and they intentionally
18 engaged in stakeholder engagement to mitigate the
19 uncertainty.

20 Including these specific requests for
21 comment now allows external stakeholders additional
22 time to prepare comments and continue to engage the
23 Staff in future periodic advanced reactor stakeholder
24 meetings.

25 So, between this and the next slide is a

1 list of topics that we've specifically asked for
2 comments on in the draft proposed rulemaking package.

3 Like I said, a number of them, we've
4 already discussed over the past two days but these are
5 the last two slides we have for our presentation
6 today.

7 MR. BLEY: Is my voice clear now?

8 MR. HOELLMAN: Sounds good to me.

9 MR. BLEY: I wanted to sneak in and ask
10 you a couple of us were discussing that it would be
11 helpful, and maybe it's in the preamble and I haven't
12 read past it, to try to explain how you decide what
13 goes into guidance and what stays in the rule.

14 How comfortable are you with your
15 consistency in those decisions you've made along the
16 way?

17 MR. HOELLMAN: I don't think it's
18 specifically called out in the preamble.

19 MR. BLEY: I didn't think so. If there
20 was a way to do it it would be wonderful, but go
21 ahead.

22 MR. HOELLMAN: I think generally what
23 we've tried to do with the rule is to keep things
24 technology-inclusive to the extent possible. Where
25 items get to be design-specific, that's I think where

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1 we've tried to draw the line and thought guidance is
2 the best place to address it.

3 As we talked about, the PRA in a leading
4 role methodology versus starting with PDC or GDC
5 causes some difficulty at least with us trying to put
6 that into guidance and make one framework that we
7 thought would provide the clarity and predictability
8 that we needed in the rule.

9 But that's a good question, I don't know.
10 I'll let anyone else on the Staff side have an
11 opportunity to respond if they want.

12 CHAIR PETTI: Jordan, just to amplify a
13 little bit on Dennis's thoughts, that's one reason to
14 look through. The other one is the what versus how
15 prism, that hopefully Part 53 is mostly about the what
16 and the how is left for guidance.

17 Now, some of the what is sometimes
18 relegated to guidance for flexibility, that I
19 understand. But it's making sure none of the how
20 creeps into the requirements.

21 MR. HOELLMAN: Like I said, I don't know
22 if I have the best answer for you but I'm happy to
23 have someone else chime in if they want.

24 MR. RECKLEY: Jordan, this is Bill. Dave
25 has a great point, we try to do that as much as

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1 possible.

2 There are cases, and it's a mix in a
3 package this big, that sometimes what we did is pull
4 over something that if you want to say the how
5 differentiates when you're in a prescriptive mode, we
6 pulled over some of that.

7 But bigger picture, we tried to do what
8 you're saying and I think we've talked in the past.
9 To some degree we were forced to do it because the
10 technology inclusive nature of this, in many cases we
11 couldn't prescribe the how because it's going to
12 differ for different technologies.

13 MEMBER HALNON: This is Greg. Just to
14 give you a reference of one place that made us think
15 about this comment, it's 53.4370 A1 VI. In that there
16 are words like: in performing this assessment you'll
17 do this, this, and this.

18 Item 2 talks about facility description
19 and it says you should give special attention to
20 certain attributes. There's another place under ALARA
21 that says it seems like that should be or could be in
22 guidance.

23 If you just want to get a context of what
24 we were thinking of, that's where we're at and I don't
25 think we have any specific recommendations, just more

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1 of a curious how we're being consistent.

2 MEMBER BROWN: Bill, back on that other
3 subject again -- Greg, are you finished? I'm sorry.

4 MEMBER HALNON: Yes, Charlie, I was just
5 giving a reference of some context.

6 MEMBER BROWN: Bill, you were commenting
7 on not the how to. The reference to 603 1991 and the
8 principles, that is not a how-to, that is just a
9 high-level set of fundamental design criteria but they
10 don't tell you how to achieve independence,
11 redundancy, defense in-depth.

12 It doesn't tell you how, it just says
13 you've got to do those, you've got to look at them.

14 MR. RECKLEY: Right, not every standard is
15 prescriptive and Jordan mentioned on the standards,
16 and again this comes somewhat because of trying to
17 address a wide variety of designs, some of which we
18 don't even foresee right now probably, was that what
19 we put in to the regulation was, as Jordan mentioned,
20 under the design requirements they must use consensus
21 codes and standards where they're available.

22 We didn't list them specifically because
23 right now they don't exist in some cases. And so we
24 put in the broad requirement to follow consensus codes
25 and standards that's been approved by the NRC without

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1 incorporating them by reference, like we have for ASME
2 and IEEE in 5055A, as you mentioned.

3 We came part of the way to where you were
4 but not necessarily being as specific in referencing
5 a particular code like IEEE. So, that requirement is
6 in there in both frameworks.

7 MEMBER BROWN: The point I'm trying to
8 make is that particular standard, 603 1991, is not
9 specific to any technology. It's totally technology-
10 inclusive, you don't have to revise it to make it --

11 MR. RECKLEY: I understand.

12 MEMBER BROWN: And that's the beauty of
13 that one. I know the ASME stuff, they are very
14 specific in terms of a lot of things. Make a sample
15 this being and put a notch in it that's so deep and
16 blah-blah-blah, everything else.

17 That particular standard has really
18 withstood the test of time for an overall design.
19 It's what I did back in the Navy programs back when we
20 had --

21 (Simultaneous speaking.)

22 MR. RECKLEY: And as a couple people have
23 mentioned, we would expect people to continue to use
24 that to the degree it's applicable to them. We just
25 didn't list any codes and standards from any standards

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1 development organization in Part 53.

2 We said use them but we didn't list any of
3 them from ANS, IEEE, SAME, or even in the seismic area
4 that we were talking about, the ASC 43, we're trying
5 to make sure the rule can accommodate that but we
6 don't list it within the regulations.

7 MEMBER BROWN: I got it, not that I agree.

8 MR. RECKLEY: I understand.

9 CHAIR PETTI: Just a comment, Members.
10 This FRN-specific request for comments, I have picked
11 a couple that I felt enough to comment on.

12 If you feel like something should be
13 commented on in one of these items, I may have already
14 commented on the draft but come prepared at full
15 Committee if you want a couple sentences put in, if
16 there are any of these where you feel you want to make
17 a comment.

18 Because this is an area that is relatively
19 new in terms of what we've seen today.

20 MEMBER BROWN: Are you talking about the
21 enclosures, Dave, the two which had the content
22 availability of documents?

23 CHAIR PETTI: No. NRC is requesting
24 specific comments on these categories of the last two
25 slides. And if there's one that you feel -- there's a

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1 couple, in the draft letter I have I'm touching on a
2 couple of these.

3 But come prepared if there is something
4 that you feel strongly enough.

5 VB: Yes, I wanted to raise one of those
6 comments now, Dave, at least briefly and then we can
7 discuss in full Committee in more detail. I've been
8 thinking a lot today about this issue of the self-
9 mitigating or whatever designs.

10 And it seems like one potential pitfall
11 with that is if that is the basis for going with, say,
12 the general operator license instead of specific SRO
13 licenses, then finding even a highly unlikely or minor
14 departure from that where human action might be needed
15 admitted totally derail the licensing basis for that
16 facility.

17 And I'm thinking back when we learned as
18 we went that we needed to think about beyond design
19 basis accidents, we didn't go back and say, okay, all
20 plants are now unlicensed because the design basis was
21 not adequate, we had a mechanical to say, okay, yes,
22 you have these in your design basis but now you still
23 do have to think about these additional items that are
24 beyond design basis.

25 And I'm wondering whether it's worth

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1 reformulating that concept of self-mitigating to say
2 that if you are able to persuade the NRC when you
3 first come for licensing that, yes, you fall in that
4 category and hence should very much lower expectations
5 regarding operator qualifications or licensing, et
6 cetera, if departures are identified that do require
7 some operator action, if it's limited enough this
8 could be accommodated by minor additional requirements
9 without going to the full range of needing an SRO.

10 And again, I'm thinking about this from
11 the point of view of incentives, you don't want the
12 reactor owner-operator to have an incentive to hide
13 the information because they don't want to end up with
14 a requirement for SROs downstream because of it.

15 So, I'm wondering whether that category
16 needs some additional caveats and in some sense it
17 goes against regulatory certainly but we might be in
18 a situation where there's good reason why we may not
19 have regulatory certainty yet.

20 So, that's my comment and I can think
21 about it more, obviously, in the next two weeks.

22 CHAIR PETTI: I'm sure we're going to talk
23 about that coupled with AERI, we've talked about it
24 more than once so thank you. Well, Members, unless
25 there's more comments, we've been going at this now

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1 for --

2 MR. HOELLMAN: Dave, this is Jordan Holman
3 again. I just wanted to make sure all the Members are
4 clear that these specific requests for comments,
5 they're in Section 7 at the end of Enclosure 1A.

6 CHAIR PETTI: We've been going at this a
7 while. I think you're done, Jordan?

8 MR. HOELLMAN: I'm done, yes. I wasn't
9 sure from some of the Members' comments if they knew
10 specifically where to find them so I wanted to be
11 clear.

12 CHAIR PETTI: I'm thinking we need to take
13 a break before we move on to the industry and public
14 comment phase because I think we've finished
15 everything, right, from the Staff?

16 MR. HOELLMAN: That's right, Dave.

17 CHAIR PETTI: Why don't we take a break
18 until 45 minutes after the hour? We'll resume then,
19 thank you.

20 (Whereupon, the above-entitled matter went
21 off the record at 4:21 p.m. and resumed at 4:45 p.m.)

22 MS. LANE: Yes, can you guys hear me?

23 CHAIR PETTI: Yes.

24 MS. LANE: Okay, great. Thanks. So good
25 afternoon, everybody. Again, my name is Hilary Lane.

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1 I'm the Director of Fuel and Radiation Safety at the
2 Nuclear Energy Institute, NEI. Thank you for the
3 opportunity to provide a few comments today on the
4 recently released draft proposal for Part 53.

5 First, we wanted to acknowledge that to
6 reach this stage in the rulemaking process is a huge
7 milestone for both NRC staff, management alike, and
8 industry. And as can be seen from the volume of the
9 draft package and the volume of industry comments,
10 including the joint NEI USNIC letter that was sent on
11 August 31st just a few weeks ago, an enormous level of
12 effort has gone into the rulemaking from a wide range
13 of stakeholders.

14 We appreciate the staff's presentations at
15 the recent October 12th advance reactor stakeholder
16 meeting which discussed changes to the overall package
17 and the language. We're still evaluating these
18 changes in detail, to include the changes to fire
19 protection language in Framework B which the staff
20 explains was made to better align with framework A,
21 and the new Interim Staff Guidance, or ISG, on
22 operator licensing.

23 We note that the NRC staff is also looking
24 to reconcile changes in the Part 50.52 rulemaking with
25 the Part 53 rulemaking once the Part 50.52 rulemaking

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1 is issued as a final rule. We support that effort and
2 recognize that that will take careful consideration to
3 ensure that the proper changes are made.

4 We would like to correct the record on
5 some of yesterday's discussion related to AERI. The
6 staff acknowledged that while they have received
7 feedback that the entry criteria is overly restrictive
8 that they, in turn, have not received any feedback on
9 alternatives.

10 NEI did, in fact, propose alternative
11 criteria in our August 31st letter to the NRC, both in
12 Attachment B, Bravo, and Attachment D, Delta.
13 Attachment Delta was a full attachment dedicated to
14 our comments on DG 1414. Our comments in Attachment
15 Bravo outlined that it was not clear why the cutoff
16 distance is 100 meters and the basis for that distance
17 cannot be found.

18 Given the AERI approach is intended for
19 facilities with maximum accidents of very low
20 consequence, it would seem the consequences should be
21 calculated using an actual distance of interest for
22 the facility. Things like source terms and
23 meteorology would be site specific.

24 We propose that the distance should be the
25 boundary of the owner-controlled area which is what

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1 power reactor sites use in their EP dose assessment
2 consequence model if the distance of that boundary
3 extends beyond 100 meters.

4 Further, the four-day term should be
5 changed to be consistent with the SMR DP rule version
6 of the same criterion, so four days should be changed
7 to the 96 hours for consistency.

8 With the addition of the AERI process is
9 a positive change in Framework B, the specifics of the
10 entry criteria are extremely restrictive, as we
11 discussed yesterday, and were characterized by the NRC
12 as not being a safety criterion. They effectively
13 become a very restrictive safety criterion for a
14 designer that would seek to use the alternative
15 evaluation.

16 We note that the staff is also soliciting
17 public comment in Section 7 of the Draft FRN on a
18 variety of topics that are important to the industry.
19 We look forward to providing constructive comments on
20 these questions, as well as reiterating our
21 outstanding concerns we have with specific rule
22 language.

23 However, we do note that the nature and
24 the phrasing of some of these questions in Section 7
25 appears to reflect a lack of understanding of some of

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1 industry's concerns on many of the key issues. As an
2 example, Section 7 solicited feedback on the new
3 facility safety program or FSP, currently in Framework
4 A, asking whether the FSP concept could contribute to
5 improving the NRC's overall regulatory programs and
6 whether the FSP should be included in Framework B.

7 We find the nature of this question to be
8 perplexing as it's incumbent upon the NRC, not
9 industry or members of the public, to justify new
10 programs. In fact, for about 18 months, the industry
11 has made repeated requests to the NRC staff for a
12 detailed explanation of the new FSP, how it would
13 reduce regulatory burden, and examples of how the FSP
14 would have been utilized in contrast to existing
15 processes.

16 We believe the FSP increases regulatory
17 burden without increasing safety. Industry has
18 advocated for its removal from the rule language that
19 NRC now entertains including the provision in
20 Framework B. We find questions of this nature to be
21 counterproductive and misleading.

22 The industry continues to believe that a
23 technology-inclusive, risk-informed, performance-based
24 Part 53 rule is vital to the long-term success of the
25 advance reactor community and in meeting the intent of

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1 NEIMA. Our joint comments from NEI and USNIC sent in
2 on August 31st focus on industry's top six concerns
3 which must be addressed in order to have a rule that
4 we consider used and useful.

5 At a high level, those top six concerns
6 are number one, there is no need for two frameworks.
7 Number two, remove QHOs as performance criteria in the
8 rule. Number three, remove ALARA as a design
9 requirement. Number four, remove requirements to
10 design to protect against and withstand beyond design
11 basis events. Number five, remove the facility safety
12 program or FSP. And finally, number six, reconcile new
13 programs and terminology.

14 We note that the ACRS shares many of these
15 same concerns as outlined in your August 2nd letter to
16 NRR which contains eight recommendations to NRR staff.
17 Notably, ACRS challenged the staff on whether Part 53
18 is considered to be streamlined and efficient and
19 stated that the rule may be too cumbersome to
20 implement and may not be used.

21 In short, we view the challenges in the
22 current rule language centering around two main
23 themes. Number one, reduction, predictability, and
24 flexibility to the inclusion of prescriptive details
25 in rule text that are typically found in guidance.

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1 And number two, increase complexity and regulatory
2 burdens without any commensurate increase in safety.

3 Over the course of the last 18 months, NEI
4 and USNIC on behalf of our members have provided
5 extensive written comments as the rule is being
6 developed and we have made numerous presentations in
7 public meetings and to this committee. Based on our
8 early reading of the Part 53 draft proposal released
9 on September 30th just a few weeks ago, we're
10 disappointed that none of our six major concerns that
11 were just listed have not been addressed or resolved.

12 Further, many of these issues we believe
13 to be outstanding policy issues which if left
14 unresolved will need to be addressed at the Commission
15 level. This will only add time and complexity to the
16 Commission's review when they receive the package in
17 February.

18 In addition, today's slides have provided
19 industry feedback, starting on Slide 166, did not
20 fully capture the industry's feedback that was
21 provided in our comprehensive August 31st letter from
22 the NEI and USNIC. The slides do not fully capture
23 the major concerns nor fully capture the feedback on
24 Framework B specifically. So again, we encourage NRC
25 to refer back to our August 31st letter which also

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1 contains six detailed attachments of our comments with
2 proposed recommendations.

3 Further, the NRC's decision not to address
4 major stakeholder concerns until the formal proposed
5 rulemaking phase creates a distraction from discussing
6 more detailed aspects of the rule such as fire
7 protection, security, and EP which also need more
8 discussion and development.

9 So in closing, thank you for the
10 opportunity to speak with you today and we look
11 forward to future opportunities to engage and interact
12 with the staff and this committee at the appropriate
13 points during the rulemaking process and the staff
14 addresses their formal comments they received. Thank
15 you very much.

16 CHAIR PETTI: Thank you. And next we have
17 -- is it NIA is going to present?

18 MR. WIDMAYER: No, the Breakthrough
19 Institute.

20 CHAIR PETTI: Breakthrough, sorry. I got
21 them mixed up. Breakthrough Institute, please.

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

24 CHAIR PETTI: Yes.

25 MS. FRANOVICH: Okay. I speak on behalf

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1 of the Breakthrough Institute or BTI, which is an
2 independent, global research center that identifies
3 and promotes technological solutions to environmental
4 and human development challenges. We believe new and
5 advanced reactors represent critical pathways to
6 decarbonization. BTI does not receive funding from
7 industry.

8 Before joining BTI, I spent 30 years with
9 the NRC staff, including eight years in Region II and
10 20 years in leadership roles in headquarters. I
11 presented to the ACRS then and I appreciate this
12 opportunity to comment as a member of the public.

13 The ACRS plays an important role in
14 reforming regulatory mindsets and encouraging
15 innovation to ensure Part 53 is responsive to
16 congressional mandates and public interest.

17 I was a resident inspector in 1998 when
18 much needed regulatory reforms were the subject of
19 congressional hearings. Under threat of deep budget
20 cuts, NRC commissioners promised to implement risk-
21 informed and performance-based rules and programs and
22 NRC survived the near-death experience.

23 In October 1998, the NRC staff conducted
24 a four day public workshop or concluded that four day
25 public workshop to agree in concept to a

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1 transformational oversight regime proposed by
2 industry. Under the new reactor oversight process,
3 NRC replaced enforcement of regulatory compliance with
4 a risk-informed, performance-based framework for
5 assessing safety performance.

6 The Commission defined the terms risk
7 informed and performance based in 1999 and called for
8 performance-based regulations to afford applicants and
9 licensees the flexibility to determine how they will
10 achieve improved outcomes and to encourage and reward
11 those improved outcomes.

12 An example might be flexible operator
13 staffing requirements that incentivize innovation.
14 Yes, operators are important, but humans are the
15 weakest link in any system. Reduced reliance on human
16 operator action is a positive innovation that should
17 be rewarded. Performance based regulatory reforms
18 since the late 1990s have not extended to licensing
19 and Parts 50 and 52 remain largely prescriptive and
20 deterministic.

21 In 2009, Southern Company embarked on the
22 LMP to adapt technical requirements in Part 50 for
23 non-light water reactors. As Jordan confirmed
24 yesterday, yesterday morning, the initial Part 53, now
25 Framework A, attempts to codify LMP, and is largely

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1 built upon existing regulatory requirements developed
2 decades ago to license large light water reactors.

3 The preliminary rule also attempts to
4 codify operational programs, as Hilary mentioned,
5 adding additional regulatory burden and operating
6 costs for applicants and licensees with no apparent
7 increase in safety.

8 In November 2021, the NRC extended the
9 Part 53 review schedule or rulemaking development
10 schedule by 9 months to reach quote reach alignment
11 with external stakeholders on the scope of the
12 rulemaking and further develop the language end quote.
13 Congress supported the extension quote to resolve
14 major concerns with the existing draft language end
15 quote.

16 In February 2022, the NRC released a hefty
17 402 page consolidated preliminary rule. NEI and USNIC
18 surveyed 22 developers and applicants and presented
19 the results to NRC staff in May. Only 14 percent of
20 respondents were likely to use Part 53. Ten percent
21 indicated they would not use Part 53 for first of a
22 kind designs. Thirty-eight percent did not see the
23 benefit in using Part 53. Another 38 percent were not
24 likely to use it. Many stakeholders objected to the
25 requirement of a formal PRA as a costly burden without

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1 a commensurate safety benefit.

2 In response, the NRC unveiled a new 304-
3 page option, Framework B, that offered an alternative
4 evaluation for risk insights for AERI. If, and I
5 agree with Hilary here, a set of overly conservative
6 deterministic and prescriptive criteria are met. Part
7 53 was developed by NRC staff and released for
8 informal comment in a time-consuming, iterative
9 process.

10 NRC staff were not responsive to many
11 comments. Nor were they receptive based on legal
12 counsel to numerous requests for workshops to improve
13 their understanding of stakeholder concerns and
14 provide a more open collaborative framework for
15 stakeholder participation.

16 Former NRC Chairman and General Counsel
17 Steve Burns saw no legal impediment to workshops and
18 cosigned a letter with BTI reiterating the request to
19 no avail. As such, the nine-month extension was
20 squandered.

21 The NRC staff reports today that they have
22 streamlined the rule package as much as possible, yet
23 it weighs in at over 1200 pages. Generally, the
24 volume of any regulation is commensurate with its
25 level of prescriptiveness and the volume and

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1 prescriptive nature of Part 53 undermine regulatory
2 agility and the rules' durability over time.

3 Framework A's heavy reliance on a formal
4 PRA makes it almost risk based as opposed to risk
5 informed. Framework B also relies on a formal PRA
6 unless again the applicant can meet the incredible
7 assumptions in AERI. Neither framework affords
8 developers or applicants sufficient flexibility to
9 determine how to meet performance objectives in ways
10 that encourage and reward improved outcomes. For all
11 these reasons, the rule does not satisfy NEIMA, nor
12 does it comply with prior Commission direction
13 disapproving codification of safety goals applying
14 QHOs.

15 The modeling uncertainties that Vesna
16 raises also make QHOs inaccurate for projections of
17 risk and observation of effects to confirm performance
18 is not statistically possible. BTI and other
19 stakeholders have no qualms with throwing the baby out
20 with the bath water to achieve the unrealized,
21 unrealized transformational potential of Part 53.

22 However, that may not be altogether
23 necessary. The NRC staff could retain high level
24 performance objectives in Subparts Bravo and Charlie,
25 but Frameworks Alpha and Bravo should represent

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1 acceptable pathways in guidance. This would allow
2 greater flexibility for innovation, while affording
3 regulatory predictability and agility.

4 Unlike rules, guidance can be developed,
5 updated, and enhanced as needed over time and informed
6 by operating experience and lessons learned. By
7 contrast, changes to regulations involve a laborious
8 multi-year process that severely constrains regulatory
9 agility.

10 NRR's executive leadership has argued that
11 the only way to provide predictability is through
12 regulation. The argument is specious. By this logic,
13 predictability is not assured by the Standard Review
14 Plan routinely used now to develop and evaluate
15 licensing submittals under Part 50.

16 Yesterday, and again today, ACRS members
17 on numerous occasions requested assistance navigating
18 the complex rule and guidance. Byzantine flow charts
19 represent the exasperating licensing labyrinth. Last
20 week, an NRC Commissioner observed that stakeholders
21 continue to complain about the volume of Part 53 and
22 cumbersome frameworks that are not usable or likely to
23 be used.

24 NRR's executive leadership responded that
25 it does not want to preclude the Commission from

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1 weighing in on the expansive breadth of the rule.
2 This is an abdication of leadership. Hard decisions
3 remain about what is necessary and sufficient for the
4 Part 53 rule.

5 Now the matter is before the ACRS.
6 Yesterday and today, I observed much nervous energy
7 among some ACRS members about how new corrosive
8 coolant media may affect systems, structures, and
9 components and what if we find operator action is
10 needed under certain plant conditions?

11 I echo Greg Halnon's sentiments. Keep an
12 open mind. And by the way, creating a rule that
13 precludes unknowns from occurring is neither
14 reasonable nor realistic. Not every potential
15 condition adverse to quality or instance when operator
16 action is desired can or should be prevented through
17 prescriptive licensing regulations. Attempts to do so
18 constrain innovation and disincentivize improve safety
19 performance of evolutionary designs.

20 Moreover, such attempts are unnecessary at
21 this juncture. Not all unknowns must be resolved at
22 licensing. NRC has many tools in its tool kit to
23 address emergent operating experience and take
24 appropriate regulatory action including issuing
25 generic communications, conducting reactive and

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1 supplemental inspections, increasing regulatory
2 oversight under Inspection Manual Chapter 0350, taking
3 enforcement actions including escalated enforcements,
4 issuing orders including shutdown orders, and imposing
5 new regulatory requirements under backfit provisions.

6 Discomfort around unknowns is a fact of
7 life. However, this discomfort must be tempered with
8 legislative context and situational awareness.
9 Legislative context is not limited to NEIMA. Fifty
10 years ago, the Energy Reorganization Act acknowledged
11 the benefits of nuclear energy to quote meet the needs
12 of present and future generations, to increase the
13 productivity of the national economy, and strengthen
14 its position in regard to international trade, to make
15 the nation self-sufficient in energy, to advance the
16 goals of restoring, protecting, and enhancing
17 environmental quality, and to assure public health and
18 safety end quote.

19 The NRC's role is to enable, enable the
20 safe, civilian use of nuclear energy, not to constrain
21 or obstruct deployment with onerous, prescriptive
22 requirements from antiquated regulatory regimes.
23 Situational awareness is the public's interest.
24 Situation awareness of the public's interest is vital.
25 Environmentalists, scientists, scholars, activists,

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1 thought leaders, and policymakers from both political
2 parties are increasingly supportive of civilian
3 nuclear power. The Russian invasion of Ukraine has
4 accelerated urgent, urgent calls for safe, reliable,
5 and clean nuclear energy.

6 Now again, BTI received no funding from
7 the nuclear industry. We represent the public's
8 interests. Nuclear power advances the nation's clean
9 energy goals, enhances environmental quality, and
10 supplies reliable electricity to the transmission
11 grid. Rapid deployment of new and advanced reactors
12 is an urgent public interest.

13 In closing, the ACRS plays an important
14 role in ensuring the NRC staff delivers a quality
15 product to the Commission that is responsive to NEIMA.
16 A better rule is more important than a quicker one.

17 BTI strongly encourages the ACRS to craft
18 a letter to the Commission identifying the key issues
19 and recommending the Commission exercise its
20 discretion to redirect the staff to expeditiously work
21 with external stakeholders in a more open,
22 collaborative manner, come to agreement on unresolved
23 issues like what should be governed by regulation
24 versus guidance, and take measures to ensure the rule
25 is significantly streamlined, more performance based,

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1 and appropriately risk informed with minimum need for
2 exemptions.

3 Timely agreement on these matters can be
4 reached if the NRC staff is open and receptive to
5 significant revision. A corresponding change in
6 regulatory posture and customer service ethic also are
7 necessary to satisfy NEIMA.

8 I would like to briefly respond to an
9 astute and timely reminder from ACR Member Petti.
10 Guidance does not establish requirements. Guidance
11 provides a roadmap of one or more acceptable approach.
12 An applicant can choose a licensing approach not
13 defined in guidance and should not be discouraged from
14 doing so just because it presents a daunting mountain
15 to climb. The staff's ultimate safety determination
16 must be based on regulatory requirements and
17 engineering judgments, not failure to follow
18 established guidance. This regulatory discipline
19 without a standard checklist must be reinforced by NRC
20 leadership, the ACRS, and the Commission going
21 forward.

22 It is practical for NRC to preserve new,
23 approved approaches that satisfy regulatory
24 requirements and guidance for broad reference. A
25 successful, high level Part 53 rule could eventually

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1 feature a multitude of technology-specific Standard
2 Review Plans. Again, guidance is much easier to
3 develop and update than regulations affording greater
4 regulatory agility.

5 I thank you, Member Petti, and the rest of
6 the ACRS Subcommittee for your audience.

7 CHAIR PETTI: Thank you. Now if there's
8 any other public comments, please unmute yourself,
9 identify yourself, and give us your comment.

10 Yes, Derrick?

11 MR. WIDMAYER: There's at least three, I
12 think that want to speak and some folks have their
13 hands up. I don't know if you want to call on them.

14 CHAIR PETTI: Yes, I see that. Okay, yes.
15 Let's start with Kalene Walker.

16 MS. WALKER: Hi. I'll try and keep it a
17 little briefer than the previous speaker.

18 I'm wondering when the NRC will be
19 addressing Part 72 for these new reactor concepts?
20 There's so many different kinds of fuel: there's
21 molten salt, there's TRISO pellets, there's fluoride
22 salt. All these new fuels. When is that going to be
23 a required assessment as part of -- will that be a
24 required assessment before you allow these things to
25 move forward?

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1 I live in a reactor community where we
2 have a -- the spent fuel waste is stranded because of
3 all those reasons that I'm sure you're aware of. So
4 is it possible to answer that question? Part 72.

5 CHAIR PETTI: At this point we don't
6 respond to input from the public. Thank you.

7 MS. WALKER: So you can't mention -- you
8 can't say whether or not you're going to address Part
9 72?

10 CHAIR PETTI: We can't. You can always
11 write directly to the Designated Federal Official,
12 send an email, and they can respond to that.

13 MS. WALKER: No, I mean within this new
14 rule. I mean isn't the waste -- NRC is responsible
15 from cradle to grave, so when is the waste aspect
16 going to be addressed? That's not an easy answer? I
17 thought it would be.

18 MEMBER REMPE: So this is Joy Rempe and
19 I'm Chairman of the ACRS and as Member Petti indicated
20 this is a time for public comments and your question
21 is definitely a question that can be sent to the
22 Designated Federal Official, Derek Widmayer, and he
23 can forward it to the staff and they can respond to
24 you. Okay?

25 MS. WALKER: Okay. Can I make a quick

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1 comment then?

2 MEMBER REMPE: Certainly.

3 MS. WALKER: The first, over an hour of
4 today was spent on self-reliant mitigation facilities
5 and discussion about operators and all of that which
6 you all recall.

7 And so what I kept wanting to hear was
8 would the licensee be responsible for showing how they
9 can respond to one of these unknowns? How is there a
10 mitigation strategy when something happens, you know?
11 So that just keeps my ear curved because being in a
12 reactor community with spent fuel storage, I've
13 studied it quite a bit and I wanted to let you know
14 what your fellow colleagues are doing in Part 72 with
15 the Division of Spent Fuel.

16 The canisters are known to corrode and
17 crack eventually and yet, and so the mitigation
18 strategy presented by the industry is to repair
19 technology or to put it into over-packed casks.
20 Neither of those have been approved or evaluated by
21 the NRC.

22 And when I asked the NRC how can they say
23 they can do this when it hasn't been approved? And
24 they said in the unlikely event that this event
25 happens, the licensee will present with us a

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1 mitigation strategy and the NRC will evaluate it.
2 This would be way too late and I pity the poor
3 emergency responders of the local community who have
4 to respond to the mess from an irresponsible system.
5 The NRC should require mitigation strategies,
6 certainly for these spent fuel storage canisters.
7 Thank you. Good luck on all of this.

8 CHAIR PETTI: Robert Fortner and then
9 we'll do USNIC.

10 MR. FORTNER: Great. Thank you. My name
11 is Robert Fortner. I'm a journalist. I don't know if
12 this is going to be a comment or a question. I've
13 heard BTI and others request repeatedly these
14 workshops with NRC to hash through some of these
15 issues, presumably the six that were mentioned in
16 NEI's comment in today's session.

17 So I don't know if this is a comment or
18 question but it certainly seems like a matter of
19 public interest what NRC's stance is on that meeting
20 request and I would also be interested to know what
21 ACRS thinks of that request.

22 Yes, so if you answer it, I guess it's a
23 question.

24 I would just comment that it seems like a
25 very important issue. Thank you.

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1 MEMBER REMPE: So this Joy. If I can just
2 briefly reiterate about this is the time for comments,
3 but I also wanted to expand that we do consider these
4 question-type comments as we assimilate our thoughts
5 and ideas in our letter report. So thank you.

6 CHAIR PETTI: USNIC.

7 MR. DRAFFIN: Hello. I'm Cyril Draffin,
8 Senior Fellow for Advanced Nuclear with the US Nuclear
9 Industry Council. And at the beginning of today's
10 meeting, Ron commented that the NRC staff has been
11 very responsive to ACRS comments.

12 Just to clarify from the industry
13 perspective under the NRC established informal process
14 in advance of the rulemaking package, there's no
15 specific provision for responding to stakeholder
16 comments. And while the NRC staff has addressed some
17 of the industry's input, a substantial portion of our
18 comments have not been addressed to date.

19 As you heard from the industry and NGO
20 speakers today, as well as in prior meetings where we
21 presented and the detail of industry submissions in
22 November of last year and the last couple months,
23 there's substantial uncertainty and concerns with Part
24 53 among many developers and whether Part 53 will
25 indeed be useful or used. So I just wanted to put

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1 that on the record as you wrap up your deliberations
2 for today.

3 CHAIR PETTI: Thank you. Any other
4 comments?

5 Okay, not hearing any, I want to thank the
6 staff. It's been a really full two days covering a
7 tremendous amount of information. We appreciate the
8 perspectives from industry and members of the public
9 and I will call this meeting to a close and we'll see
10 people -- one more.

11 Is that another member of the public,
12 Connie Kline? Maybe not.

13 MS. KLINE: Can you hear me?

14 CHAIR PETTI: Yes. Yes.

15 MS. KLINE: Just very quickly, I was
16 unable to attend yesterday's session. I attended most
17 of today's session. To me, it seems contrary to the
18 industry's comments, it seems to me many concessions
19 have already been either considered or made to the
20 industry. And I strongly disagree with the idea that
21 unknowns don't have to be addressed before licensing.
22 Every effort should be made to address as many
23 unknowns as possible.

24 And I'm just going to close with a trite
25 adage. Better safe than sorry.

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1 CHAIR PETTI: Thank you. Okay, and with
2 that, I adjourn the meeting and we'll see everybody at
3 full committee in a couple of weeks. Thank you. Have
4 a good evening.

5 (Whereupon, the above-entitled matter went
6 off the record at 5:21 p.m.)

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Advisory Committee on Reactor
Safeguards (ACRS) Regulatory
Rulemaking, Policies and
Practices:
Part 53 Subcommittee



**10 CFR Part 53 “Licensing and Regulation
of Advanced Nuclear Reactors”**

October 18-19, 2022

Agenda – October 18th



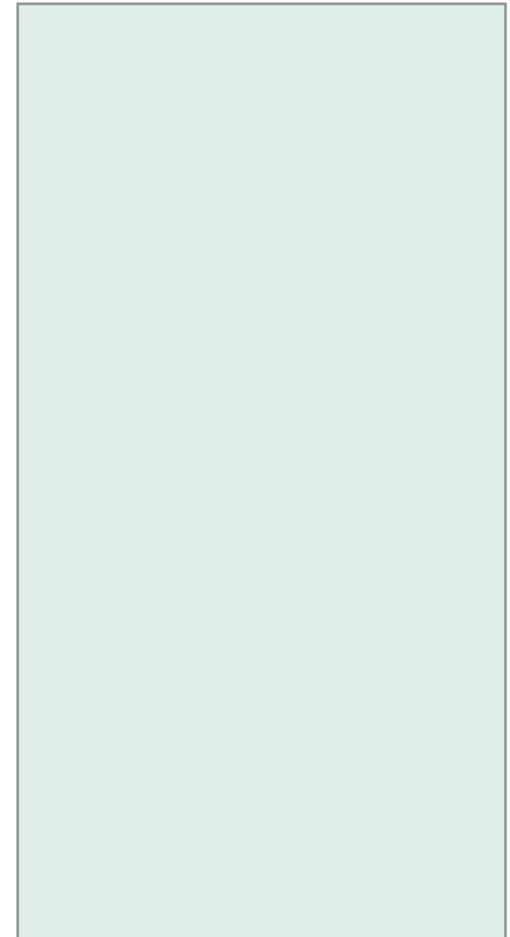
8:35 am – 10:00 am Staff Introduction and Overview of Frameworks A and B

10:00 am – 11:45 am Draft Proposed Language for Quantitative Health Objectives (QHOs)/Safety Analysis

11:45 am – 12:45pm Lunch

12:45 pm – 5:00 pm Draft Proposed Language for Alternative Evaluation for Risk Insights (AERI) Methodology and Guidance Documents

Rulemaking Schedule



Part 53 Licensing Frameworks

Subpart A - General Provisions

```
graph LR; A[Subpart A - General Provisions] --> B[Subpart B - Safety Requirements]; A --> C[Subpart C - Design Requirements]; A --> D[Subpart D - Siting]; A --> E[Subpart E - Construction/Manufacturing]; A --> F[Subpart F - Operations]; A --> G[Subpart G - Decommissioning]; A --> H[Subpart H - Application Requirements]; A --> I[Subpart I - License Maintenance]; A --> J[Subpart J - Reporting]; A --> K[Subpart K - Quality Assurance]; A --> N[Subpart N - Siting]; A --> O[Subpart O - Construction/Manufacturing]; A --> P[Subpart P - Operations]; A --> Q[Subpart Q - Decommissioning]; A --> R[Subpart R - Application Requirements]; A --> S[Subpart S - License Maintenance]; A --> T[Subpart T - Reporting]; A --> U[Subpart U - Quality Assurance];
```

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



Rule Package (ML22272A034)

<u>Federal Register Notice (FRN)</u>		
Enclosure 1A	Preamble	ML22272A036
Enclosure 1B	Section by Section, Availability of Guidance	ML22272A038
Enclosure 1C	Framework A	ML22272A039
Enclosure 1D	Framework B	ML22272A040
<u>Guidance Documents</u>		
DG-1413	Licensing Events	ML22272A042
DG-1414	AERI Methodology	ML22272A045
DRO-ISG-2023-01	Operator Licensing Program Review ISG	ML22272A047
DRO-ISG-2023-02	Staffing Plan Review ISG Augmenting NUREG-1791	ML22272A049
DRO-ISG-2023-03	Scalable Human Factors Engineering Review ISG	ML22272A051

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)
- Framework B Definitions
 - Construction, Design basis, Functional containment, Safety-related structures, systems, and components (SSCs), Severe nuclear accident

Subpart A – Safety Function Definition

- ***Safety function*** means a purpose served by a design feature, human action, or programmatic control to prevent or mitigate unplanned events and thereby demonstrate compliance with requirements in part 53 for limiting risks to public health and safety. Safety functions can be performed by any combination of the elements listed above and can be specified at the plant level or at the level of a particular barrier or system. The approach to identifying and addressing safety functions in Frameworks A and B are as follows:
 - (1) Within Framework A, the primary safety function is stated to be limiting the release of radioactive materials. Additional safety functions supporting the retention of radioactive materials, such as controlling reactivity, heat generation, heat removal, and chemical interactions, are determined for each reactor design by analyzing a spectrum of unplanned events.
 - (2) Within Framework B, multiple plant-level safety functions are assumed to apply to all reactor designs based on established requirements and historical practices. These fundamental safety functions include the control of reactivity, removal of heat, and limiting the release of radioactive materials. The protection of a specific barrier or system that contributes to meeting plant-level safety criteria may also be referred to as a safety function.

Framework A

Subpart B – Technology- Inclusive Safety Requirements

- 53.200 Safety objectives.
- 53.210 Safety criteria for design basis accidents.
- 53.220 Safety criteria for licensing basis events other than design basis accidents. ***(including QHOs)***
- 53.230 Safety functions.
- 53.240 Licensing basis events.
- 53.250 Defense-in-depth.
- 53.260 Normal operations.
- 53.270 Protection of plant workers.

Subpart C – Design and Analysis Requirements

- § 53.400 Design features for licensing basis events.
- § 53.410 Functional design criteria for design basis accidents.
- § 53.415 Protection against external hazards.
- § 53.420 Functional design criteria for licensing basis events other than design basis accidents.
- § 53.425 Design features and functional design criteria for normal operations.
- § 53.430 Design features and functional design criteria for protection of plant workers.
- § 53.440 Design requirements.
- § 53.450 Analysis requirements.
- § 53.460 ***Safety categorization and special treatment.***
- § 53.470 Maintaining analytical safety margins used to justify operational flexibilities.
- § 53.480 Earthquake engineering.

Subpart D – Siting Requirements

- § 53.500 General siting.
- § 53.510 External hazards.
- § 53.520 Site characteristics.
- § 53.530 Population-related considerations
- § 53.540 Siting interfaces.

Subparts E & O Construction and Manufacturing Requirements

- Scope and purpose.
- Reporting of defects and noncompliance.
- Construction
- ***Manufacturing***
 - ***Fuel loading for manufactured reactor modules***

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

Subpart F – Requirements for Operation

- § 53.700 Operational objectives.
- § 53.710 Maintaining capabilities and availability of structures, systems, and components.
- § 53.715 Maintenance, repair, and inspection programs.
- § 53.720 Response to seismic events.
- § 53.725 ***General staffing, training, personnel qualifications, and human factors requirements.***
- § 53.845 Programs
 - Radiation Protection
 - Emergency preparedness
 - Security
 - Quality Assurance (QA)
 - Integrity Assessment
 - Fire protection
 - Inservice inspection (ISI) and inservice testing (IST)
 - Facility safety

Subpart G & Q Decommissioning Requirements

- Scope and purpose.
- Financial assurance for decommissioning.
- Cost estimates for decommissioning .
- Annual adjustments to cost estimates for decommissioning.
- Methods for providing financial assurance for decommissioning.
- Limitations on the use of decommissioning trust funds.
- NRC oversight.
- Reporting and recordkeeping requirements.
- Termination of license.
- Program requirements during decommissioning
- Release of part of a commercial nuclear plant or site for unrestricted use.

Subpart H – Licenses, Certifications, and Approvals

- § 53.1100 - 53.1121 General/common requirements.
- § 53.1124 Relationship between sections.
- § 53.1130 Limited work authorizations.
- § **53.1140 Early site permits.**
- § 53.1200 Standard design approvals.
- § **53.1230 Standard design certifications.**
- § 53.1270 Manufacturing licenses
- § 53.1300 Construction permits.
- § 53.1360 Operating licenses.
- § 53.1410 Combined licenses.
- § 53.1470 Standardization of commercial nuclear power plant designs: licenses to construct and operate nuclear power reactors of identical design at multiple sites.

Subparts I & S Maintaining and Revising Licensing Basis Information

- Licensing basis information.
- Specific terms and conditions of licenses
- Changes to licensing basis information requiring prior NRC approval.
- License amendments.
- Specific provisions (e.g., changes to standard designs)
- Other licensing basis information
- Evaluating changes to facility as described in final safety analysis reports (SAR).
- Program-related documents
- Transfer of licenses or permits.
- Termination of license.
- Information requests.
- Revocation, suspension, modification of licenses, permits, and approvals for cause.
- Backfitting.
- Renewal.

Subparts J & T Reporting and Other Administrative Requirements

- General information.
- Unfettered access for inspections.
- Maintenance of records, making of reports.
- Immediate notification requirements for operating commercial nuclear plants.
- Licensee event report system.
- Facility information and verification.
- Reporting of defects and noncompliance.
- Financial requirements.
- Financial qualifications.
- Annual financial reports.
- Licensee's change of status; financial qualifications.
- Creditor regulations.
- Financial protection.
- Insurance required to stabilize and decontaminate plant following an accident.
- Financial protection requirements.

Subparts K & U Quality Assurance Criteria for Commercial Nuclear Plants

	<u>10 CFR Part 50, Appendix B Criteria</u>
• General Provisions	I
• Organization	II
• Quality Assurance Program	III
• Design Control	IV
• Procurement Document Control	V
• Instructions, Procedures and Drawings	VI
• Document Control	VII
• Control of Purchased Material, Equipment and Services	VIII
• Identification and Control of Materials, Parts and Components	IX
• Control of Special Processes	X
• Inspection	XI
• Test Control	XII
• Control of Measuring and Test Equipment	XIII
• Handling, Storage and Shipping	XIV
• Inspection, Test and Operating Status	XV
• Nonconforming Materials, Parts or Components	XVI
• Corrective Action	XVII
• Quality Assurance Records	XVIII
• Audits	

Subpart N - Siting

New subpart that facilitates risk-informed, performance-based approaches to siting and seismic design

§ 53.3505 Scope.

§ 53.3510 Definitions.

§ 53.3515 Factors to be considered when evaluating sites.

§ 53.3520 Non-seismic siting criteria.

§ ***53.3525 Geologic and seismic siting criteria.***

Subpart P – Requirements for Operation

- § 53.4200 Operational objectives.
- § 53.4210 Maintaining capabilities and availability of structures, systems, and components.
- § 53.4213 Technical specifications.
- § 53.4215 Response to seismic events.
- § 53.4220 ***General staffing, training, personnel qualifications, and human factors requirements.***
- § 53.4300 Programs
 - Radiation Protection
 - Emergency Preparedness
 - Security
 - QA
 - Integrity Assessment
 - Fire Protection***
 - ISI and IST
 - Environmental qualification of electric equipment
 - Procedures and guidelines
 - Primary containment leakage testing
- § 53.4420 ***Mitigation of beyond-design-basis events.***

Subpart R – Licenses, Certifications, and Approvals

- § 53.4700 - 53.4721 General/common requirements.
- § 53.4724 Relationship between sections.
- § **53.4730** ***General technical requirements.***
- § 53.4731 Risk-informed classification of SSCs.
- § **53.4733** ***Seismic design alternatives.***
- § 53.4740 Limited work authorizations.
- § 53.4750 Early site permits.
- § 53.4800 Standard design approvals.
- § 53.4830 Standard design certifications.
- § 53.4870 Manufacturing licenses
- § 53.4900 Construction permits.
- § 53.4960 Operating licenses.
- § 53.5010 Combined licenses.
- § 53.5070 Standardization of commercial nuclear power plant designs: licenses to construct and operate nuclear power reactors of identical design at multiple sites.

Draft Proposed Language for QHOs / Safety Analysis

Framework A Integrated Approach to Ensure Comparable Findings

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

Part 53 (SECY-20-0032)

- 1) Continue to provide reasonable assurance of adequate protection of public health and safety and the common defense and security,
- 2) Promote regulatory stability, predictability, and clarity,
- 3) Reduce requests for exemptions from the current requirements in 10 CFR Part 50 and 10 CFR Part 52,
- 4) Establish new requirements to address non-light-water reactor (LWR) technologies,
- 5) Recognize technological advancements in reactor design, and
- 6) Credit the response of advanced nuclear reactors to postulated accidents, including slower transient response times and relatively small and slow release of fission products.

Framework A Integrated Approach to Ensure Comparable Findings

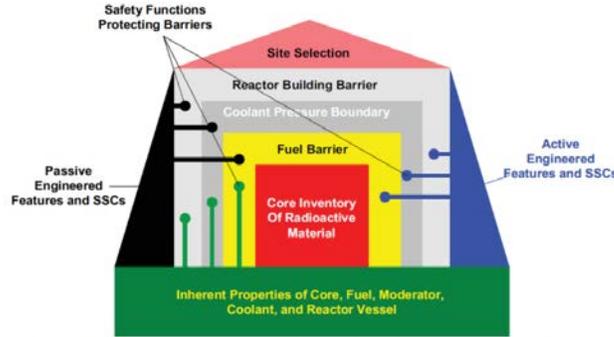
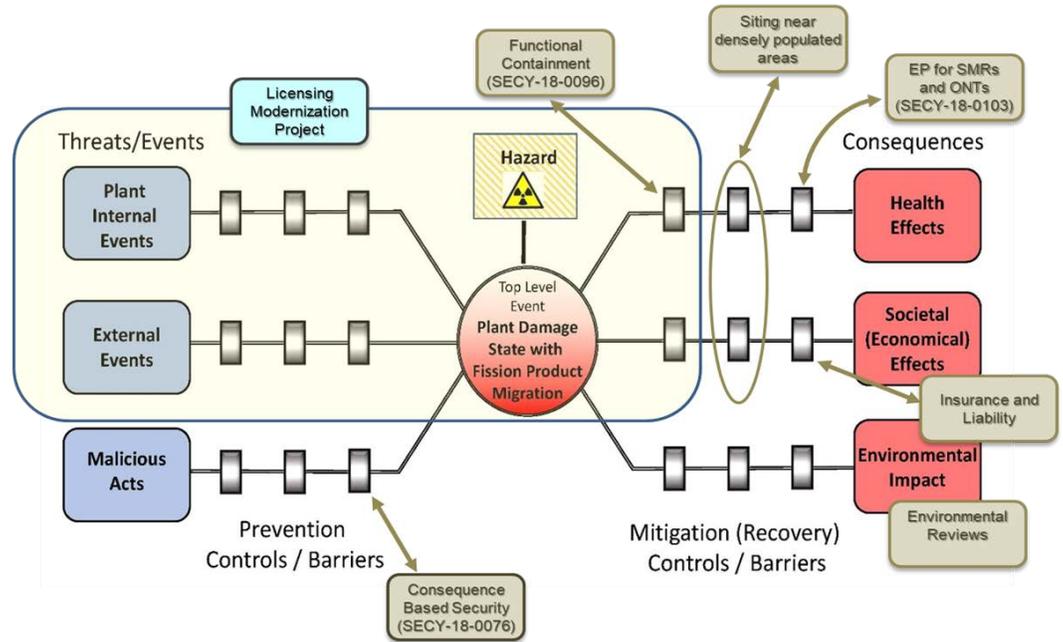
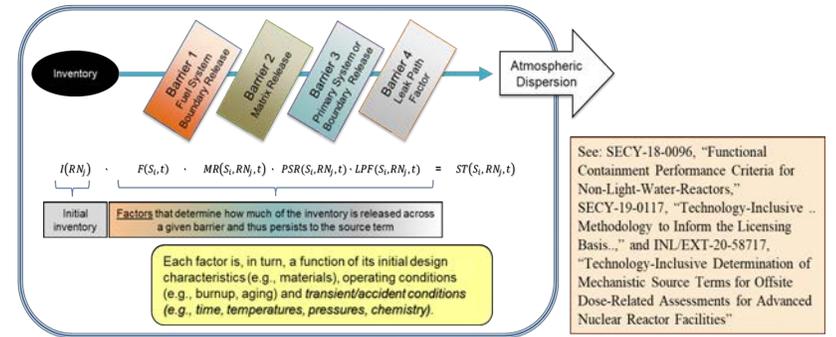


Figure 3-6. Elements of safety design approach incorporated into *Plant Capability Defense-in-Depth*.

See INL/EXT-09-17139, "Next Generation Nuclear Plant Defense-in-Depth Approach"

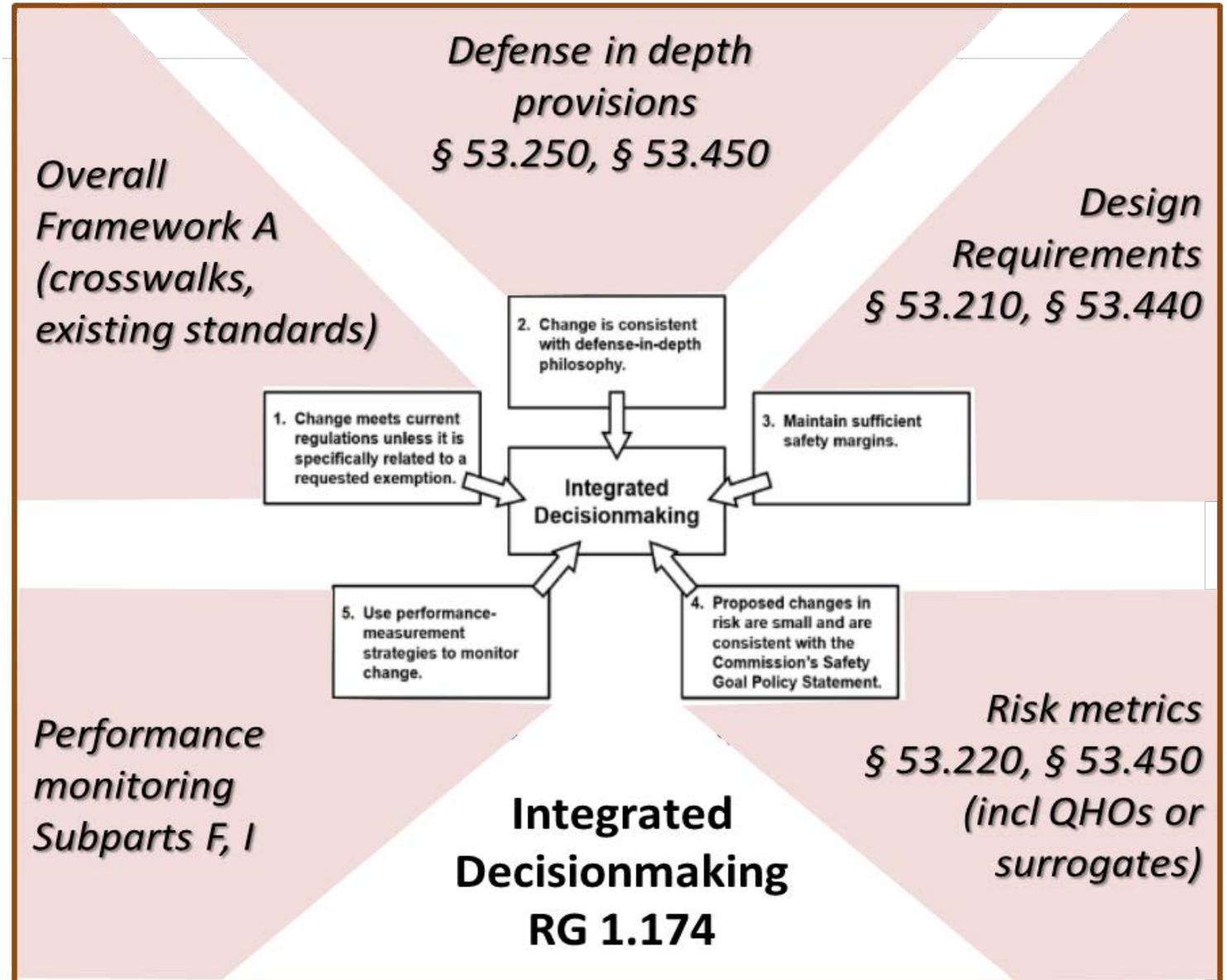
Recent NRC activities related to advanced reactors (e.g., functional containment performance criteria, possible changes to emergency planning & security, and DG-1353) recognize the limitations of existing LWR-related guidance, which requires a return to first principles such as fundamental safety functions supporting the retention of radionuclides



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.



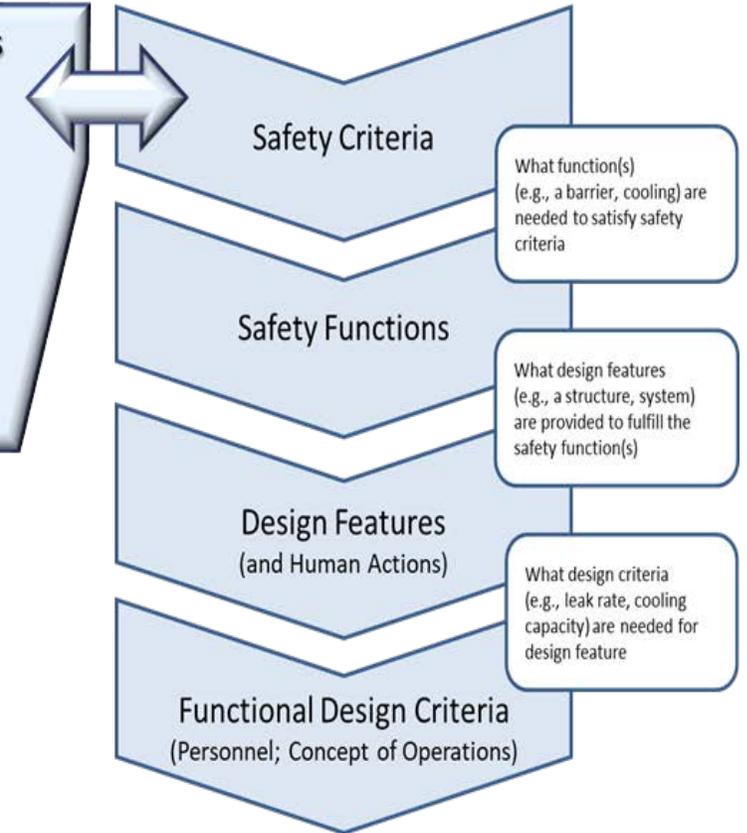
Framework A

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



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.**

Example § 53.450(e) evaluation criteria

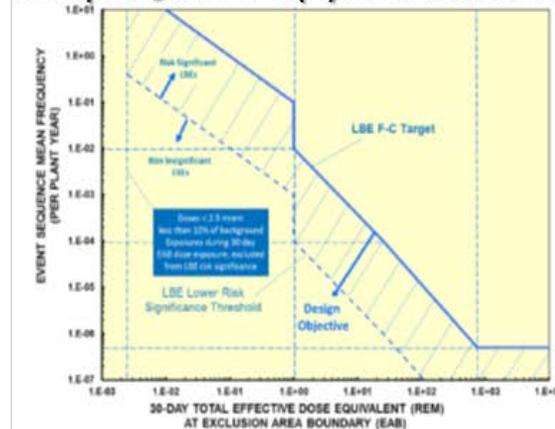


Figure 3-4. Use of the F-C Target to Define Risk-Significant LBEs
Licensing Modernization Project (LMP)

Framework A

Consideration of Feedback on Including QHOs

Comments generally fall into following groups:

- Rule should not include a cumulative risk measure
- Rule should include alternative risk measures
 - Surrogates for the QHOs
- Develop new safety goals

- It is appropriate to include a risk-related performance standard in Framework A as part of an integrated decisionmaking process, especially given the importance of risk assessments and consideration of risk-insights within the licensing process
- In SRM-SECY-10-0121, the Commission reaffirmed that “existing safety goals, safety performance expectations, subsidiary risk goals and associated risk guidance ... are sufficient for new plants...”
- Surrogate measures tend to be technology- or design-specific. However, the Preamble reinforces that technology- or design-specific surrogates for the QHOs may be developed and proposed for use in supporting licensing under Framework A
- Major efforts such as developing new safety goals not included in rulemaking plan and not feasible considering project constraints

Subpart R – Licenses, Certifications, and Approvals

§ 53.4730(a)(1) Site safety analysis.

- Proposed rule language derived from current requirements in § 52.79(a)(1); (i) through (v) are essentially identical to Part 52 requirements
- Requirements in subparagraph (vi) modified to ensure rule is technology-inclusive
- *Fuel or core damage or potential for large radiological releases from sources other than the reactor system replaces fission product release from the core into the containment*
- Fission product release analyses can be performed using a mechanistic source term or bounding assessment
- Applicant may elect to comply with more restrictive dose consequence criteria (e.g., 1 rem [roentgen equivalent man] TEDE [total effective dose equivalent] over 96 hours)

Subpart R – Licenses, Certifications, and Approvals

§ 53.4730(a)(5) Initiating events and accident analysis.

- Objectives
 - Provide an equivalent level of safety by developing technology-inclusive analogs to applicable Part 50 and 52 requirements for initiating events and accident analyses
 - Provide an approach that better aligned with international regulatory paradigms, as appropriate and consistent with Commission policy
- Leveraged previously developed language from the “Part 5X” effort
- Preliminary proposed rule language maintains top-level acceptance criteria from Part 50 and 52

Subpart R – Licenses, Certifications, and Approvals

§ 53.4730(a)(5) Initiating events and accident analysis.

(i) Analysis and Evaluation

- From § 52.79(a) with modifications to support technology-inclusiveness and Framework B event classifications.
- Recent changes to acknowledge multi-unit facilities (e.g., SMRs)

(ii) Design Basis Accidents

- Technology-inclusive requirements for DBA analyses and SSC classification drawing from §§ 50.34(a)(4) and 50.46.
- Includes deterministic classification approach for safety-related SSCs

(iii) Normal Operation and Anticipated Operational Occurrences (AOOs)

- Consistent with existing requirements including Part 20 acceptance criteria
- Changes clarify applicability of requirements to normal operations

Subpart R – Licenses, Certifications, and Approvals

§ 53.4730(a)(5) Initiating events and accident analysis.

(iv) Additional Licensing Basis Events

- Technology-inclusive requirements for relevant additional LBEs and analysis requirements for these events; similar to international defense-in-depth (DID) requirements
- Changes clarify scope of initiators and event sequences that must be considered and design requirements for SSCs used to mitigate additional LBEs

(v) Severe Accidents

- Derived from § 52.79(a)(38), with modifications to support technology-inclusiveness
- Definition of *severe nuclear accident* moved to § 53.028

(vi) Chemical hazard requirements address substances commingled with licensed material or those produced by a reaction with licensed material

Subpart R – Licenses, Certifications, and Approvals

§ 53.4730(a)(36) Containment requirements.

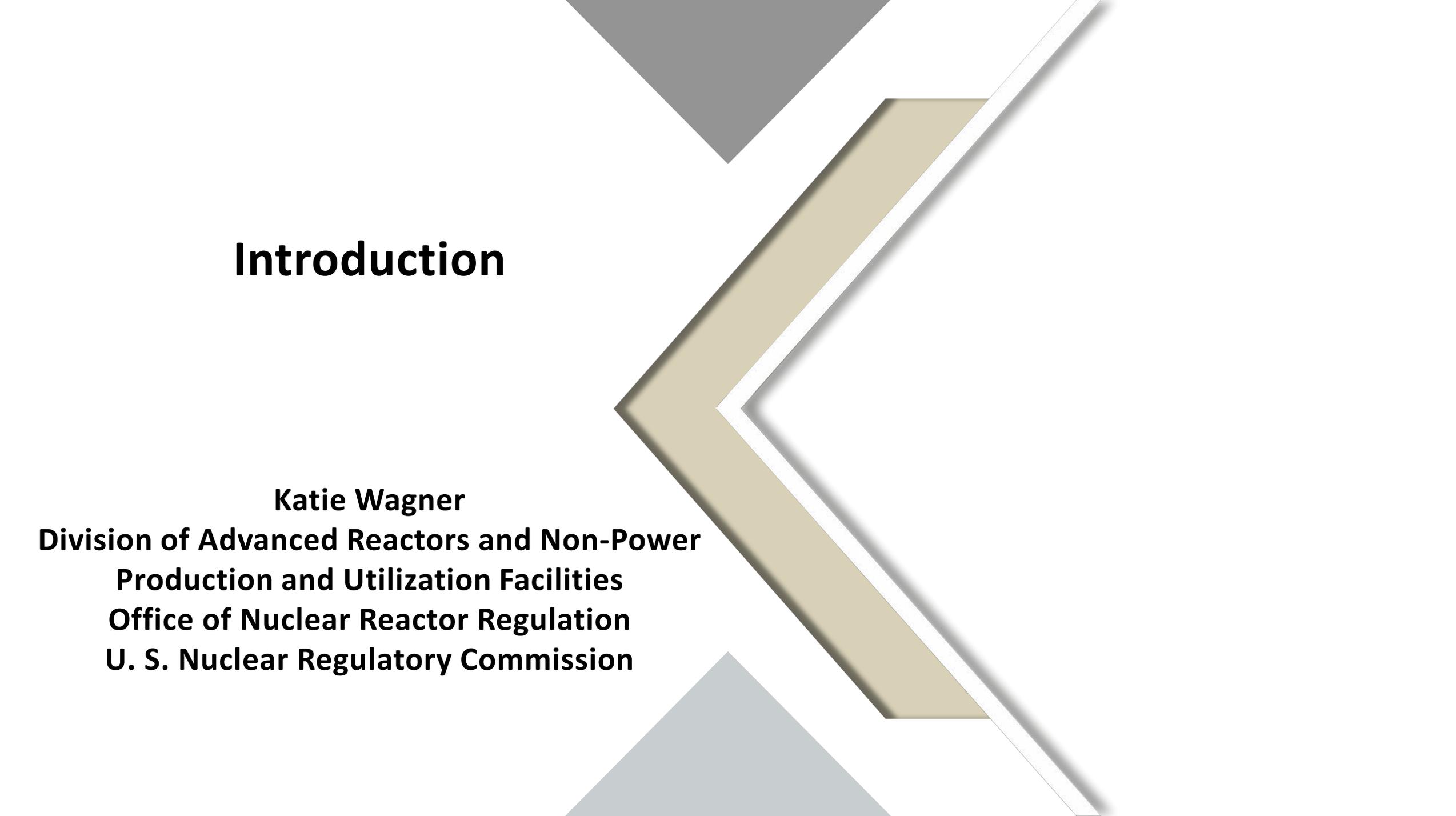
- Requirements split to acknowledge differences between non-LWR and LWR approaches to containment
- For non-LWRs, § 53.4730(a)(36)(i) addresses:
 - Set of barriers used to meet requirements for AOOs, DBAs, and siting criteria (functional containment)
 - Safety classification (i.e., safety-related) and qualification of SSCs making up functional containment barriers
 - Functional containment now defined in § 53.028
- For LWRs, § 53.4730(a)(36)(ii) addresses the need for a leak-tight primary containment that:
 - Meets the requirements of Part 50 Appendix J (also addressed in Subpart P)
 - Addresses any technically relevant requirements from LWR operating experience (containment isolation systems, penetrations, venting/purging)

Subpart R – Licenses, Certifications, and Approvals

Other General Technical Requirements

- § 53.4730(a)(2) Facility description.
- § 53.4730(a)(4) Design bases and principal design criteria.
- § 53.4730(a)(11) Dose to members of the public.
- § 53.4730(a)(14) Earthquake engineering criteria.
- § 53.4730(a)(34) Description of risk evaluation.
- § 53.4730(a)(37) Water-cooled reactor requirements.
- Changes to other paragraphs under § 53.4730 largely organization since last iteration was issued

**10 CFR Part 53, Framework B
Alternative Evaluation for Risk
Insights,
DG-1413, and DG-1414**



Introduction

Katie Wagner

**Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission**

Agenda

- Introductions & Recent Activities
- Proposed AERI Entry Conditions
- Evaluation of Dose-Based AERI Entry Criteria Using MELCOR Accident Consequence Code System (MACCS)
- DG-1413 (proposed new RG 1.254), "Technology-Inclusive Identification of Licensing Events for Commercial Nuclear Plants"
- DG-1414 (proposed new RG 1.255), "Alternative Evaluation for Risk Insights (AERI) Methodology"



Introductions

- **Marty Stutzke** – Technical Lead of the Graded PRA Working Group (WG), Senior Level Advisor for Probabilistic Risk Assessment, Division of Advanced Reactors and Non-power Production and Utilization Facilities (DANU), Office of Nuclear Reactor Regulation (NRR)
- **Keith Compton** – Lead for MACCS calculations related to the AERI entry conditions, Senior Reactor Scientist, Division of Systems Analysis, Office of Nuclear Regulatory Research (RES)
- **Mihaela Biro** – Principal Author of DG-1413 (proposed new RG 1.254), "Technology-Inclusive Identification of Licensing Events for Commercial Nuclear Plants," Senior Reliability and Risk Analyst, Division of Risk Assessment (DRA), NRR
- **Anne-Marie Grady** – Principal Co-author of DG-1414 (proposed new RG 1.255), "Alternative Evaluation for Risk Insights (AERI) Methodology," Reliability and Risk Analyst, DRA, NRR
- **Katie Wagner** – Project Manager of the Graded PRA WG, Project Manager, DANU, NRR

The Graded PRA Working Group Membership

Project Manager

- Katie Wagner, NRR/DANU

Technical Lead

- Marty Stutzke, NRR/DANU

Working Group Members

- Hosung Ahn*, previously on rotation from NRR/Division of Engineering and External Hazard
- Mihaela Biro, NRR/DRA – Principal Author of DG-1413
- Anne-Marie Grady, NRR/DRA – Principal Co-Author of DG-1414
- Matt Humberstone, RES/DRA
- Ian Jung, NRR/DANU

- Alissa Neuhausen, NRR/DRA*^ – Principal Co-Author of DG-1414
- Hanh Phan, NRR/DANU
- Sunil Weerakkody, NRR/DRA

- Robert Budnitz, consultant

Management/Coordination

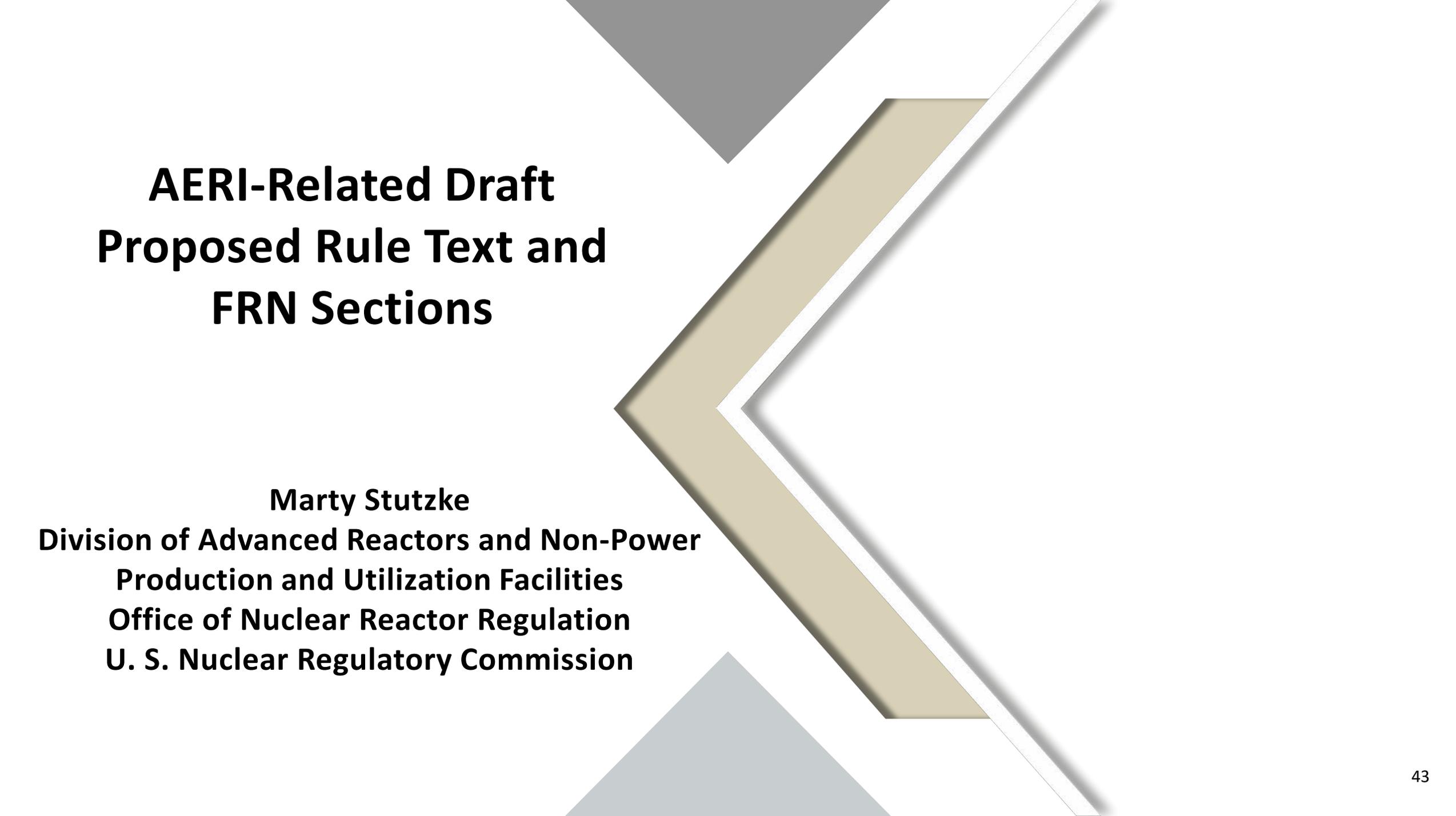
- Candace de Messieres, NRR/DANU^
- Steve Lynch, NRR/DANU
- Nathan Sanfilippo*
- John Segala, NRR/DANU

*Former WG member

^On rotation from current position

Recent Activities

- Latest ACRS Interactions and Communications
 - ACRS Subcommittee Meeting – June 23-24, 2022 (ML22172A091)
 - ACRS Full Committee Meeting – July 6, 2022 (ML22186A166)
 - ACRS Letter – August 2, 2022 (ML22196A292)
- Path forward discussion in late-June 2022
 - DG-1413 & DG-1414
 - Make revisions in response to ACRS and stakeholder feedback
 - Monitor changes to preliminary proposed rule text
 - DG-1414
 - Develop guidance for AERI maintenance and upgrades



AERI-Related Draft Proposed Rule Text and FRN Sections

Marty Stutzke

**Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
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U. S. Nuclear Regulatory Commission**

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 DID adequacy

AERI-Related Draft Proposed Rule Text

The proposed AERI entry conditions are designed to limit use of the proposed AERI approach to commercial nuclear plants whose designs are relatively straightforward and do not involve overly **complex systems** and interactions and, accordingly, would not warrant development of a PRA to provide quantitative risk insights.

Draft Proposed Rule Text Presented to the ACRS Regulatory Rulemaking, Policies and Practices: Part 53 Subcommittee June 23-24, 2022

§ 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 PRA, or
- (ii) An AERI, provided that the dose from a postulated bounding event to an individual located 100 meters (328 feet) away from the commercial nuclear plant does not exceed 1 rem total effective dose equivalent (TEDE) over the first four days following a release, an additional 2 rem TEDE in the first year, and 0.5 rem TEDE per year in the second and subsequent years.

Current Draft Proposed Rule Text

§ 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 at a location 100 meters (328 feet) away from the commercial nuclear plant does not exceed 10 mSv (1 rem) total effective dose equivalent (TEDE) over the first four days following a release, an additional 20 mSv (2 rem) TEDE in the first year, and 5 mSv (0.5 rem) TEDE per year in the second and subsequent years; and

(B) The qualification in § 53.4730(a)(34)(ii)(A) is demonstrated to be met without reliance on active safety features or passive safety features except for those passive safety features that do not require any equipment actuation or operator action to perform their required safety functions, that are expected to survive accident conditions, and that cannot be made unavailable or otherwise defeated by credible human errors of commission and omission.

Changes to the AERI-Related Draft Proposed Rule Text

- 53.4730(a)(34)(ii)(A)
 - The consequence criteria in the AERI entry condition were originally inspired by the U.S. Environmental Protection Agency (EPA) Protective Action Guidelines (PAGs); however:
 - The EPA PAGs are used in response to an actual event; in contrast, the AERI entry conditions refer to a postulated bounding event that is used to help establish the licensing basis.
 - The Commission has never stated that the EPA PAGs are limits. In addition, the PAGs state: “...protective action guide doses represent trigger points for taking protective actions. They are not dose limits that cannot be exceeded.”
 - Stakeholders may misconstrue the previous draft proposed AERI entry conditions to mean that it is an acceptable limit for an emergency dose to the public under accident conditions.
 - Changes to the draft proposed rule text were made during extensive discussions with the Office of Nuclear Security and Incident Response.
 - Conforming changes were made to the FRN preamble and to DG-1414.
- 53.4730(a)(34)(ii)(B)
 - Changes made in concert with changes to Part 53, Framework A, Subpart F concerning operator licensing.
 - Current draft proposed rule text is consistent with:
 - Draft staff white paper, “Risk-Informed and Performance-Based Human-System Considerations for Advanced Reactors,” March 2021, ML21069A003
 - Section 2.7 of DOE-HDBK-1224-2018, “DOE Handbook: Hazard and Accident Analysis Handbook (Interim Use),” August 2018

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 may have generally licensed reactor operators (GLROs) in lieu of senior reactor operators (SROs) and reactor operators (ROs)

Maintenance of Risk Evaluations

§ 53.6052 Maintenance of risk evaluations.

Applicants or licensees required to submit a risk evaluation under § 53.4730(a)(34) must meet the following requirements:

(a) No later than the scheduled date for initial loading of fuel, each holder of an operating or combined license for a commercial nuclear plant under Framework B of this part must develop a risk evaluation.

(b) Each licensee required to develop a risk evaluation under paragraph (a) of this section must **maintain** the risk evaluation to reflect the as-built, as-operated facility. The risk evaluation must be **maintained** at least every five years until the permanent cessation of operations under § 53.4670. If a PRA is performed under § 53.4730(a)(34)(i), the licensee must **upgrade** the PRA to cover initiating events and modes of operation contained in consensus standards on PRA that are endorsed by the NRC. The upgrade must be completed within five years of NRC endorsement of the standard.

(c) Each licensee required to develop a risk evaluation based on a PRA must, no later than the date on which the licensee submits an application for a renewed license, **upgrade** the PRA required by paragraph (a) of this section to cover all modes and all initiating events.

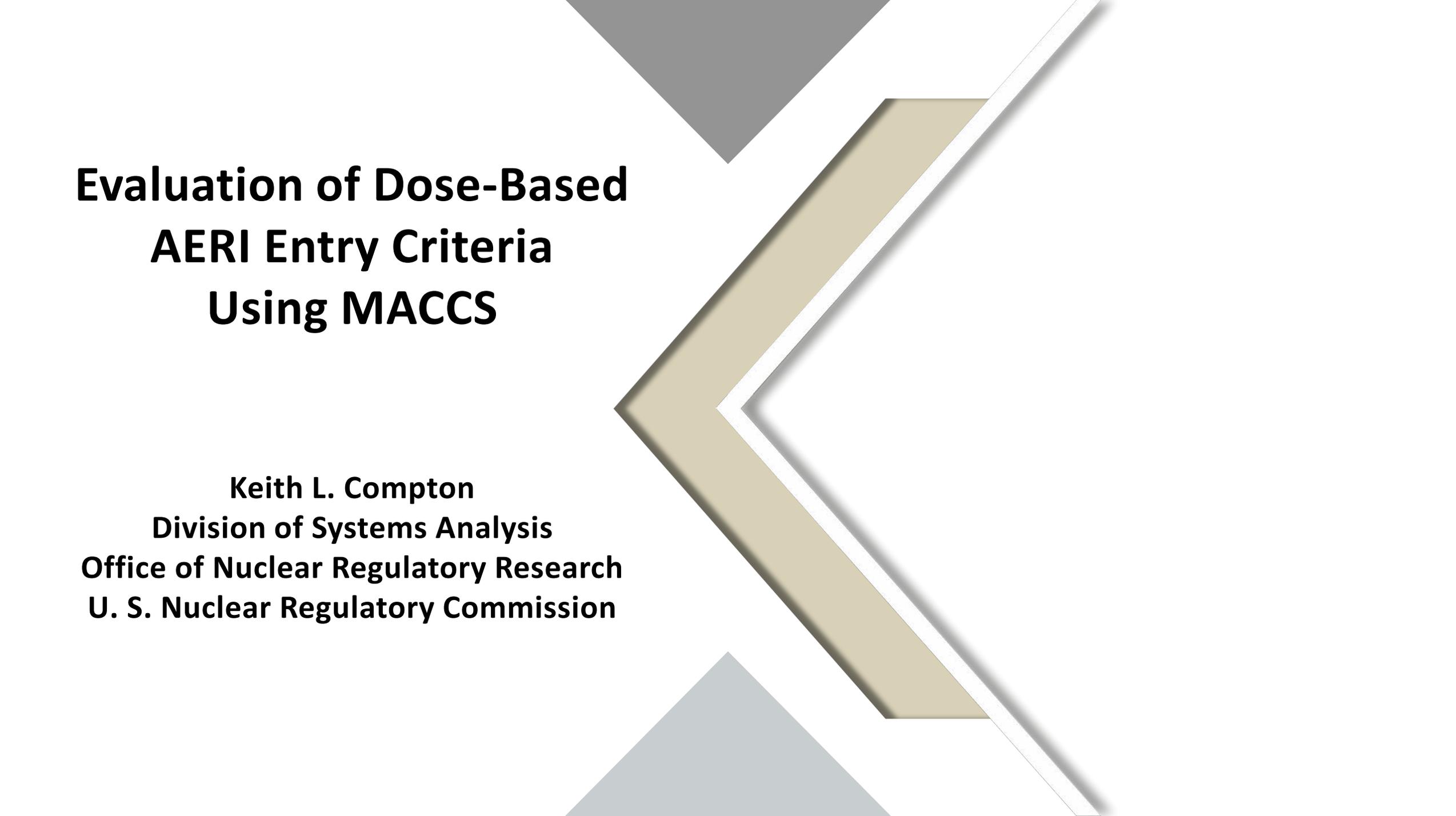
(d) Each licensee who developed an alternative evaluation for risk insights under § 53.4730(a)(34)(ii) must, no later than the date on which the licensee submits an application for a renewed license, confirm that the alternative evaluation for risk insights reflects the as-built, as-operated facility.

Definitions from the non-LWR PRA standard (ASME/ANS Ra-S-1.4-2022)

- **PRA maintenance:** a change in the PRA that does not meet the definition of PRA upgrade.
 - Peer review not required by the standard
- **PRA upgrade:** a change in the PRA that results in the applicability of one or more supporting requirements or Capability Categories (e.g., the addition of a new hazard model) that were not previously assessed in a peer review of the PRA, an implementation of a PRA method in a different context, or the incorporation of a method not previously used.
 - Peer review required by the standard

Proposed AERI-Related FRN Questions

- The NRC is seeking comment on whether the NRC should retain this AERI approach under Framework B. If so, what changes, if any, would be recommended to the proposed criteria and approach in proposed Framework B? Please provide the considerations and rationale for your answer.
- Could the AERI criteria as written or potentially as revised and the related analyses of bounding events be used to support other regulatory decisions in Framework B (e.g., physical security, cyber security, AA (access authorization), FFD (fitness for duty) and emergency preparedness)? If so, which design areas and programs could logically use the AERI criteria and related analyses and how could requirements in those areas be scaled or graded based on the proposed 53.4730(a)(34)(ii) or a similar concept?
- The NRC is seeking comment on the criteria and how they are used in both justifying an alternative to PRAs and in allowing the use of GLROs, as well as possible alternatives to the proposed criteria. Please provide your considerations and rationale for your recommendation.



Evaluation of Dose-Based AERI Entry Criteria Using MACCS

**Keith L. Compton
Division of Systems Analysis
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Objectives

- Evaluate the relationship between dose computed at 100 m and the population-weighted individual latent cancer fatality risk (ILCFR) averaged over 10 miles using MACCS
 - Develop a closed-form analytic approximation to this relationship
 - Identify assumptions needed to develop the closed-form approximation
 - Test the impact of these assumptions using suitable calculations with MACCS
- **The analyses and results in this presentation provide a status report on work-in-progress. They do not represent the staff's final analyses or conclusions.**

Analytic Expression

Assumptions

- Individual doses from ingestion pathways are not explicitly considered
- The maximum individual dose δ_{\max} at a distance r is assumed to be related to the maximum individual dose $\delta_{\max,0}$ at the distance r_0 as follows:

$$\partial(r, \max) = \partial_{\max, r_0} \left(\frac{r}{r_0} \right)^{-n}$$

- All material is released in a single plume (i.e., there are no wind shifts during release)
- The population density ρ_N is assumed to be constant and independent of distance r
- The latent cancer proportionality constant γ is assumed to be constant and independent of dose

Downwind Dose Reduction Coefficient

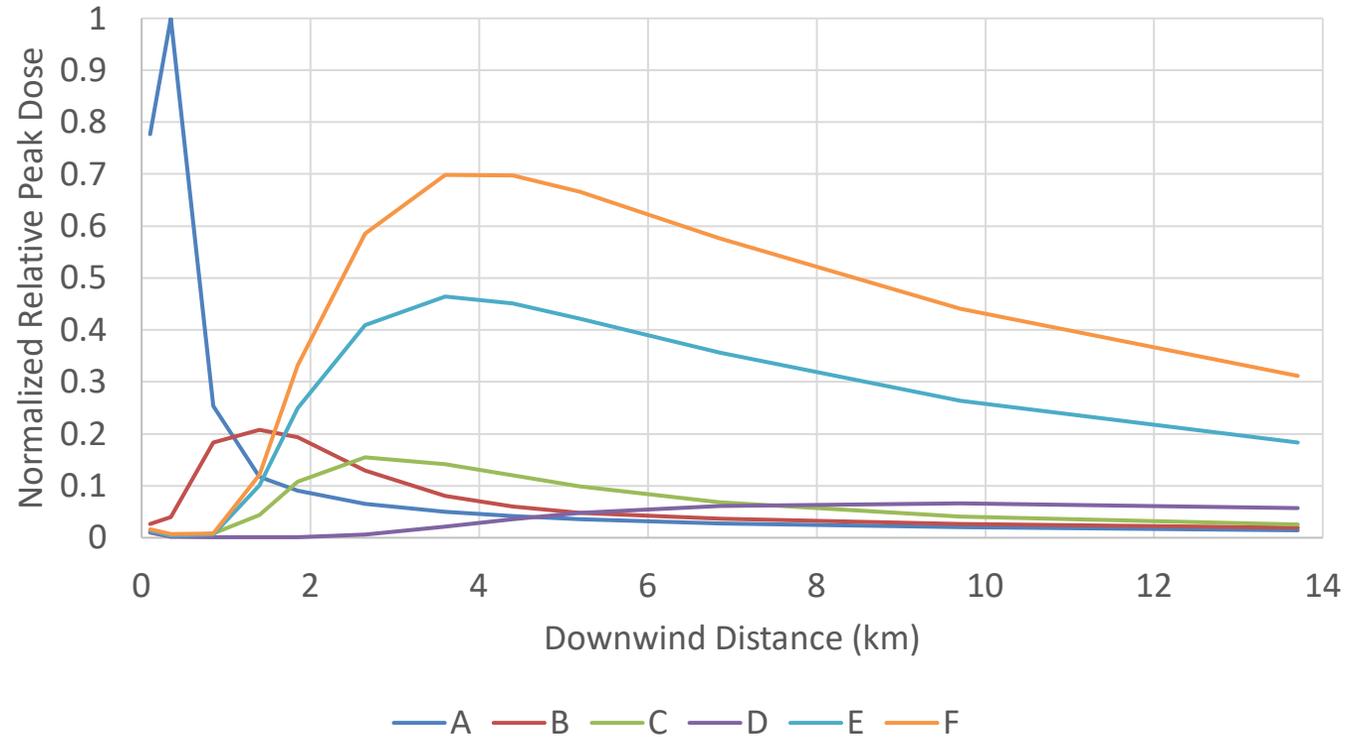
The maximum individual dose δ_{max} at a distance r is assumed to be related to the maximum individual dose $\delta_{max,0}$ at the distance r_0 as follows:

$$\delta(r, max) = \delta_{max,r0} \left(\frac{r}{r_0}\right)^{-n}$$

Subsidiary Assumption	Rationale
The release is from ground level and non-bouyant (i.e., $\delta(r, max)$ is monotonically decreasing)	Elevated releases or plume rise will result in an increase in concentration at short downwind distances as the plume disperses overhead before contacting ground
Protective actions to limit dose are not taken	Protective actions may constrain dose at short downwind distances
The plume is completely reflected at the ground surface and is unconstrained by a mixing height	Highly unstable conditions can result in rapid vertical dispersion to the top of the mixing layer due to insolation of ground surface
The dose-distance reduction coefficient n is assumed to be independent of distance r .	Although crosswind (transverse) dispersion is typically represented as a power law, vertical dispersion does not follow a power law relationship with distance

Downwind Dose Reduction Coefficient

Elevated/Buoyant Plume



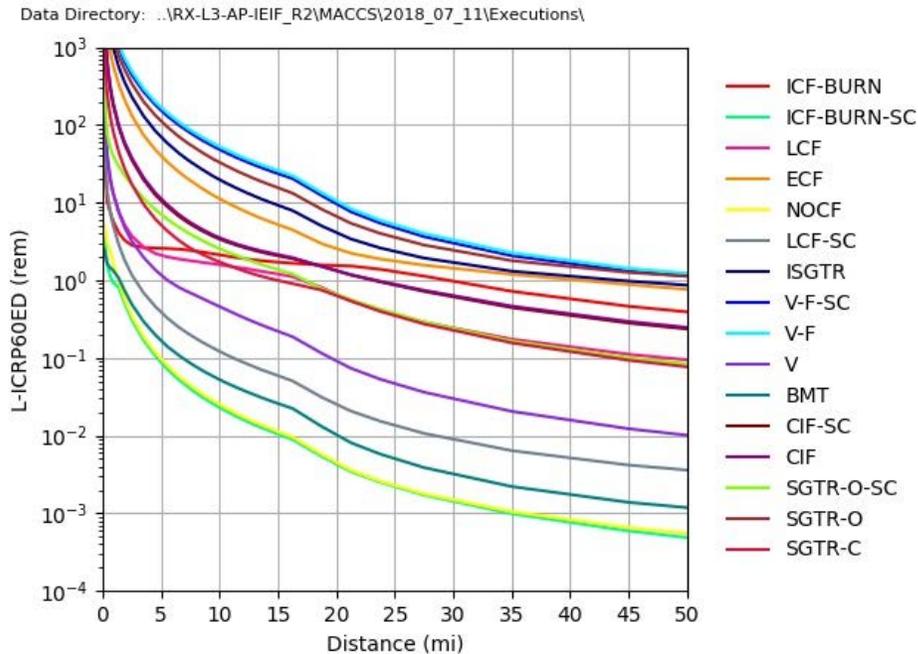
Normalized relative peak dose as a function of downwind distance and stability class

Normalized to a constant core scaling factor and maximum peak dose

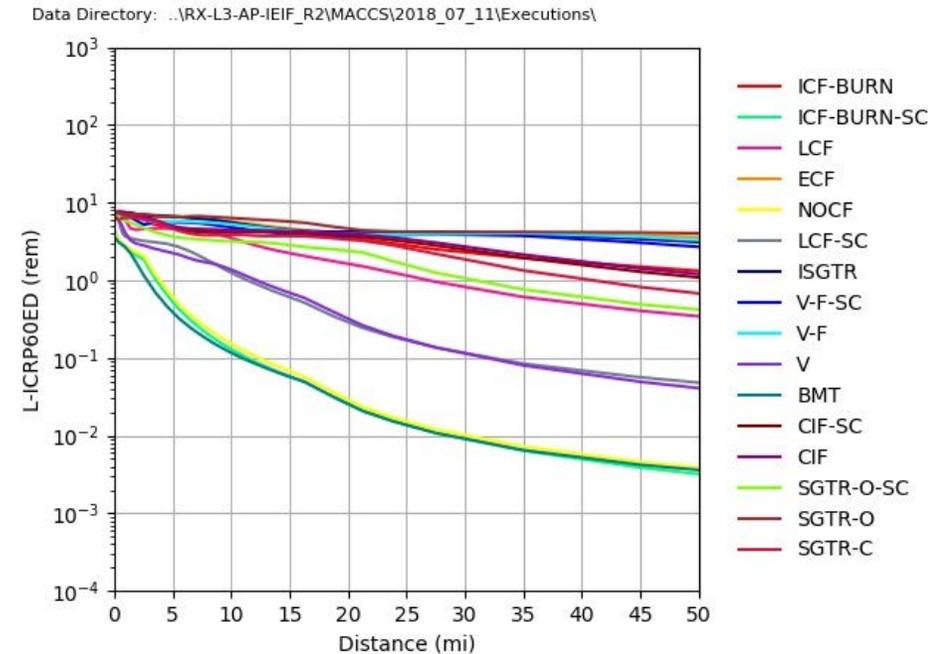
Downwind Dose Reduction Coefficient

Effect of Protective Actions

- The flatness of the ICF-BURN (red) curve out to 20 miles, and the latent cancer fatality (LCF) (magenta) curve out to 15 miles, is due to early-phase hotspot relocation within 12 hours coupled with a relatively prolonged release
- Doses incurred during the late phase are low near the site, but do not appreciably decline with distance from the site for the most severe scenarios.



Mean value (across all weather trials) of peak total effective dose (rem) from early-phase exposure to the non-evacuating cohort

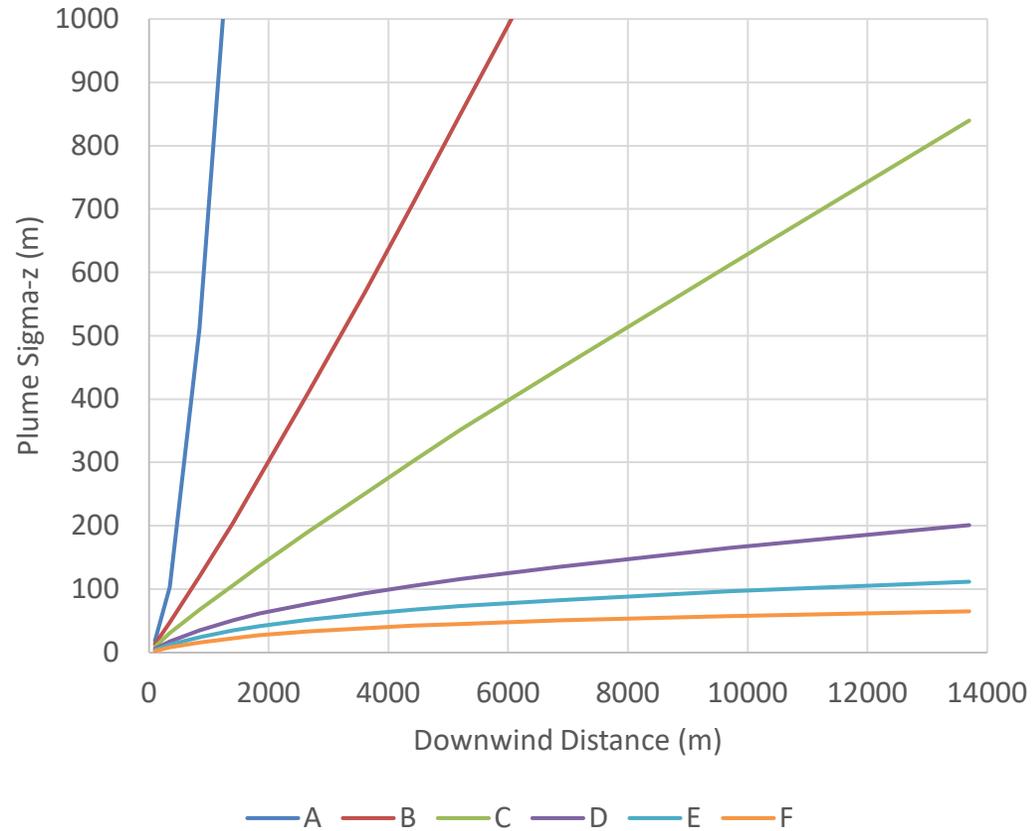


Mean value (across all weather trials) of peak total effective dose (rem) from late-phase exposure

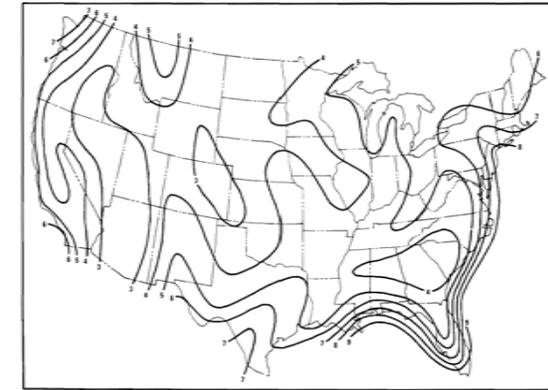
Source: NRC 2022

Downwind Dose Reduction Coefficient

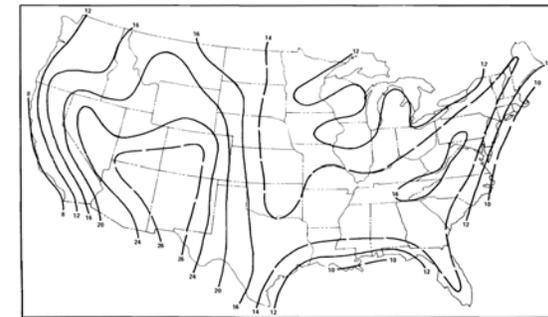
Mixing Height



Plume sigma z (m) as a function of downwind distance



Isopleths of mean annual morning mixing height ($m \cdot 10^{-2}$) as a function of downwind distance
Isopleth levels: 300 - 900 m

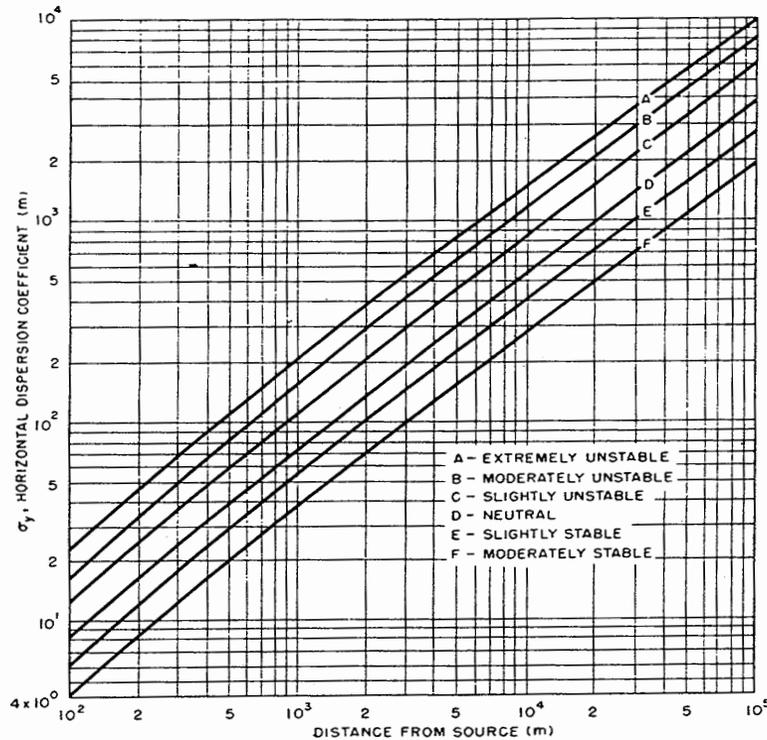


Isopleths of mean annual afternoon mixing height ($m \cdot 10^{-2}$) as a function of downwind distance
Isopleth levels: 800 - 2600 m

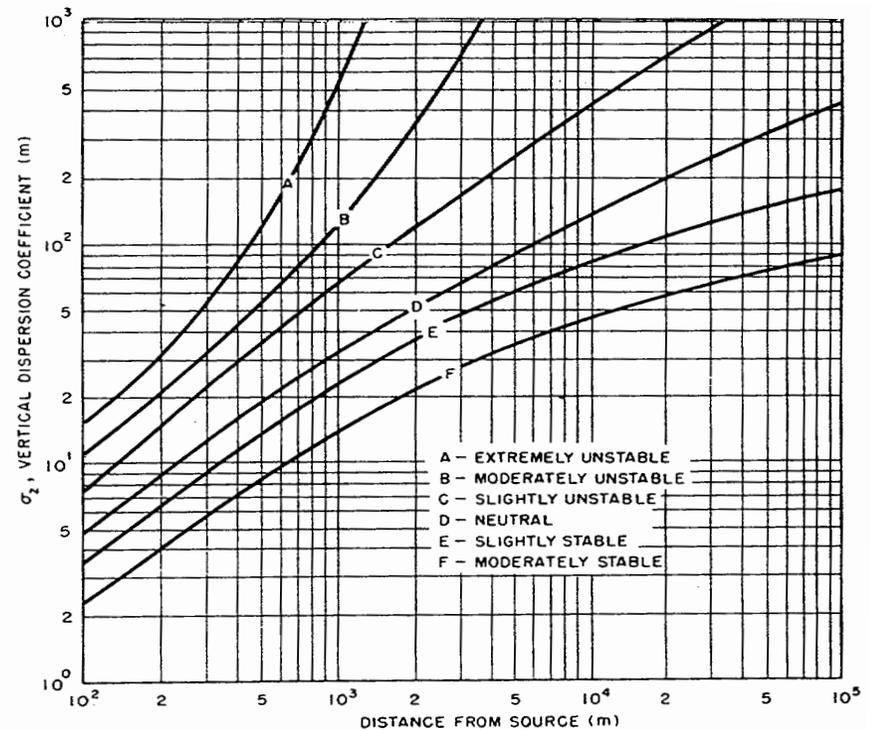
Sources: Case 2 Model Output Files; Holzworth 1972

Downwind Dose Reduction Coefficient

Power Law Coefficient with Distance



Lateral diffusion without meander and building wake effects (σ_y) vs. downwind distance from source for Pasquill's turbulence types (atmospheric stability)



Vertical diffusion without meander and building wake effects (σ_z) vs. downwind distance from source for Pasquill's turbulence types (atmospheric stability)

Source: Reference 7 of NRC 1983

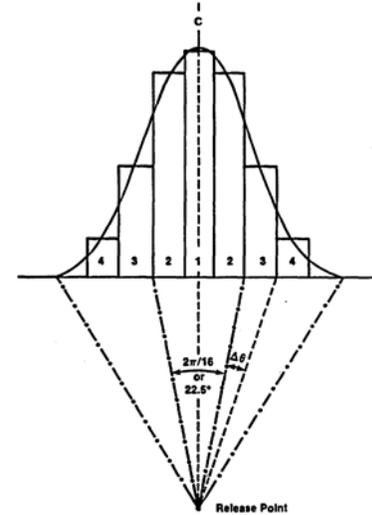
Single Plume Azimuthal Correction Factor

- A single plume azimuthal correction factor $\varphi(r)$ is defined as the ratio between peak individual dose δ_{\max} from a single plume at a distance r and the individual dose δ averaged across the circumference of a circle of radius r .
- Assuming (Tadmor and Gur, 1969) that the crosswind dispersion factor may be represented as a power function given by $\sigma_y = A_y r^{B_y}$, the azimuthal correction factor may be represented as:

$$\varphi(r) = \frac{A_y r^{B_y}}{\sqrt{2\pi r}} = \frac{A_y}{\sqrt{2\pi}} r^{(B_y-1)}$$

- An alternative would be to simply assume that the crosswind plume spread may be represented by a “tophat” with a width of one 22.5° sector, resulting in an azimuthal correction factor of 0.0625 (1/16)

Figure Source: Jow et al. 1990



Stability Class	A_y	B_y	$\varphi(r)$ 100 m	$\varphi(r)$ 10 mi
A	0.3658	0.9031	0.0934	0.0571
B	0.2751	0.9031	0.0702	0.0429
C	0.2089	0.9031	0.0533	0.0326
D	0.1471	0.9031	0.0376	0.0230
E	0.1046	0.9031	0.0267	0.0163
F	0.0722	0.9031	0.0184	0.0113
G	0.0481	0.9031	0.0123	0.0075

Maximum Dose vs Average Dose / Risk over an Annular Region

For $n \neq B_y + 1$, the average individual dose $\overline{d(x)}$ in the annular region between r_0 and x may be expressed as:

$$\overline{d(x)} = \frac{2A_y r_0^n (x^{B_y - n + 1} - r_0^{B_y - n + 1})}{\sqrt{2\pi}(x^2 - r_0^2)(B_y - n + 1)} d_{max, r_0}$$

The average individual cancer risk $\overline{R(x)}$ in the annular region between r_0 and x may be expressed as :

$$\overline{R(x)} = \frac{2A_y r_0^n (x^{B_y - n + 1} - r_0^{B_y - n + 1})}{\sqrt{2\pi}(x^2 - r_0^2)(B_y - n + 1)} d_{max, r_0} \gamma$$

Where:

- A_y is the power law linear coefficient for transverse dispersion
- B_y is the power law exponent for transverse dispersion
- d_{max, r_0} is the peak centerline dose at the inner annular radius (e.g., 100 m)
- r_0 is the inner annular radius (e.g., 100 m)
- x is the outer annular radius (e.g., 16,090 m (10 mi))
- n is the downwind dose reduction coefficient

Approach

- Develop a set of MACCS modeling cases to quantitatively examine impact of assumptions
- Use source terms from NRC Level 3 PRA reactor at-power internal events and internal floods Level 2 analyses to represent a range of source term compositions
- Apply scaling factors to source terms to yield a 25 rem (0.25 Sv) lifetime* dose at 100 m
- Use combinations of constant weather conditions, constant population density, and meteorological and site files from SOARCA (state-of-the-art reactor consequence analyses) analyses to examine impact of variability in weather condition and population density

** Lifetime dose, in this analysis, is assumed to be the dose resulting from a 96-hour (4 day) early phase exposure and a 50-year late phase exposure.*

Summary of Source Terms

Source Term Characteristics

- All source terms are inventory-scaled to yield 25 rem overall (EARLY+CHRONC) dose at 100 m
- Base case plume is based on intersystem loss-of-coolant accident (VF/5D) source term
- Scaled source terms may vary in relative radionuclide composition and release duration
- Single segment plume are created by summing/averaging properties for individual plume segments.
Multi-plume releases capture the time dependence of the release.

RC	Case	Release Category Description	NUMREL	PDELAY (hr)	PLUDUR (50%) (hr)	PLUDUR (100%) (hr)	PLHITE (m)	PLHEAT (MW)
VF	5D	Unscrubbed interfacing systems loss-of-coolant accident with auxiliary building failure	86	3.2	4.5	68.8	11	19
LCF	1B	Late containment due to long-term quasi-static overpressure, unscrubbed	179	48	32.1	120.0	0.36	5.9
NOCF	2R1	Containment is not bypassed or failed, and radiological release to the environment occurs via design-basis containment leakage only.	199	13	89.9	154.5	32	0.0026

RC	Case	Xe	Cs	Ba	I	Te	Ru	Mo	Ce	La
VF	5D	8.6E-01	1.3E-01	2.1E-03	1.4E-01	1.3E-01	2.6E-03	3.3E-02	9.3E-05	2.7E-06
LCF	1B	9.1E-01	9.9E-03	3.0E-04	1.2E-02	1.1E-02	6.6E-06	4.0E-02	1.4E-06	5.8E-07
NOCF	2R1	1.0E-02	7.4E-05	2.4E-06	8.5E-05	7.9E-05	3.7E-06	2.0E-04	2.3E-08	2.0E-08

Source: adapted from Tables 3.1-1 and A.1a in NRC 2022

Summary of Modeling Cases

- Modeling cases designed to test effect of key assumptions related to plume rise, wake effects, protective actions, plume segmentation, weather variability, and population density

Case	Dose Reduction Coefficient	Effects	Azimuthal Variation	Population Density
0A-F*	Single Stabilities - A-F	Power Law Stability	Single Plume - VF	Constant
1A-F*	Single Stabilities - A-F	Pasquill-Gifford Stability	Single Plume - VF	Constant
2A-F*	Single Stabilities - A-F	Plume Rise	Single Plume - VF	Constant
3A-F*	Single Stabilities - A-F	Wake Effects	Single Plume - VF	Constant
4A-F*	Single Stabilities - A-F	Protective Actions	Single Plume - VF	Constant
5A-B	Met Sampling - PB	None/Plume Rise	Single Plume - VF	Constant
6A-C	Met Sampling - PB	None	Multiplume - VF/LCF/NOCF	Constant
7A-C	Met Sampling - PB	None	Multiplume - VF/LCF/NOCF	PB

* Each stability class (A-F) represent a separate subcase for these cases. For example, Case 2A represents Case 2 with stability class A, Case 3F represents Case 3 with stability class F, etc.

Case 0: Simple Model

Results

- Simplest Case
 - Power law representation for σ_y and σ_z with constant parameters
 - Constant weather conditions – specified stabilities, 2.5 m/s, no rain, mixing layer depth 10 km
 - Constant deposition velocity (0.003 m/s)
 - Single plume – scaled VF source term, ground level release with no plume buoyancy (plume heat of 0 MW)
 - Uniform population density with no protective actions
 - Single cancer risk coefficient based on total effective dose
- “Fitted n” derived from power law regression of MACCS results (see supplemental slides)
- Lifetime dose of 25 rem yields 10-mile ILCFR from 3.6e-8 to 3.4e-7
- All cases produce MACCS ILFCR <2e-6
- Difference between MACCS and analytic calculation ranges from 3.6% to 470%

Case	OVERALL Peak dose (Sv) at 100 m	EARLY Peak dose (Sv) at 100 m	CHRONC Peak dose (Sv) at 100 m	MACCS 10- mile ILCFR	P-G n	MACCS fitted n	Analytic 10-mile ILCFR	Percent Difference
0A	0.25	0.02	0.23	3.6E-08	3.0	2.4	2.0E-07	470%
0B	0.25	0.02	0.23	5.5E-08	2.5	2.4	1.4E-07	160%
0C	0.25	0.02	0.23	2.9E-07	1.8	1.8	4.2E-07	47%
0D	0.25	0.02	0.23	3.4E-07	1.6	1.6	4.6E-07	32%
0E	0.25	0.02	0.23	2.9E-07	1.5	1.6	3.6E-07	21%
0F	0.25	0.02	0.23	2.0E-07	1.5	1.7	2.0E-07	3.6%

Case 1: Pasquill-Gifford Stability

Results

- Differences from Case 0:
 - 1000-m deep boundary layer
 - Eimutis and Konicek representation for σ_y and σ_z with spatially variable parameters for σ_z
 - Particle-size-dependent deposition velocity
 - Organ-specific cancer risk coefficients
- Lifetime dose of 25 rem yields 10-mile ILCFR from 1.4e-7 to 3.3e-7
- Difference between MACCS and analytic calculation ranges from 40% to 264%
- Analytic calculation is conservative relative to MACCS calculation
- All cases produce MACCS ILFCR <2e-6

Case	OVERALL Peak dose (Sv) at 100 m	EARLY Peak dose (Sv) at 100 m	CHRONC Peak dose (Sv) at 100 m	MACCS 10- mile ILCFR	P-G n	MACCS fitted n	Analytic 10-mile ILCFR	Percent Difference
1A	2.5E-01	2.3E-02	2.3E-01	3.3E-07	3.0	1.6	1.2E-06	260%
2B	2.5E-01	2.3E-02	2.3E-01	2.5E-07	2.5	1.8	5.0E-07	100%
2C	2.5E-01	2.3E-02	2.3E-01	2.2E-07	1.8	1.8	3.7E-07	68%
2D	2.5E-01	2.4E-02	2.3E-01	2.4E-07	1.6	1.7	4.0E-07	65%
2E	2.5E-01	2.5E-02	2.3E-01	2.0E-07	1.5	1.7	3.1E-07	54%
2F	2.5E-01	2.7E-02	2.2E-01	1.4E-07	1.5	1.7	1.9E-07	40%

Case 2: Plume Buoyancy

Results

- Difference from Case 1: Ground-level release with plume buoyancy based on 19 MW plume heat
- Lifetime dose of 25 rem yields 10-mile ILCFR from 2.5e-5 to 6.1 e-3
- Difference between MACCS and analytic calculation ranges from 38% to 566%
- Analytic calculation can be either conservative or non-conservative relative to MACCS calculation
- All cases produce MACCS ILCFR > 2e-6

Case	OVERALL Peak dose (Sv) at 100 m	EARLY Peak dose (Sv) at 100 m	CHRONC Peak dose (Sv) at 100 m	MACCS 10- mile ILCFR	MACCS fitted n	Analytic 10-mile ILCFR	Percent Difference
2A	2.5E-01	2.6E-02	2.3E-01	2.5E-05	0.9	1.6E-05	-38%
2B	2.5E-01	1.0E-01	1.5E-01	8.0E-04	0.1	4.3E-04	-47%
2C	2.5E-01	2.5E-01	4.9E-04	2.3E-03	-0.6	8.0E-03	244%
2D	2.5E-01	2.5E-01	9.8E-13	1.9E-03	-0.8	1.3E-02	566%
2E	2.5E-01	2.5E-01	0.0E+00	5.4E-03	-1.0	2.3E-02	331%
2F	2.5E-01	2.5E-01	0.0E+00	6.1E-03	-1.0	2.2E-02	256%

Case 3: Wake Effects

Results

- Difference from Case 1: Eimutis and Konicek representation for σ_y and σ_z coupled with Ramsdell-Fosmire model for plume meander and wake effects
- Lifetime dose of 25 rem yields 10-mile ILCFR from 5.5e-7 to 1.9e-6
- Difference between MACCS and analytic calculation ranges from 3% to 210%
- Analytic calculation generally conservative relative to MACCS calculation
- All cases produce MACCS ILCFR <2e-6

Case	OVERALL Peak dose (Sv) at 100 m	EARLY Peak dose (Sv) at 100 m	CHRONC Peak dose (Sv) at 100 m	MACCS 10- mile ILCFR	MACCS fitted n	Analytic 10-mile ILCFR	Percent Difference
3A	2.5E-01	2.3E-02	2.3E-01	5.5E-07	1.5	1.7E-06	210%
3B	2.5E-01	2.3E-02	2.3E-01	5.3E-07	1.7	8.1E-07	53%
3C	2.5E-01	2.3E-02	2.3E-01	6.3E-07	1.6	7.3E-07	16%
3D	2.5E-01	2.3E-02	2.3E-01	1.2E-06	1.3	1.3E-06	13%
3E	2.5E-01	2.3E-02	2.3E-01	1.5E-06	1.2	1.5E-06	2.7%
3F	2.5E-01	2.3E-02	2.3E-01	1.9E-06	1.1	1.7E-06	-11%

Case 4: Protective Actions

Results

- Difference from Case 1: Early phase relocation at 1-5 rem and late phase interdiction/decontamination at 2 rem in first year and 500 mrem in second year
- Lifetime dose of 25 rem yields 10-mile ILCFR from 1.5e-6 to 4.1e-6
- Difference between MACCS and analytic calculation ranges from 17% to 47%
- Analytic calculation is generally non-conservative relative to MACCS calculation
- Most cases produce MACCS ILCFR >2e-6

Case	OVERALL Peak dose (Sv) at 100 m	EARLY Peak dose (Sv) at 100 m	CHRONC Peak dose (Sv) at 100 m	MACCS 10- mile ILCFR	MACCS fitted n	Analytic 10-mile ILCFR	Percent Difference
4A	2.5E-01	1.9E-01	6.1E-02	4.1E-06	1.2	6.0E-06	47%
4B	2.5E-01	1.9E-01	6.1E-02	3.1E-06	1.4	2.2E-06	-29%
4C	2.5E-01	1.9E-01	6.0E-02	2.6E-06	1.3	1.8E-06	-31%
4D	2.5E-01	1.9E-01	6.0E-02	2.8E-06	1.2	2.3E-06	-17%
4E	2.5E-01	1.9E-01	5.9E-02	2.2E-06	1.2	1.7E-06	-23%
4F	2.5E-01	1.9E-01	5.7E-02	1.5E-06	1.2	9.1E-07	-38%

Case 5: Meteorological Sampling

Results

- Difference from Case 1: Weather sampled from SOARCA Peach Bottom meteorological file without (5A) and with (5B) plume buoyancy
- Lifetime dose of 25 rem yields 10-mile ILCFR from 1.3e-7 to 1.4e-6
- Difference between MACCS and analytic calculation ranges from 220% to 240%
- Analytic calculation is conservative relative to MACCS calculation

Case	OVERALL Peak dose (Sv) at 100 m	EARLY Peak dose (Sv) at 100 m	CHRONC Peak dose (Sv) at 100 m	MACCS 10- mile ILCFR	MACCS fitted n	Analytic 10-mile ILCFR*	Percent Difference
5A	2.5E-01	2.7E-02	2.2E-01	1.3E-07	1.8	4.5E-07	238%
5B	2.5E-01	2.3E-02	2.3E-01	1.4E-06	1.1	4.5E-06	222%

* Transverse dispersion assumed consistent with slightly unstable conditions

Case 6: Multiple Plumes

Results

- Difference from Case 1:
 - Weather sampled from SOARCA Peach Bottom meteorological file
 - Multiple plume segments – scaled VF (6A) / LCF (6B) / NOCF (6C) source terms
- Lifetime dose of 25 rem yields 10-mile ILCFR from $1.3e-7$ to $2.9e-7$ for different source terms
- Difference between MACCS and analytic calculation ranges from 45% to 460% for different source terms
- Analytic calculation is conservative relative to MACCS calculation
- MACCS ILCFR is comparable to Case 5 (single plume) for source term 5D

Case	OVERALL Peak dose (Sv) at 100 m	EARLY Peak dose (Sv) at 100 m	CHRONC Peak dose (Sv) at 100 m	MACCS 10- mile ILCFR	MACCS fitted n	Analytic 10-mile ILCFR*	Percent Difference
6A	2.5E-01	2.2E-02	2.3E-01	1.3E-07	1.8	7.0E-07	460%
6B	2.5E-01	1.8E-02	2.3E-01	2.9E-07	2.0	4.3E-07	45%
6C	2.5E-01	6.7E-03	2.4E-01	1.3E-07	2.0	4.0E-07	210%

* Transverse dispersion assumed consistent with highly unstable conditions

Case 7: Population Distribution

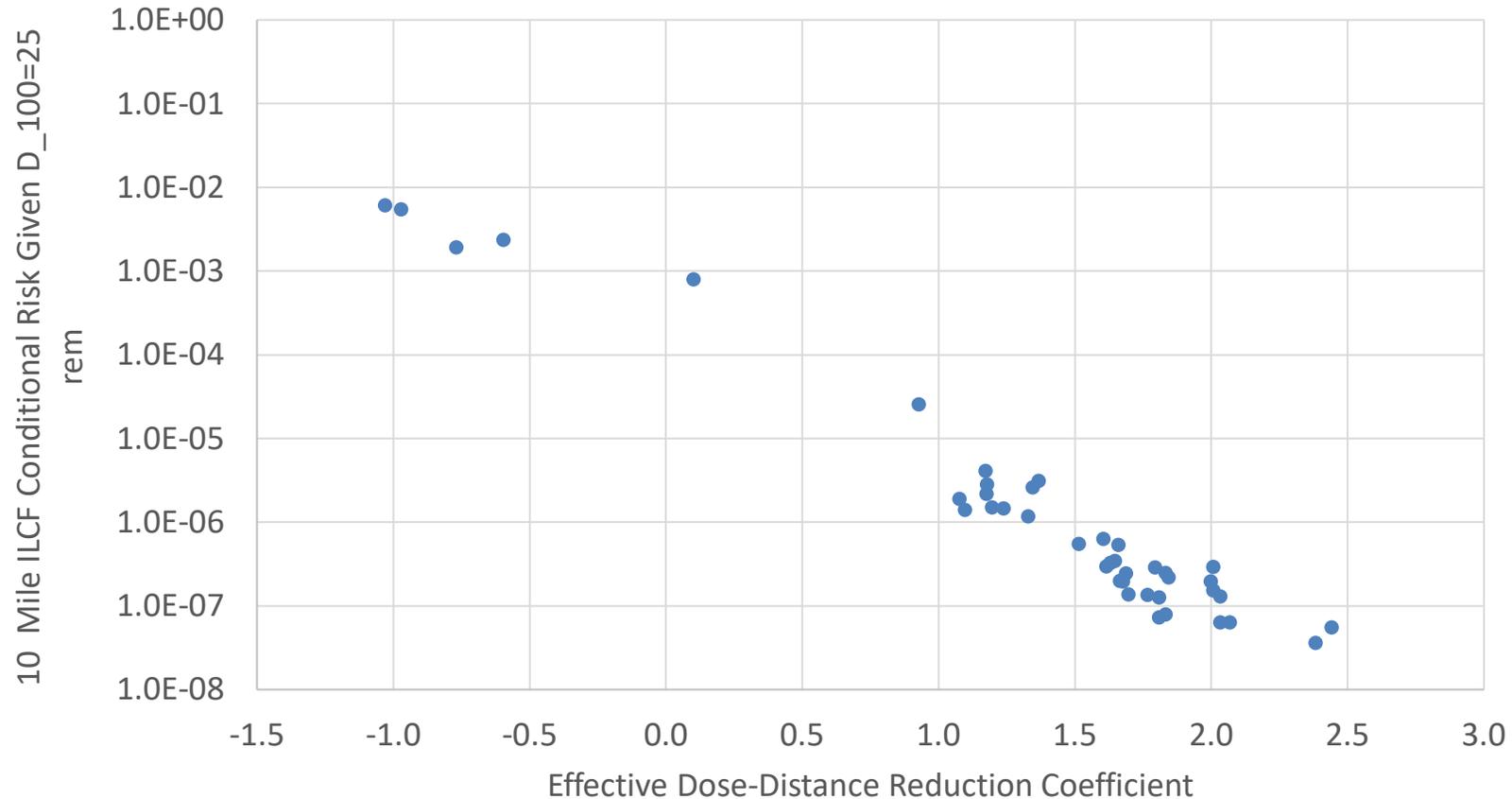
Results

- Difference from Case 1:
 - Weather sampled from SOARCA Peach Bottom meteorological file
 - Multiple plume segments – scaled VF (7A) / LCF (7B) / NOCF (7C) source terms
 - Population distribution based on Peach Bottom site file
- Lifetime dose of 25 rem yields 10-mile ILCFR from 6.3e-8 to 1.5e-7 for different source terms
- Difference between MACCS and analytic calculation ranges from 180% to 866%
- Realistic population distribution resulted on lower ILCFR relative to Case 6, particularly for “pulse” type releases such as VF/5D.

Case	OVERALL Peak dose (Sv) at 100 m	EARLY Peak dose (Sv) at 100 m	CHRONC Peak dose (Sv) at 100 m	MACCS 10- mile ILCFR	MACCS fitted n	Analytic 10-mile ILCFR*	Percent Difference
7A	2.5E-01	2.2E-02	2.3E-01	7.3E-08	1.8	7.0E-07	866%
7B	2.5E-01	1.8E-02	2.3E-01	1.5E-07	2.0	4.3E-07	180%
7C	2.5E-01	6.7E-03	2.4E-01	6.3E-08	2.0	4.0E-07	537%

* *Transverse dispersion assumed consistent with highly unstable conditions*

Effect of Downwind Dose Reduction Coefficient on Individual Latent Fatality Risk within 10 miles



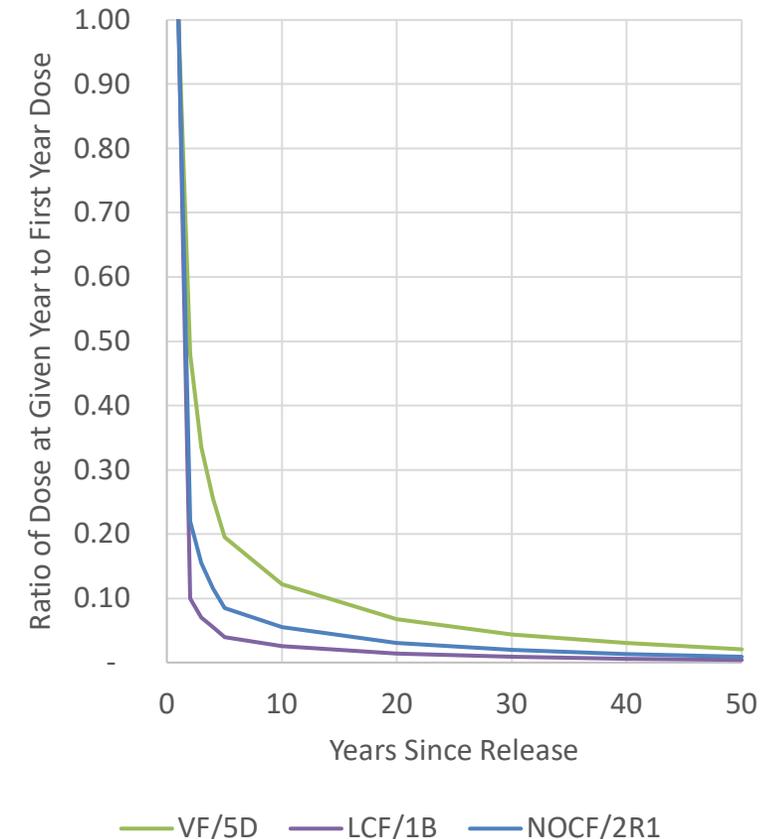
Long-Term Time Dependence of Dose

- Accumulation of dose in years after the event occurs at different rates for different source terms
- Therefore, there is likely no fixed ratio between early phase dose, first year dose, and 50-year cumulative dose
- However, for the scaled source terms considered in this analysis, a first-year dose of 2 rem appears to correspond to a lifetime dose* less than 25 rem, probably due to radioactive decay and the effect of weathering on groundshine and resuspension

Case	Early Phase	First Year CHRONC	Second Year CHRONC	50 year Cumul CHRONC*	50 year Cumul TOTAL*
PAGs	1-5	2	0.5	Not specified	Not specified
VF/5D	0.70	2.0	1.0	9.0	9.7
LCF/1B	0.13	2.0	0.2	3.5	3.6
NOCF/2R1	0.11	2.0	0.4	5.2	5.3

* Cumul.: cumulative

* Lifetime dose, in this analysis, is assumed to be the dose resulting from a 96-hour (4 day) early phase exposure and a 50-year late phase exposure.

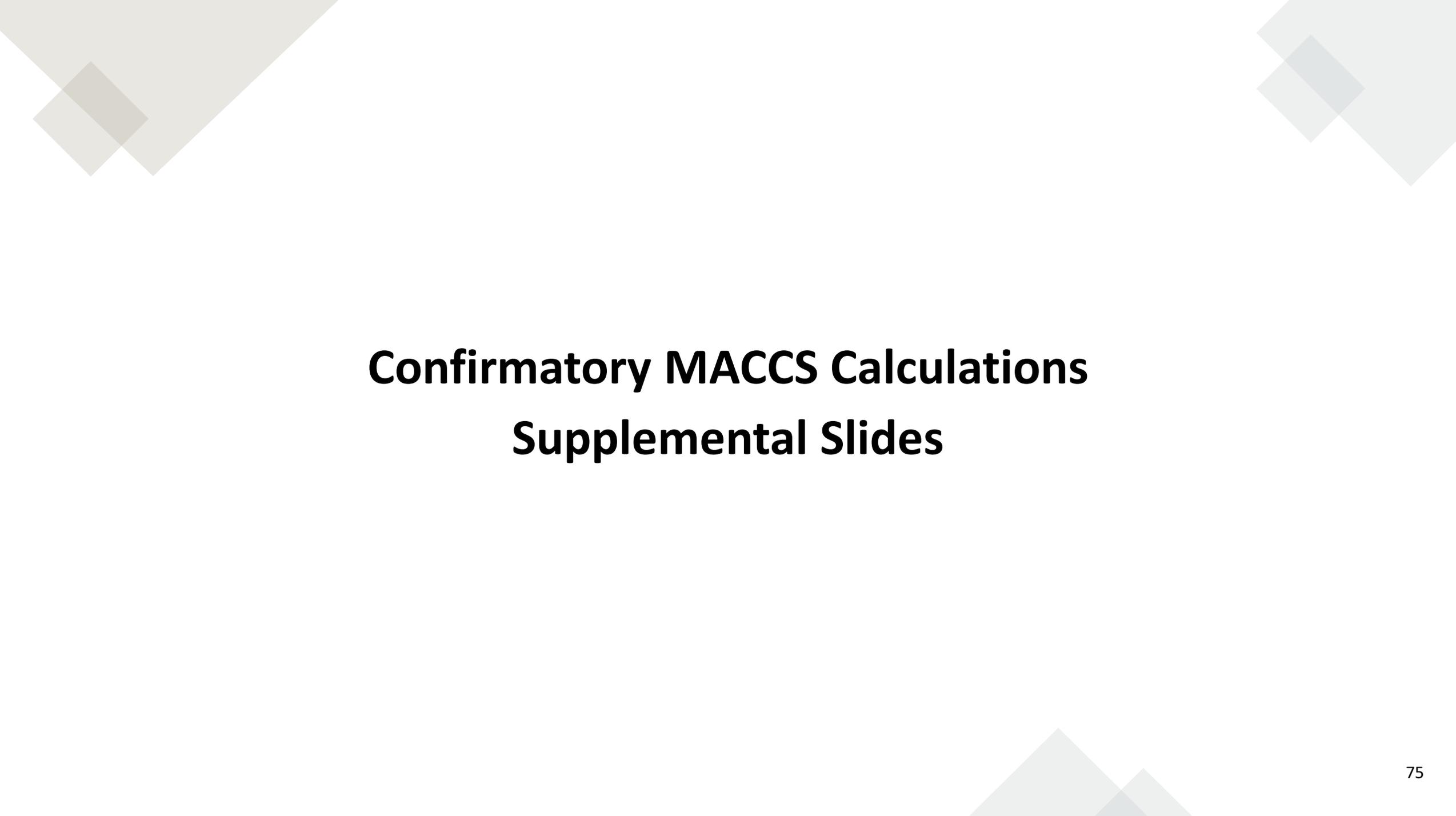


Summary

- Analytic derivation of relationship between 100 m lifetime dose and 10-mile population-weighted ILCFR developed and used to identify assumptions for examination with MACCS.
- A 25-rem lifetime dose at 100 meters generally corresponds to a 10-mile population-weighted lifetime ILCFR less than $2e-6$, unless buoyant releases or protective actions are credited for computing dose at 100 m.
- The relationship is sensitive to the value used for the downwind dose reduction coefficient.
- There is likely no fixed ratio between early phase dose, first year dose, and 50-year cumulative dose.
- For the scaled source terms considered in this analysis, a first-year dose of 2 rem appears to correspond to a 50-year dose less than 25 rem, probably due to radioactive decay and the effect of weathering on groundshine and resuspension.

Bibliography

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- Holzworth, G.C, 1972. Mixing Heights, Wind Speeds, and Potential for Urban Air Pollution Throughout the Contiguous United States (AP-101), Research Triangle Park, NC: Office of Air Programs, U.S. Environmental Protection Agency, January 1972.
- U.S. Nuclear Regulatory Commission, 1983. Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants, Rev. 1 (RG 1.145), Washington DC: U.S. Nuclear Regulatory Commission, November 1982, Reissued February 1983 (ML003740205)
- Jow, H-N, J.L. Sprung, J.A. Rollstin, L.T. Ritchie, and D.I Chanin, 1990. “MELCOR Accident Consequence Code System (MACCS): Volume 2, Model Description” (NUREG/CR-4691 / SAND86-1562), Albuquerque, NM: Sandia National Laboratories, February 1990. (ML063560409)

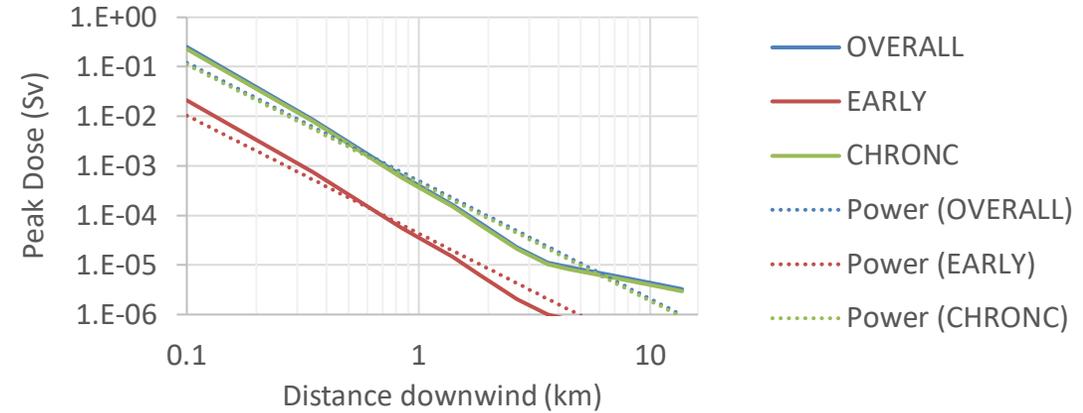
The slide features decorative geometric shapes in the corners: a light gray triangle in the top-left, a light gray triangle in the top-right, and a light gray triangle in the bottom-right. The text is centered on a white background.

Confirmatory MACCS Calculations Supplemental Slides

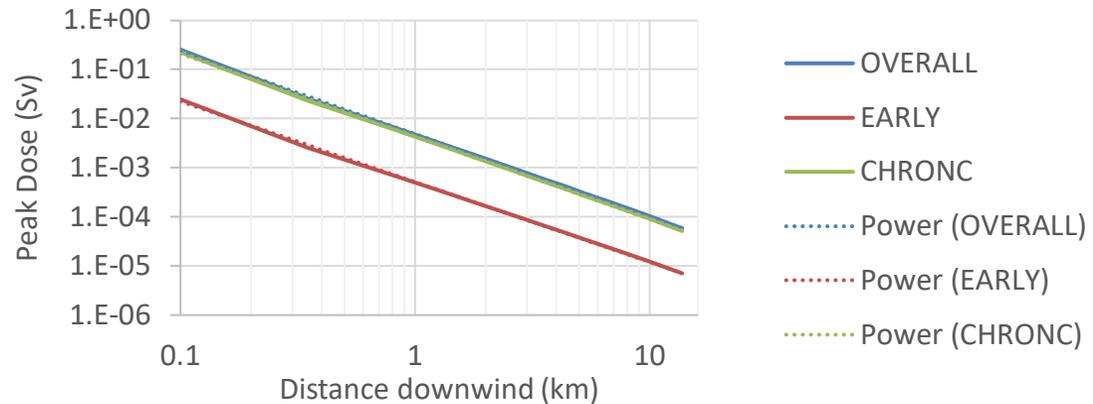
Case 0: Simple Model

Peak Dose vs Distance

Stability Class A:
Extremely Unstable



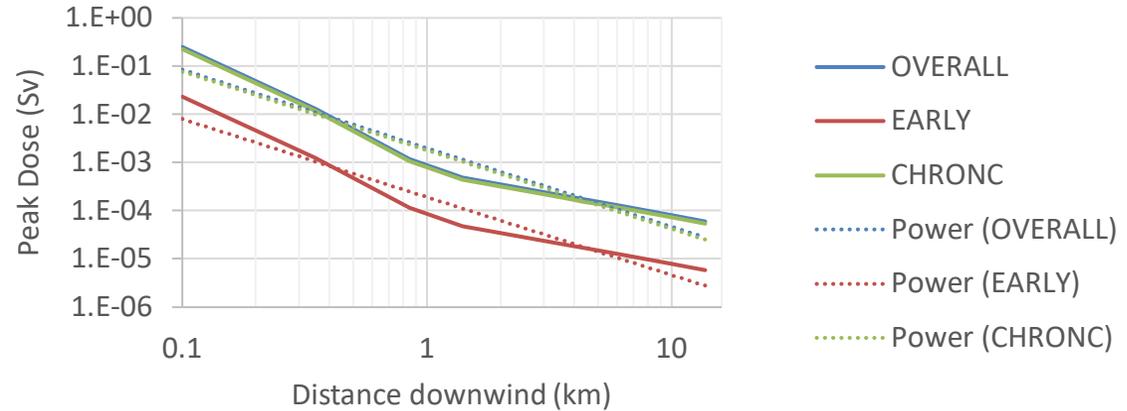
Stability Class F:
Strongly Stable



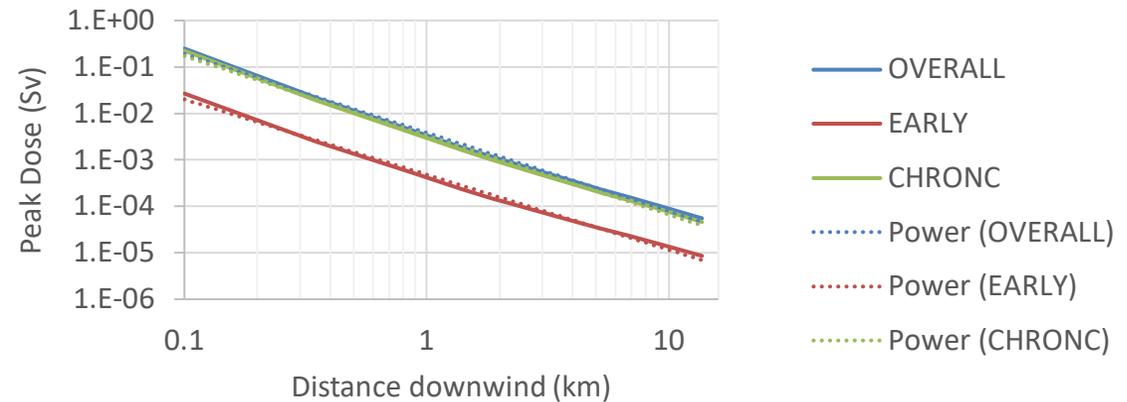
Case 1: Pasquill-Gifford Stability

Peak Dose vs Distance

Stability Class A:
Extremely Unstable



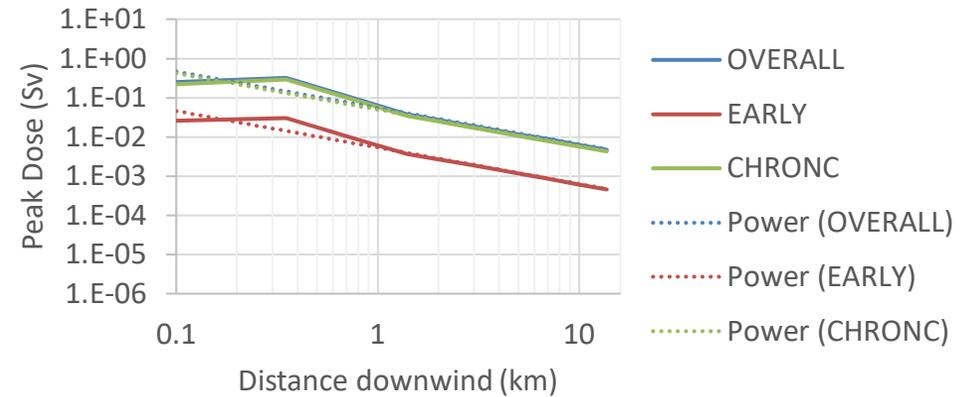
Stability Class F:
Strongly Stable



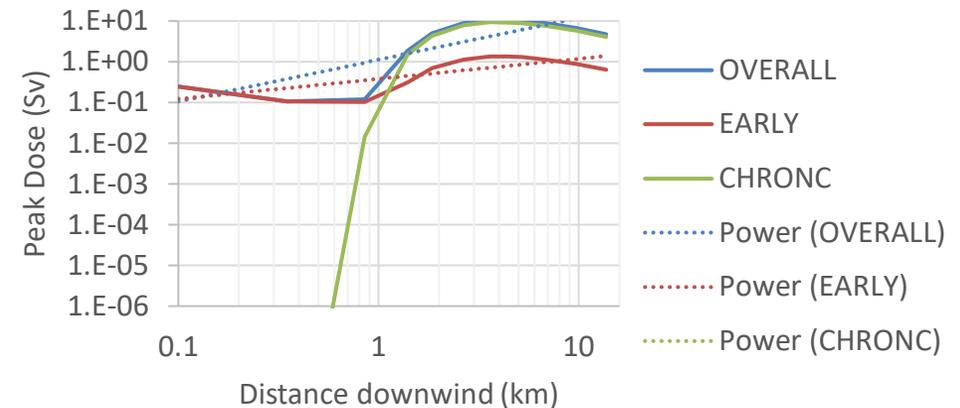
Case 2: Plume Buoyancy

Peak Dose vs Distance

Stability Class A:
Extremely Unstable



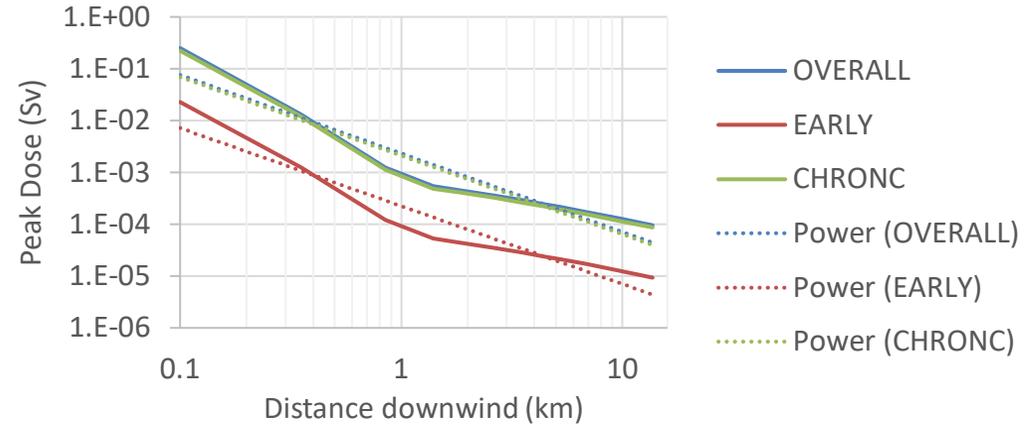
Stability Class F:
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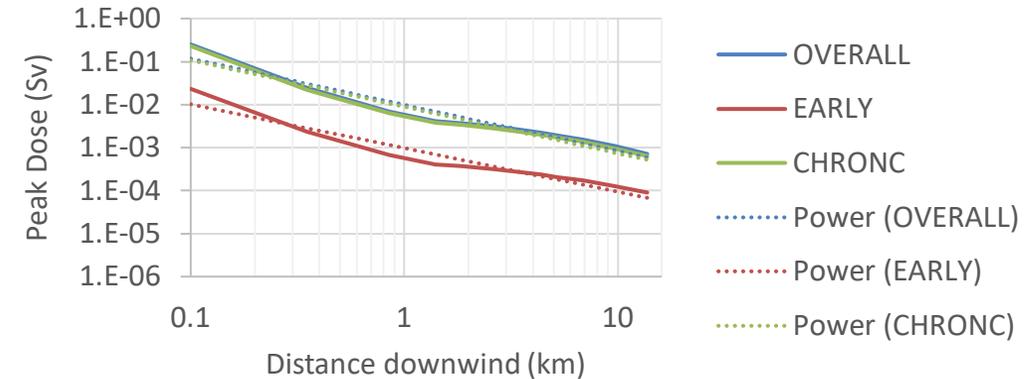
Case 3: Wake Effects

Peak Dose vs Distance

Stability Class A:
Extremely Unstable



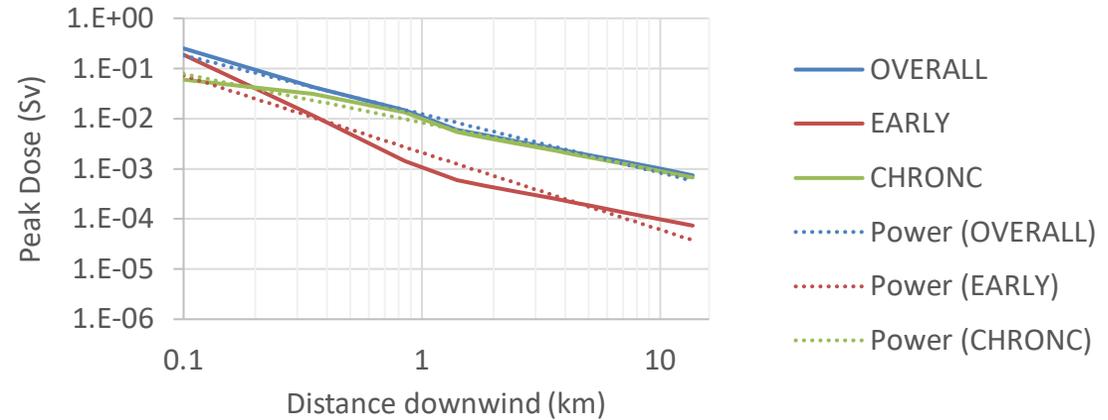
Stability Class F:
Strongly Stable



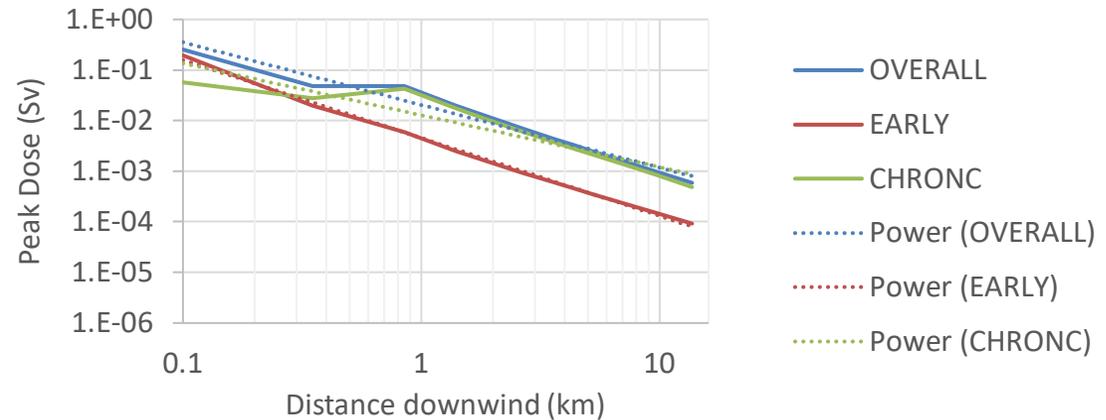
Case 4: Protective Actions

Peak Dose vs Distance

Stability Class A:
Extremely Unstable



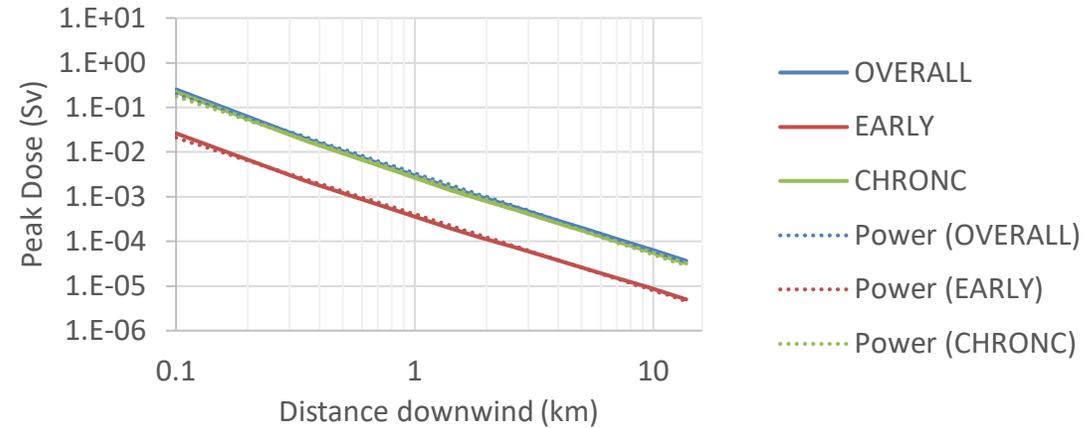
Stability Class F:
Strongly Stable



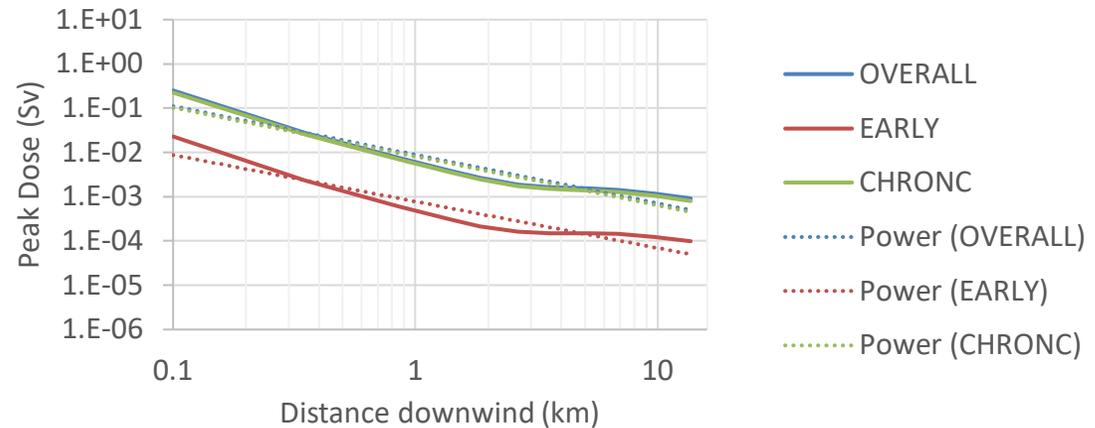
Case 5: Meteorological Sampling

Peak Dose (Mean) vs Distance

Without plume buoyancy

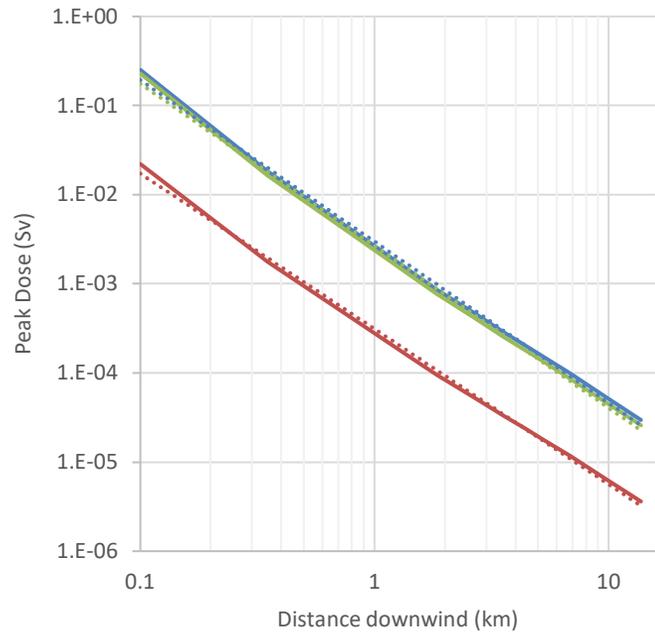


With plume buoyancy



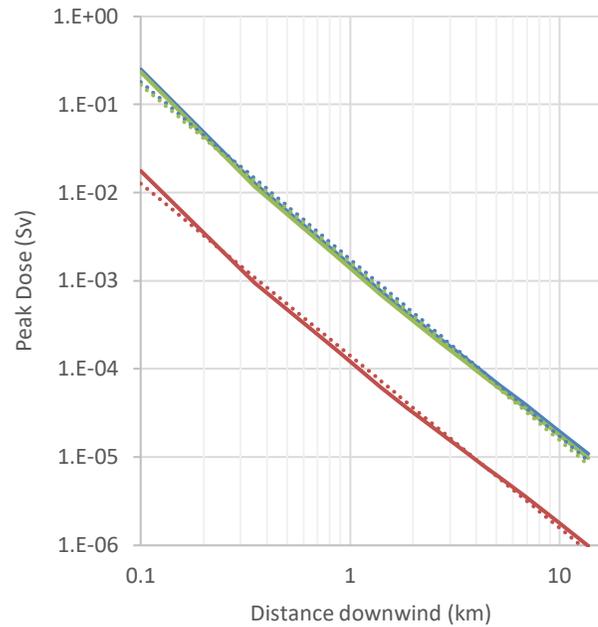
Case 6/7: Weather Sampling with Multiple Plumes

Peak Dose (Mean) vs Distance



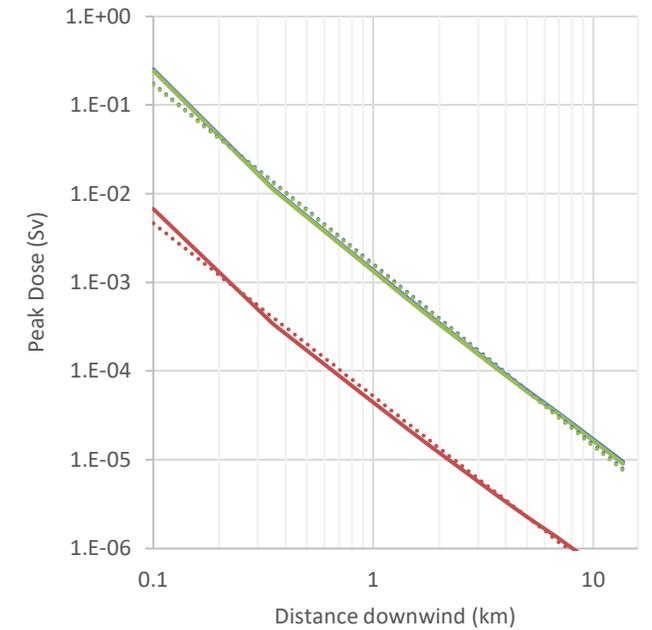
— OVERALL — EARLY — CHRONC
..... Power (OVERALL) Power (EARLY) Power (CHRONC)

VF/5D



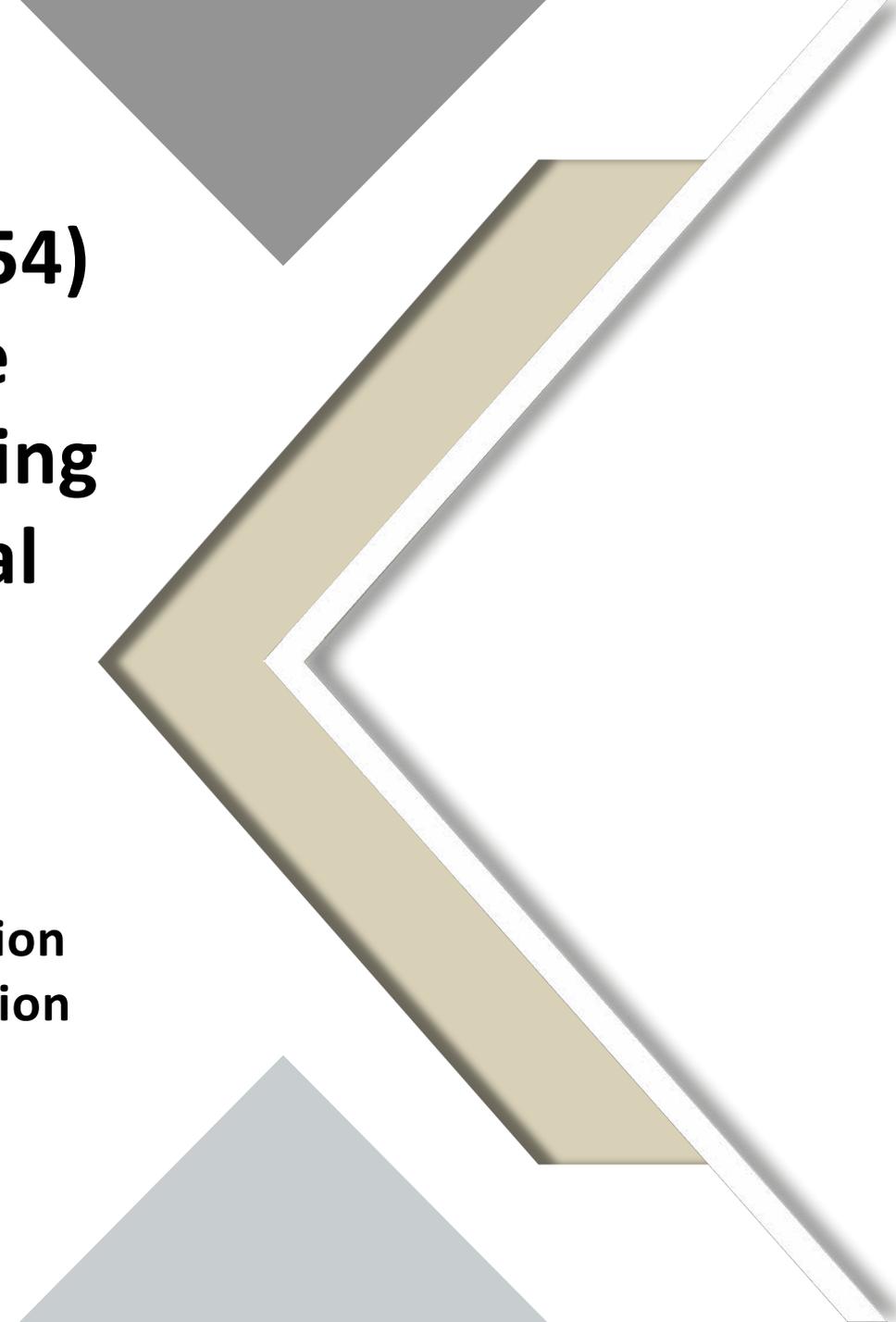
— OVERALL — EARLY — CHRONC
..... Power (OVERALL) Power (EARLY) Power (CHRONC)

LCF/1A2



— OVERALL — EARLY — CHRONC
..... Power (OVERALL) Power (EARLY) Power (CHRONC)

NOCF/2R1



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

Mihaela Biro
Division of Risk Assessment
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission

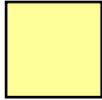
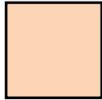
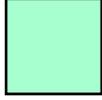
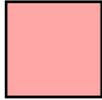
Technology-Inclusive Identification of Licensing Events for Commercial Nuclear Plants (DG-1413)

- Section A: Applies to 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 [SRP])
 - 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

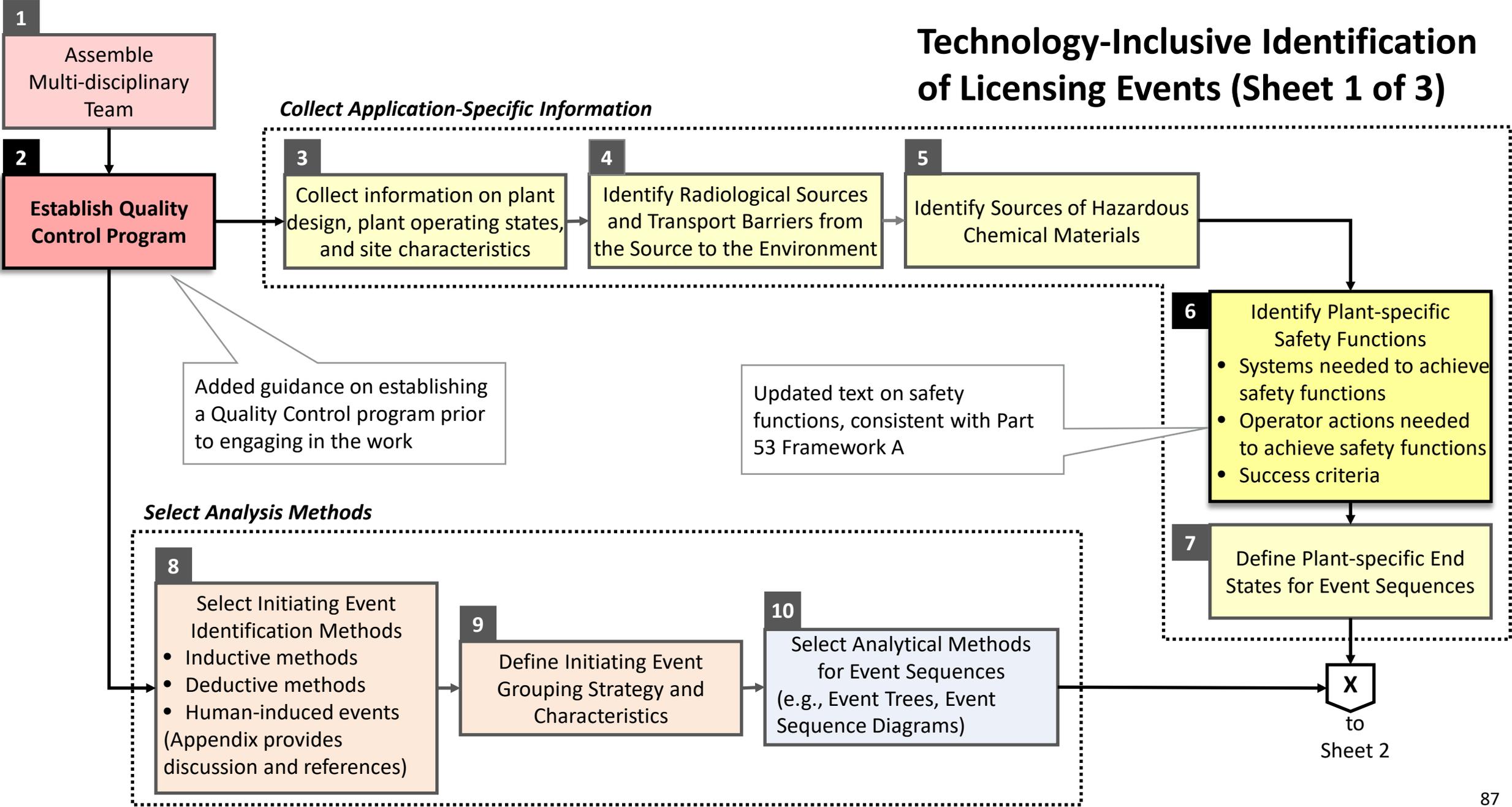
Licensing Pathways and Licensing Events

Regulation and Application Type	Reactor Type	Use of LMP	Licensing Event Categories	Risk Evaluation	
Part 50 CP, OL	LWR	not applicable (NEI 18-04, Rev. 1 and RG 1.233 currently only apply to non-LWRs licensed under Parts 50 or 52)	<ul style="list-style-type: none"> • Design-basis events (DBEs) (§ 50.49): <ul style="list-style-type: none"> ○ AOOs ○ DBAs (i.e., postulated accidents) ○ External events ○ Natural phenomena • Non-DBA (§ 50.2 alternate ac source) • Beyond-design-basis events (BDBE) • Anticipated transient without scram • Station black out 	not required (Parts 50/52 lessons-learned rulemaking)	
Part 52 DC, SDA, ML, COL				PRA required	
Part 50 CP, OL	Non-LWR	no		not required (Parts 50/52 lessons-learned rulemaking)	
Part 52 DC, SDA, ML, COL				PRA required	
Part 50 CP, OL	Non-LWR	yes		Licensing events are collectively referred to as licensing-basis events (LBEs), which include the following categories: <ul style="list-style-type: none"> • AOOs • DBEs • BDBEs • DBAs 	PRA implied by use of LMP
Part 52 DC, SDA, ML, COL					PRA required
Part 53, Framework A CP, OL, DC, SDA, ML, COL	LWR or non-LWR	not applicable (potential future update to NEI 18-04 and RG 1.233)	Licensing events are collectively referred to as LBEs, which include the following categories: <ul style="list-style-type: none"> • AOOs • Unlikely event sequences • Very unlikely event sequences • DBAs 	PRA required	
Part 53, Framework B CP, OL, DC, SDA, ML, COL	LWR or non-LWR	not applicable	<ul style="list-style-type: none"> • AOOs • DBAs • Additional licensing-basis events • Severe accidents 	PRA or AERI required	

Overarching Principles

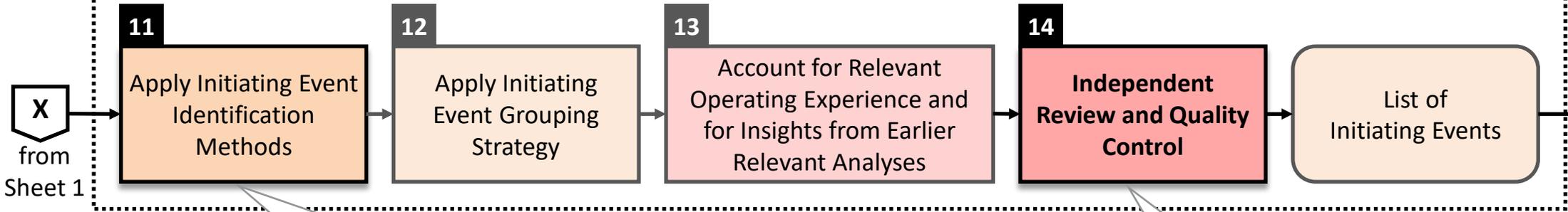
-  Identify application-specific factors (licensing framework, plant-specific design features, and site characteristics).
-  Conduct a systematic and comprehensive search for initiating events.
-  Use a systematic process to delineate a comprehensive set of event sequences.
-  Group initiating events and event sequences into designated licensing event categories according to the selected licensing framework.
-  Provide assurance that the set of licensing events is sufficient.

Technology-Inclusive Identification of Licensing Events (Sheet 1 of 3)



Technology-Inclusive Identification of Licensing Events (Sheet 2 of 3)

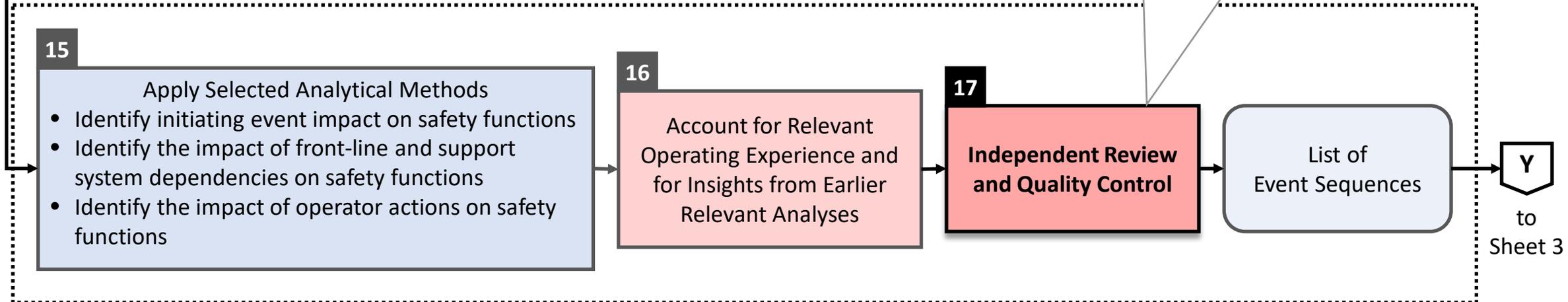
Initiating Event Analysis



Added references for listing of external hazards.

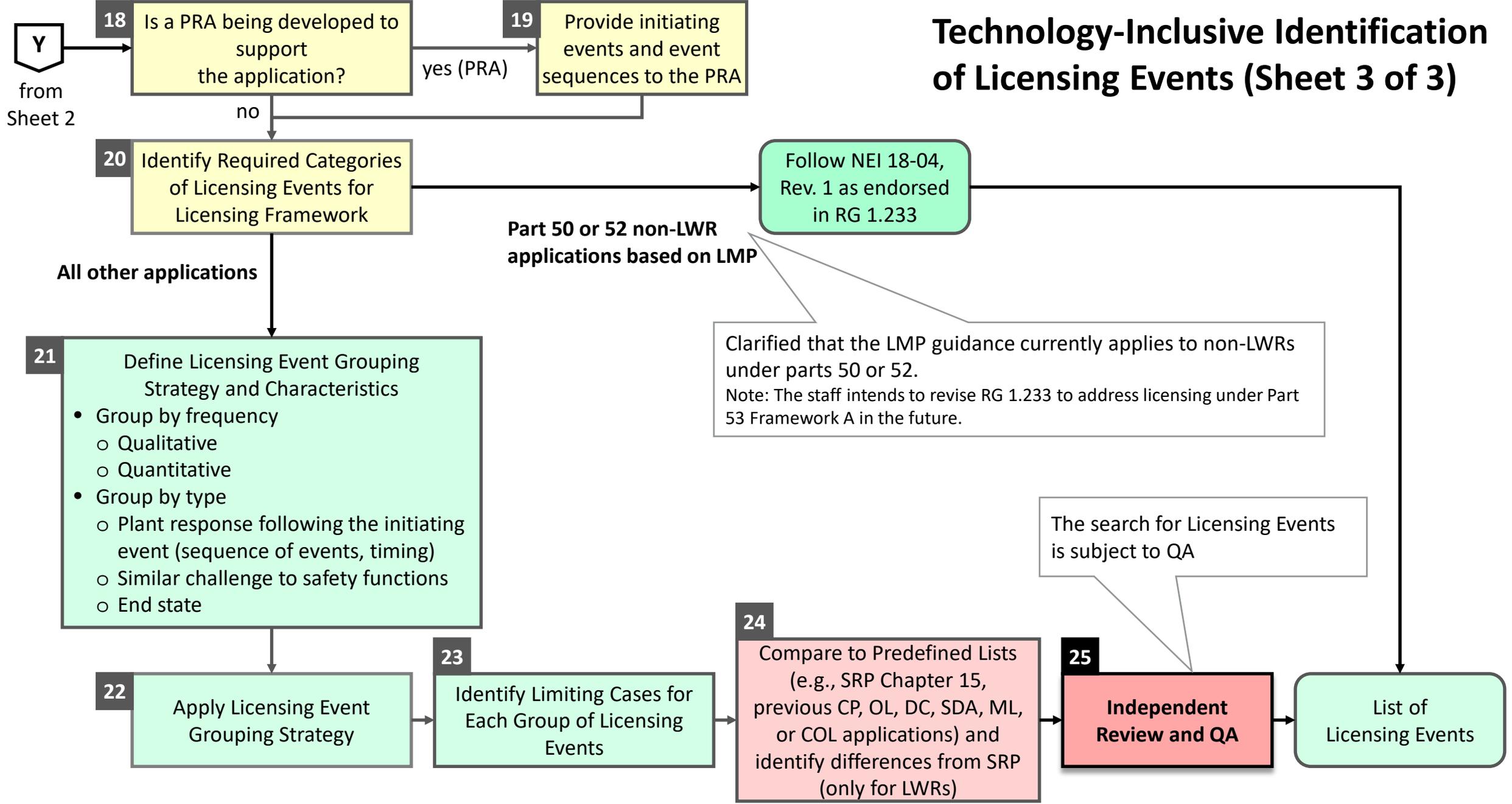
The search for Initiating Events and Event Sequences is subject to Quality Control (not QA)

Event Sequence Selection



to Sheet 3

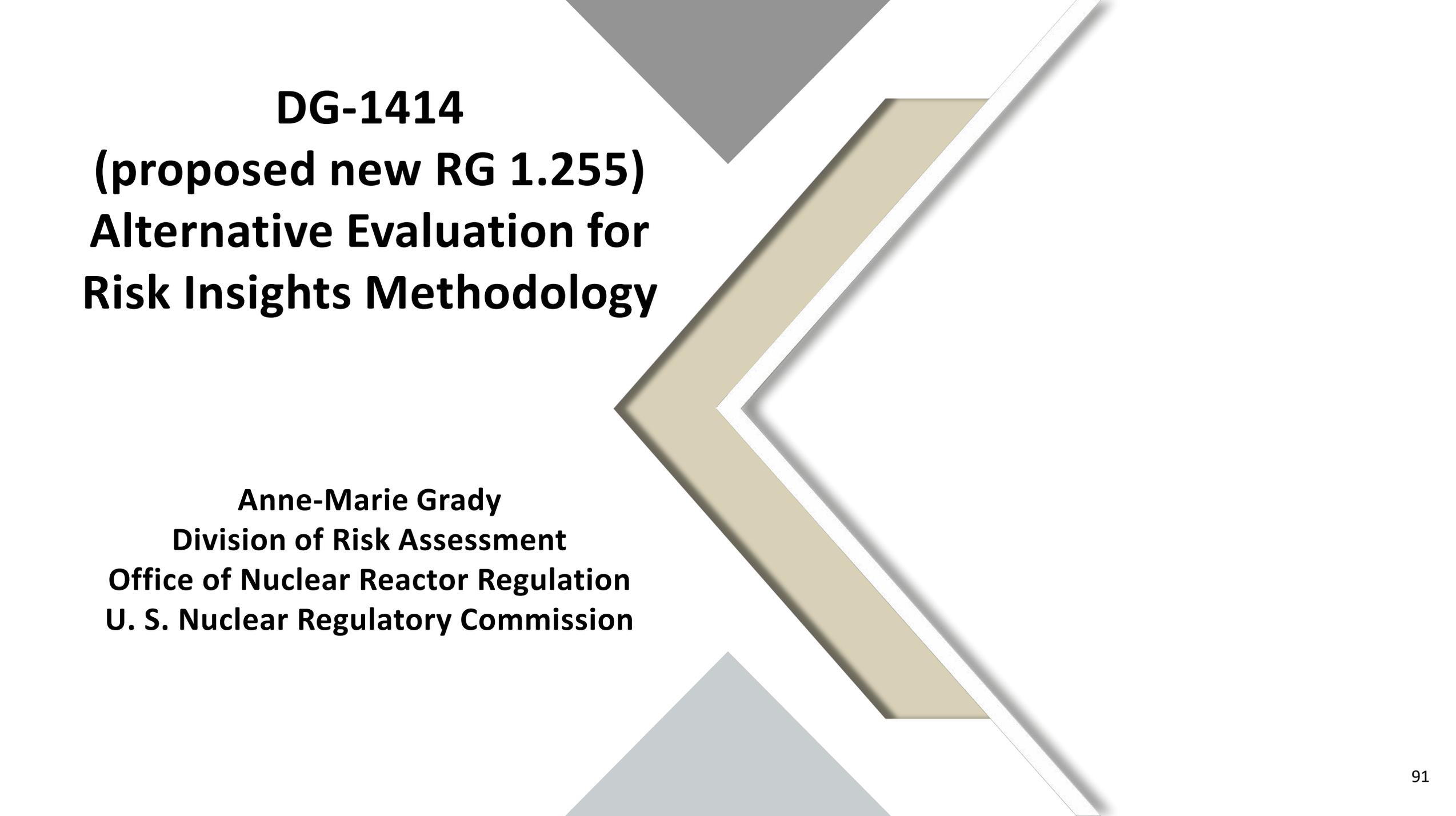
Technology-Inclusive Identification of Licensing Events (Sheet 3 of 3)



Quality Control Program

- A Quality Control Program should be established prior to engaging in the work; includes personnel, procedures, documentation.
- The initiating event and event sequence analyses are not subject to QA requirements (PRA is not part of the design-basis information).
- Existing programs may be leveraged:
 - If a PRA is developed, PRA Configuration Control can be used for analysis documentation.
 - If a PRA is developed, PRA peer review can be used for independent review.

The licensing event selection informs the design basis and licensing basis; therefore, it is subject to QA requirements.



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

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Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission

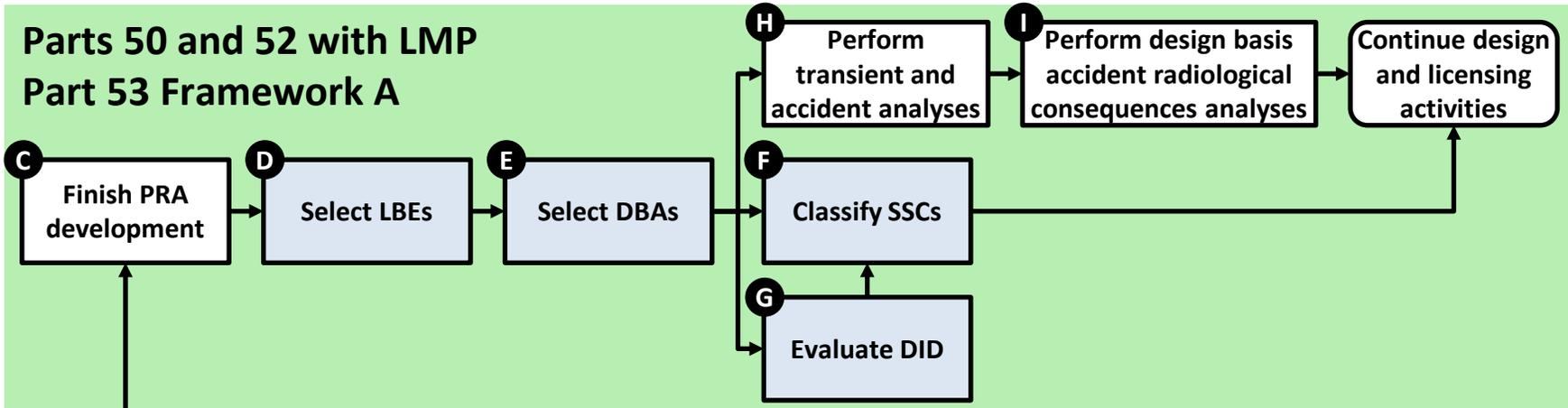
Alternative Evaluation for Risk Insights Methodology

- 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.

Licensing Pathways – Risk Evaluation Perspective



A Comprehensive and systematic initiator search and event sequence delineation without preconceptions or reliance on predefined lists

B Select licensing framework

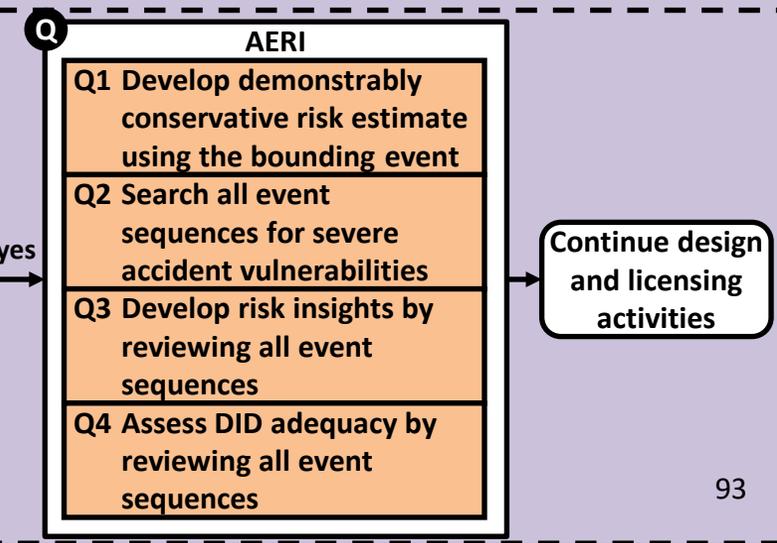
J Select licensing events

K Perform transient and accident analyses

L Perform design basis accident radiological consequences analyses

M Elect to develop PRA

N Finish PRA development



Notes:
 1) Each step builds on all of the preceding steps (considers all information available at that point)
 2) Feedback loops (e.g., the impact of design revisions) are not shown

- Applicant decision
- DG-1413, “Technology-Inclusive Identification of Licensing Events for Commercial Nuclear Plants”
- DG-1414, “Alternative Evaluation for Risk Insights (AERI) Methodology”
- LMP guidance - NEI 18-04, Rev. 1, as endorsed in RG 1.233

Alternative Evaluation for Risk Insights

Elements of the AERI Methodology (1 of 4)

- DG-1414 applies only to LWRs and non-LWRs licensed under Part 53, Framework B
- Identification and characterization of the postulated bounding event(s):
 - Selection of licensing events is covered in DG-1413
 - Consider both core and non-core radiological sources
 - Perform consequence analysis for selected licensing event(s)
 - Multiple bounding events could be considered for events with approximately similar likelihoods of occurrence and similar overall radiological impacts, but with different radiological release characteristics
- Estimate dose consequence for the postulated bounding event to confirm that the reactor design meets the AERI entry conditions:
 - Condition A - Consequences evaluated at 100m (328 feet) from plant do not exceed:
 - 10 mSv (1 rem) TEDE over the first four days following a release,
 - An additional 20 mSv (2 rem) TEDE in the first year, and
 - 5 mSv (0.5 rem) TEDE in second and subsequent years
 - Condition B – Condition A must be met without reliance on active safety features or passive safety features, except passive safety features that:
 - Do not require equipment actuation or operator action to perform their required safety functions,
 - Are expected to survive accident conditions, and
 - Cannot be made unavailable or otherwise defeated by credible human errors of commission and omission
 - One acceptable approach to developing a dose consequence estimate is to provide the postulated bounding event source term to MACCS or a comparable analytical model

Elements of the AERI Methodology (2 of 4)

- Determination of a demonstrably conservative risk estimate for the postulated bounding event to demonstrate that the QHOs are met:
 - Utilize consequence estimate.
 - Assume a frequency of 1/yr to represent the sum of the event sequence frequencies (based on LWR statistics equal to the sum of initiating event frequencies).
 - Compare to QHOs.
 - Applicant may use a different frequency, with justification, which NRC staff will review on a case-by case basis.
 - One acceptable approach to developing a dose consequence estimate is to provide the postulated bounding event source term to MACCS, or a comparable analytical model.
 - The applicant should identify the software codes used for the consequence analyses and provide information on how the development and maintenance of these software codes meets quality standards commensurate with the application.

Elements of the AERI Methodology (3 of 4)

- Search for severe accident vulnerabilities:
 - Severe accidents are those events that progress beyond the DBAs, in which substantial damage is done to the reactor core or to any other structure, vessel, or retention system containing a significant inventory of radiological material, whether or not there are serious offsite consequences
 - Severe accident vulnerabilities are aspects of a design which represent an overreliance on a single design feature, either for accident prevention or mitigation, that could lead to a severe accident
 - Encompasses the entire set of licensing events and any additional severe accidents
 - Search for cliff-edge effects
 - Consider external hazards
- Address how identifying severe accident vulnerabilities could enable the design to prevent or mitigate severe accidents
- Justify why a severe accident vulnerability is acceptable for the design

Elements of the AERI Methodology (4 of 4)

- Identification of risk insights:
 - The objective of the search for risk insights is to understand issues that are important to plant operation and safety such as:
 - important hazards and initiators
 - important event sequences and their associated SSC failures and human error
 - system interactions
 - vulnerable plant areas
 - likely outcomes
 - sensitivities
 - areas of uncertainty
 - Search encompasses the entire set of licensing events
 - Provides an understanding of the hierarchy of event sequences ranked by frequency
- Assessment of DID adequacy:
 - Encompasses the entire set of previously identified licensing events
 - Facility design should include a reasonable balance among the layers of defense, to ensure that failure of a single barrier does not result in a severe accident

Maintaining and Upgrading the AERI Risk Evaluation (1 of 2)

- Assure that the AERI risk evaluation continues to be valid, useful, and an adequate basis for regulatory decision-making throughout the plant operating lifetime.
 - The initial risk evaluation must be performed by the scheduled fuel load date
 - The risk evaluation should be maintained/updated every five years
- Regularly assess that the “postulated bounding event” selection remains current
 - If not, identify new postulated bounding event to be used in the upgraded risk evaluation
- As-built, as-operated facility
 - Ascertain if any important aspects of the facility’s design or operational scheme have changed since the prior risk evaluation, and if so, maintain/upgrade the risk evaluation
- New safety issue(s)
 - Ascertain if any new safety issues have arisen since the prior risk evaluation, and if so, maintain/upgrade the risk evaluation
- New data, information, or analyses
 - Ascertain if any relevant new data, information or analyses have arisen since the prior risk evaluation, and if so, maintain/upgrade the risk evaluation

Maintaining and Upgrading the AERI Risk Evaluation (2 of 2)

- QHO comparison
 - If the AERI risk evaluation requires upgrading, the QHO comparison should be revisited and modified, if appropriate
- Vulnerability search
 - If the AERI risk evaluation requires upgrading, the severe accident vulnerability search should be revisited and modified, if appropriate
- Search for Risk Insights
 - If the AERI risk evaluation requires upgrading, the search for risk insights should be revisited and modified, if appropriate
- DID
 - If the AERI risk evaluation requires upgrading, the DID evaluation should be revisited and modified, if appropriate

Discussion

Final Discussion and Questions



Agenda – October 19th



8:35 am – 1:00 pm

Requirements for Operations: Draft Proposed Language for Staffing, Role of STA, and Guidance

1:00 pm – 2:00 pm

Lunch

2:00 pm – 5:00 pm

Draft Proposed Language Addressing Other ACRS Comments and Major Industry Comments

Preliminary Requirements for Operations: Rule Language Updates, Staffing Topics, and Overview of Key Guidance

Agenda

- Introduction
- Updates to Subparts F and P since the 2nd Iteration
 - Consolidation of requirements under Subpart F
 - Current status of engineering expertise requirements
 - Current status of GLRO requirements
 - Response to recent ACRS letter
- Overview of ISG for Operator Licensing Program Reviews
- Overview of ISG for Staffing Plan Reviews
- Overview of ISG for Scalable Human Factors Engineering (HFE) Reviews
- Questions

Overview of Primary Staff Contributors (NRR & RES)

- Theresa Buchanan, Senior Reactor Engineer (Examiner)
- Dr. David Desaulniers, Senior Technical Advisor for Human Factors and Human Performance Evaluation
- Dr. Brian Green, Senior Human Factors Engineer (Team Lead)
- Dr. Niav Hughes Green, Human Factors Psychologist
- Dr. Stephanie Morrow, Human Factors Psychologist
- Lauren Nist, Branch Chief, Operator Licensing and Human Factors Branch
- Maurin Scheetz, Reactor Engineer (Examiner)
- Jesse Seymour, Senior Reactor Engineer (Examiner)

Updates to Subpart F and P since the 2nd Iteration

- Requirements for HFE, staffing, operator licensing, and training have all been consolidated under Subpart F, with Subpart P now just containing a single pointer located at 53.4220 (i.e., Framework A and B now use a common set of requirements in these areas)
- The class of reactors meeting the technical requirements for utilizing GLROs has been defined as “self-reliant mitigation facilities”
- Procedure program requirements have been consolidated
- Staffing plan requirements for non-operations positions are now functional in nature
- Examination programs are required to provide for validity and reliability in testing
- Remedial training is mandated for operators failing requalification examinations
- Commission approval is no longer required for simulation facilities

Status of Engineering Expertise & GLRO requirements

- Engineering expertise remains a required element of staffing plans for all facilities under both Frameworks A and B, including for those facilities staffed by GLROs
- Criteria for potentially allowing facilities under Framework B to use GLROs have been incorporated, in addition to those already in place for Framework A
 - Framework B GLRO criteria vary depending on whether an AERI is used
 - Irrespective of AERI, DID without human action is needed
 - For a non-AERI plant, the GLRO criteria are analogous to the equivalent criteria for Framework A, as adapted to the differing requirements of Framework B
 - For an AERI plant, the GLRO criteria are met by meeting AERI criteria (plus DID)
- These various sets of criteria have a common goal of identifying when operators are not expected to significantly influence safety outcomes based on the design
- GLRO criteria now are specific to limiting analysis to “credited” human actions

Response to Interim Letter Report from August 2022

- ACRS letter included a recommendation that “...the associated guidance for implementing 10 CFR Part 55 can be amended to accommodate the objectives of the proposed rule without the additional voluminous text.”
- Key points from the staff response included the following:
 - New framework for operator licensing under Part 53 is technology-inclusive and creates significant flexibilities compared to Part 55
 - Accommodating such flexibilities while complying with statutory requirements necessitates requirements for GLROs being codified in regulations
 - Absent Part 53’s alternative, applicants would be required to adhere to Part 55
 - While revised or new guidance could be developed, applicants would be required to seek exemptions and justify pursuing alternative approaches, requiring NRC staff reviews on an application-specific basis; proposed Part 53 will remove the need for exemptions and enhance regulatory reliability and clarity

Overview of ISG for Operator Licensing Program Reviews

DRO-ISG-2023-01

Operator Licensing Programs
Draft Interim Staff Guidance

Purpose

- To assist staff reviews of applications under 10 CFR Part 53 related to the operator licensing examination program
- To provide guidance for review of tailored initial and requalification examination programs
 - For specifically licensed operators (SROs and ROs)
 - For generally licensed operators (GLROs)
- To address proficiency for SROs and ROs
- To assist staff reviews of exemptions from 10 CFR Part 55 for non-LWR, power reactor examination programs

Goals

- Enable facility applicants/licensees to identify knowledge, skills, and abilities (KSAs) necessary for safe operation as the basis for the examination standards
- Establish reliable guidelines for exam program developments based on current best practices from research and expertise on the measurement and testing of KSAs

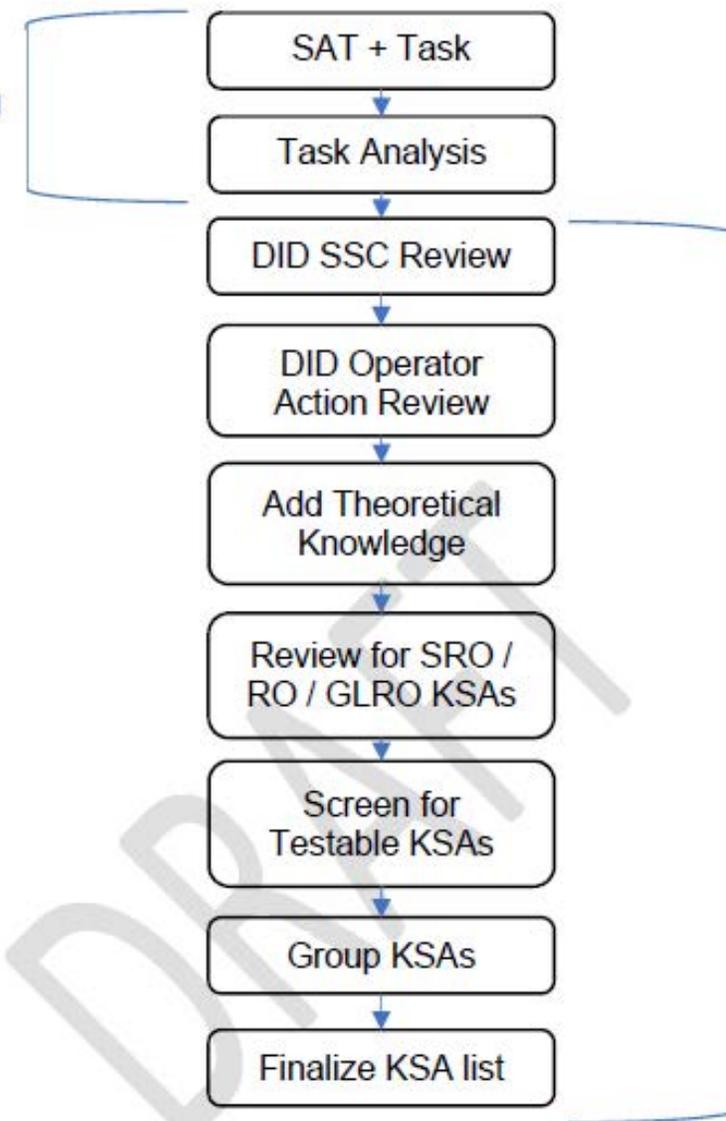
Section 1.0

KSAs List Development

- Systems approach to training-based processes are used to identify a training KSA list
 - This list is not solely limited to tasks related to safe plant operation
 - DRO-ISG-2023-04, “Facility Training Programs,” is planned to provide additional information in this area
- Using this list as a starting point, a screening is performed to identify those tasks important to safe plant operation and/or related to the foundational theory of plant operations to develop the KSA list for the exam program
 - Depending on the original list, may have needed to add or remove items to get the necessary KSAs for testing

Figure 1.0 – Overview of KSA Development Process Steps

Performed as part of the SAT-based training program development process – See the Facility Training Programs ISG



Performed as part of the examination program development process – See this ISG

Section 2.0 Operator Licensing Test Development

- Developed Test Plan
 - How the testable KSAs will be measured
 - For example, what KSAs will be tested using a written test, or a walkthrough format, etc.
 - What the format for the test will be
- Developed detailed content specification
 - What specific KSAs the exam type (written, oral, scenario, job performance measure, etc.) covers
 - How the KSAs are sampled for each examination developed
 - How the test items are reviewed for clarity, quality, and other psychometric issues

Section 3.0 Examination Validity

- Describe validation plan
 - What evidence was collected to support validity of the test, that the test works and will work as intended
 - Content validity, concurrent validity
 - Should require content validity at the least

Section 4.0 Scoring Specifications

- Criterion-referenced
 - Described how each test item is scored and how scores combined to get total score
 - If based on scorer observation, described steps to eliminate any bias in judgments
 - Provided cut-off score

Section 5.0 Reliability of the Test

- If individual repeats the test, the result would be similar to the original result
- Documentation that the tests will have stability of test performance over time
- Documentation of findings that are adequate to justify use of the test for operator licensing

Section 6.0 Test Manual

- Companion to the test plan
- Provides more detail related to the specific types of tests
- Includes administrative aspects of test
 - How to administer
 - Time to administer or time allowed to take the test
 - Materials provided to test takers
 - How to interpret test results

Section 7.0 Additional Characteristics of High- Quality Test Materials

- This section is specifically for written and computer-based tests
- Provides additional characteristics associated with psychometrics, test instructions, objective scoring system, and standardization

Section 8.0 Other Examination Program Considerations

- This section references back to sections of NUREG-1021, “Operator Licensing Examination Standards for Power Reactors” for items that are universally applicable, regardless of plant design

Section 9.0 Simulation Facilities

- Documentation on how the simulation facility provides a level of fidelity sufficient to assess KSAs as required by 10 CFR Part 53.780(e) or 53.815(e)
- Simulation facilities should have same cognitive requirements as the real environment
- For simulation-based assessment, documentation provided on how that examination is valid

Section 10.0 Administering Operating Tests

- Examination procedures should be similar to those in NUREG-1021, as specific to the type of test administered
- Measures are in place to ensure examiners behave in accordance with codes of conduct to ensure examination integrity
- Measures are in place to retain required records

Section 11.0 Examination Program Change Management Process

- Documentation specifies what changes require NRC approval and which do not
 - NRC approval
 - Exemption from regulation
 - Change to technical specification
 - Negative impact to examination security/integrity
 - Negative impact on consistency

Section 12.0 Static Computer- Based Testing

- Beyond the scope of the guidance
- The documentation would need to describe how this approach is equivalent to the guidance provided in the ISG

Section 13.0 Additional Guidance for Requalification Programs

- Any requalification failures must be remediated and retested prior to returning to license duties
- For ROs and SROs
 - Periodicity not to exceed 24 months
- For GLROs
 - Periodicity defined by program
 - If >24 months, bases provided

Section 14.0 Proficiency Programs for Specifically Licensed Operators and Senior Operators

- Actively perform the functions
- Maintain proficiency and familiarity
- Re-establish proficiency if it cannot be maintained

Section 15.0 Waivers for GLROs

- Appropriate criteria to waive requirements for an examination included in the program
- If similar to 10 CFR 55.47, no further NRC review
- Else, a basis is provided that describes how the criteria ensures individuals are able to safely and competently operate the facility

Appendix A Currently Approved Examination Methods

- Methods currently approved in NUREG-1021 can be used without needing further basis from the facility or additional NRC review
- Example: use of a 4-part multiple choice written examination with 80% cut score

Overview of ISG for Staffing Plan Reviews

DRO-ISG-2023-02

Interim Staff Guidance Augmenting NUREG-1791,
“Guidance for Assessing Exemption Requests from the
Nuclear Power Plant Licensed Operator Staffing
Requirements Specified in 10 CFR 50.54(m),” for
Licensing Plants under Part 53

Background: Current Practice

- Current 10 CFR 50/52 staffing requirement (i.e., 50.54(m)) is prescriptive
- NRC reviews exemptions to this requirement using NUREG-1791, Guidance for Assessing Exemption Requests from the Nuclear Power Plant Licensed Operator Staffing Requirements Specified in 10 CFR 50.54(m)
 - Developed with advanced reactors in mind
 - Performance-based process for determining appropriate number of licensed control room operators
 - 11 steps including a staffing plan validation
- Staff used NUREG-1791 to evaluate novel control room staffing models for NuScale SMR design and concept of operations
- Cannot use NUREG-1791 as written for Part 53 staffing plan reviews because it relies on exemptions to Part 50 requirements

Part 53

Approach to Staffing

- Applicant proposes minimum staffing level by submitting a staffing plan with application
- Consider differences in staffing level when operators have/do not have a safety role (i.e., for specific or generally licensed operators) – if specific licenses then applicants must include more detail supported by HFE analysis and assessments
- Operators may fill multiple roles (e.g., maintenance, radiation protection, etc.) so must include these responsibilities in staffing plan submittal
- The staff will review and approve the staffing plan. Changes to approved staffing plans are subject to administrative controls

Preliminary Part 53 Staffing Requirement

- Addressed under the preliminary requirements of § 53.730(f):
 - *A staffing plan must be developed to include the numbers, positions, and qualifications of operators and senior operators or, if applicable, generally licensed reactor operators across all modes of plant operations, as well as a description of how the numbers, positions, and responsibilities of personnel contained within those plans will adequately support all necessary functions within areas such as plant operations, equipment surveillance and maintenance, radiological protection, chemistry control, fire brigades, engineering, security, and emergency response.*

Proposed Part 53 Requirement for On-Shift Engineering Expertise [§ 53.730(f)(1)]

- The staffing plan must include a description of how engineering expertise will be available to the on-shift crew during all plant conditions to assist in situations not covered by procedures or training
- A person available to support the crew at all times. This person is familiar with the operation of the facility and has a technical degree:
 - Bachelor's in in engineering or,
 - Bachelor's in engineering technology or a physical science or,
 - PE license
- Basis: Commission policy for, "Education for Senior Reactor Operators and Shift Supervisors at Nuclear Power Plants," (published in the Federal Register (54 FR 33639) on August 15, 1989)

DRO-ISG-2023-02: for review of Part 53 staffing plans

- Objective is to guide reviewer through the process of:
 - Evaluating staffing plans and support analyses submitted under § 53.730(f)
 - Determining whether the proposed minimum staffing level provides assurance that plant safety functions can be maintained across all modes of plant operations
 - Approving staffing plans
- For plants that will have specifically licensed operators; could scale the review for plants with generally licensed operators
- Use in conjunction with NUREG-1791
- 11 steps that rely on other Human Factors elements
- Includes review guidance for engineering expertise requirement
- Developed as an Interim Staff Guide (ISG)
 - Following experience with using the ISG the staff plans to update NUREG-1791

DRO-ISG-2023- 02: for reviewing engineering expertise

- Guidance on what staff will look at for satisfying engineering expertise requirement to include:
 - Education prerequisites
 - Training and qualification
 - Responsibilities of the job
 - Data needs if offsite
 - Response time if on site
 - Expectations for one or multiple people filling the job
 - Communication needs
 - Cybersecurity expectations
 - Include job in validation activities

Overview of ISG for Scalable Human Factors Engineering Reviews

DRO-ISG-2023-03

Development of Scalable Human Factors Engineering Review Plans

Background: Current Practice

- Current 10 CFR 50 HFE requirement (i.e., 50.34(f)(2)(iii)) is focused on the main control room
- NRC's HFE reviews for large light-water reactors have been conducted using NUREG-0711, Human Factors Engineering Program Review Model
 - Systems engineering based approach
 - 12 program elements and 300+ criteria
- Lessons-learned from recent Part 52 reviews indicated a need for a new approach to regulation and review of HFE for advanced reactor technologies

Background: Proposed Part 53 Approach to HFE

- HFE to be required where necessary to support important human actions
- HFE reviews to be application specific (i.e., scaled) considering the characteristics of the facility design and its operation

Background: Preliminary Part 53 HFE Requirement

- Addressed by the preliminary requirement of § 53.730(a)
- The plant design must reflect state-of-the-art human factors principles for safe and reliable performance in all locations that human activities are expected for performing or supporting the continued availability of plant safety or emergency response functions

Background: Draft Guidance

- Objective is to guide reviewer through the process of:
 - Developing an application specific review plan
 - Identifying appropriate HFE review guidance
- To be used in place of NUREG-0800, Chapter 18, Human Factors Engineering
- Developed as an ISG
 - Following experience with using the ISG the staff plans to make the guidance a NUREG

Scaling Process: Overview

- Begins - during pre-application engagements (if conducted)
- Concludes - with completion of application acceptance review
- Conducted - in 5 steps leading to the staff assembling the review plan

Scaling Process: 5 Steps

1. **Characterization** – establishing a documented understanding of the design and its operation from an HFE perspective
2. **Targeting** – identifying aspects of the design and operation for HFE review
3. **Screening** – selecting HFE program elements / activities for review in conjunction with each target
4. **Grading** – selecting specific standards and guidance documents to be applied to the review
5. **Assembling the review plan** – integrating results of prior steps to produce a plan that supports an efficient, risk-informed, reasonable assurance determination

Scaling Guidance: Overview

- Main body (22 pages) – provides essential guidance for developing the review plan
- Appendices (88 pages) – provide supporting guidance for implementing each step of the process

Scaling Guidance: Main Body – Key Features

- Applicability:
 - SDAs, DCs, COLs and OLs
- Rationale for scaling reviews
- Regulatory basis / acceptance criteria
- Guidance for each step of scaling process
 - Objective
 - Process
 - Reviewer Responsibilities
- Focus is on “what to do / accomplish” when scaling reviews

Scaling Guidance: Appendices – Key Features

- Focus is on “how to”
- Recommended methods for each step of scaling process
- Pointers to sources of additional guidance

Scaling Guidance: Appendix A

Characterization:

- What to include in the characterization – essential elements
- How to organize and document the characterization
- Use of the characterization to aid coordination with related reviews (e.g., staffing, operator licensing, instrumentation and controls)

Scaling Guidance: Appendix B

Targeting:

- General principles for target selection
- Descriptions of 38 prospective (example) characteristics of advanced reactor designs and operations
 - Human performance implications
 - Availability of guidance to support reviews

Scaling Guidance: Appendix C

Screening:

- General strategies and specific considerations for selecting which HFE activities to review or screen out
- Implications / challenges of advanced reactor design characteristics for certain HFE activities or their review

Scaling Guidance: Appendix D

Grading:

- Guidance for selection of standards and guidance documents to support the review
 - Considerations for use of documents that lack prior NRC endorsement
- Reference table of HFE standards and guidance documents in both nuclear and non-nuclear domains

Scaling Guidance: Appendix E

Assembling the Review Plan:

- Strategies for integrating the results of Steps A-D to develop a plan that is efficient yet sufficient to support a reasonable assurance determination
- Guidance for documenting the review plan and gaining management approval

Discussion

Draft Proposed Language Addressing Other ACRS Comments and Major Industry Comments

Interim Letter Report; October 21, 2020

1. The staff's proposed approach for developing the Title 10 of the Code of Federal Regulations (10 CFR) Part 53 rule is viable.

2. The staff should ensure that applicants compensate for novel designs with uncertainties due to incompleteness in the knowledge base by performing systematic searches for hazards, initiating events, and accident scenarios with no preconceptions that could limit the creative process.

3. The rule should provide a pathway for licensing prototype facilities, when uncertainties in the knowledge base and lack of operating experience suggest that additional testing and monitoring are needed.

Concern addressed by requirements in both frameworks requiring systematic assessments to identify events supporting the design and licensing of commercial nuclear plants. Examples include §§ 53.240 and 53.450 in Framework A and § 53.4730 in Framework B. In addition, proposed guidance provided in DG-1413.

Existing pathway for prototype facilities maintained in both frameworks. Provisions included in § 53.440 (Subpart A, common), § 53.440 for Framework A, and § 53.4730 for Framework B. Existing guidance on prototype plants is applicable to Part 53.

Interim Letter Report; May 30, 2021

1. The overall structure of Subparts A through I provides a logical framework for the rule. It is complete with respect to topics that must be covered and addresses the lifetime of a power reactor. It will be helpful to all applicants and to the NRC staff.

2. A coherent and detailed explanation of the integrated intent of the rule and its associated design-specific guidance should be developed as soon as possible and enshrined in the rule itself.

Included some introduction-type sections to various subparts. However, most detailed explanation of the rule provided in Preamble.

Interim Letter Report; May 30, 2021

3. Regarding Subpart B:

a. To this point in the development, we find no value in the two-tiered approach to safety requirements. Alternative integral risk criteria to the QHOs should be investigated.

(a₁) Revised Subpart B to eliminate reference to two tiers. However, safety objectives include: (1) ensuring no immediate threat to public health and safety and (2) considering potential risks.

(a₂) See previous discussion on QHOs.

b. Desired flexibility to address the broad range of technologies ... is provided ...

(c) Framework A continues to define a top-down methodology based on criteria, safety functions, and related requirements for SSCs, personnel, and programmatic controls. Framework B requires development of principal design criteria based on LWR general design criteria or other generally accepted standards.

c. The rule should include a set of over-arching general principles in one place (Subpart B) that would apply to any reactor concept.

d. The rule should state that safety analyses must demonstrate that for ... AOOs all safety related barriers to release are maintained.

(d) Framework A (§ 53.450(e)) requires establishing evaluation criteria for each AOO [anticipated event sequence]. Framework B ((§ 53.4730(a)(5)(iii)) limits offsite dose for AOOs and requires demonstration that events do not escalate to DBA.

e. The rule should state that safety analyses must demonstrate that DBAs achieve and maintain a safe, stable, and subcritical condition.

(e) Framework A (§ 53.450(f)) revised to require safe, stable end state for DBA and subcriticality following LBE required by § 53.440(g). Framework B (§ 53.4730(a)(5)(ii)) requires acceptance criteria for SR SSCs to demonstrate they adequately mitigate the consequences of DBAs. Additional requirements provided through principal design criteria.

Interim Letter Report; May 30, 2021

4. Subpart C, “Design and Analysis Requirements,” is generally in good shape.

a. The requirement for risk-informed analysis is appropriate if the use of PRA is approached in a graded fashion commensurate with the potential consequences and the simplicity of the design.

b. The requirements for selection and analysis of DBAs must be clarified.

c. The rule eliminates single failure criteria but needs to define the process that replaces it.

a. Rule language remains general (requiring use of PRA in Framework A) and flexibility afforded through key guidance such as RG 1.247

b. Requirements to identify and assess DBAs provided in §§ 53.240 and 53.450(f) in Framework A and § 53.4730(a)(5)(ii) in Framework B. Each maintains general alignment with Parts 50/52 in terms of establishing design requirements for safety-related SSCs. Additional information available in guidance documents (e.g., RG 1.233 for Framework A)

c. Use of probabilistic (reliability) criteria instead of single failure criteria for Framework A discussed in Preamble (see also SECY-03-0047)

5. The two recommendations in our first letter report on 10 CFR Part 53 of October 21, 2020, still apply: for novel designs with uncertainties due to incompleteness in the knowledge base, systematic searches for hazards, initiating events, and accident scenarios should be required; and a licensing pathway including additional testing and monitoring akin to prototype testing should be available.

Concern addressed by requirements in both frameworks requiring systematic assessments to identify events supporting the design and licensing of commercial nuclear plants. Examples include §§ 53.240 and 53.450 in Framework A and § 53.4730 in Framework B. In addition, guidance provided by developing DG-1413.

Existing pathway for prototype facilities maintained in both frameworks.

Interim Letter Report; February 17, 2022

1. The staff is methodically working through the delicate balance of flexibility and predictability in regulations for operator staffing.

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2. The staff should consider the suggestions identified in this letter to ensure the 10 CFR Part 53 approach yields equivalent safety to current regulatory approaches.

Staff agrees with the ACRS, See subsequent iterations and discussions

3. The staff should approach the concept of not having a Shift Technical Advisor (STA) by having the applicant justify why the STA is not needed rather than a blanket elimination of this position. This is particularly important for the expected wide application of first-of-a-kind technologies that may be licensed under this rule.

See subsequent iterations and discussions

4. The concept of non-licensed, certified operators should not be pursued. Staff should focus on adapting the existing approach to the NRC operator licensing process to produce training, qualification, and licensing requirements based on the degree of safety reliance attributed to operator actions for the specific plant design. This should take advantage of inherent and passive safety features of the nuclear power plant.

See subsequent iterations and discussions

5. Staff should develop guidance for judging the acceptability of limited scope simulators.

See subsequent iterations and discussions

Interim Letter Report; August 2, 2022

1. There are limitations of the existing QHOs to fully capture the value and risk of nuclear technologies and the large uncertainties associated with evaluating individual and societal risk. This could inhibit flexibility and opportunities for more innovative approaches as the regulator and applicants learn from new nuclear technologies and associated missions.

- Discussed during previous session
- Additional questions/discussion ?

Interim Letter Report;
August 2, 2022

2. Critical safety functions are foundational to the licensing process. As such, the requirements for identifying critical safety functions should be common to both frameworks.

- Preliminary proposed rule language includes a definition for *safety function*
- Definition has generic elements, but is bifurcated to acknowledge fundamental differences between the frameworks
- Defining critical safety functions remains an explicit requirement in Framework A (top-down approach); primary and secondary (additional) safety functions made explicit
- Safety functions are addressed implicitly through the principal design criteria in Framework B, consistent with current bottom-up approach in existing framework

Interim Letter Report;
August 2, 2022

3. The staff should require, early in the preapplication process, each applicant to identify numeric safety dose criteria, the critical safety functions, the safety design criteria, and the underlying rationale for their selection and application in the design.

- Draft white paper on preapplication engagement for advanced reactor applicants recommends early engagement in several topical areas:
 - Principal design criteria
 - Selection of LBEs
 - SSC classification
 - Source term methodology
 - QA
 - Probabilistic risk assessment
 - Safety analysis methods
 - Fuel qualification and testing
- Pre-application engagement is optional and at the discretion of the applicant

Interim Letter Report;
August 2, 2022

4. The staff needs to ensure that the fire protection requirements in both frameworks are fully technology-inclusive.

- Fire protection provisions in Framework B have been completely revised (aligned with Framework A) and are now technology-inclusive

Interim Letter Report; August 2, 2022

5. The current approach with self-contained requirements for each of the two frameworks is very long. Furthermore, the rule has a significant amount of implementation detail that could be better located in regulatory guidance. The optics of this approach run counter to a streamlined more efficient licensing process, which is an expectation for many stakeholders. As a result, the rule may be too cumbersome to implement and may not be used.

- NRC staff agrees that streamlined and efficient regulatory frameworks are desirable and that guidance used where practicable to reduce the size of the rule
- Each framework in the preliminary proposed rule language must be viewed independently (§ 53.010), with some exceptions
- Requirements in each framework largely replace existing requirements under Parts 50, 52, 55, and 100; either framework is less than half of the existing requirements

Interim Letter Report;
August 2, 2022

6. The proposed GLRO description should provide for qualified operating personnel. However, the associated guidance for implementing 10 CFR Part 55 can be amended to accommodate the objectives of the proposed rule without the additional voluminous text.

- Draft requirements in Part 53 are technology-inclusive and significantly more flexible than those in Part 55
- Development of a new category of license operators and facility class requires codification of related regulatory requirements
- Significant amount of new guidance would need to be developed to address recommended approach
- Proposed approach should greatly reduce the need for exemptions while enhancing regulatory reliability and clarity

Interim Letter Report; August 2, 2022

7. The results of the PRA can be used to inform SSC classification by aligning the risk assessment and deterministic safety analysis. This should result, in most cases, in just two tiers for classification of SSCs: Safety Related/Safety Significant and Not-Safety Related/Low Safety Significant.

- Staff considers two tiers of SSC classification generally too limiting
- Both frameworks generally address safety-related SSCs in a manner consistent with current requirements
- At least one additional tier considered necessary for non-safety related SSCs warranting some type of special treatment due to DID/risk considerations
 - Framework A: Non-safety related with special treatment
 - Framework B: Important to safety

Interim Letter Report;
August 2, 2022

8. The simple novel analysis that provides the technical basis for the entry criteria to be able to use the AERI should be documented either in an appendix to the DG-1414 or in another appropriate document (e.g., NUREG).

- Staff agreed with the recommendation and are currently evaluating the most appropriate format for documenting the technical basis for AERI entry criteria, including MACCS validation

Major Industry Feedback

Feedback	NRC Staff Perspectives
Duplicative/overlapping programs	Added flexibility for licensees to organize and combine programs as appropriate to avoid duplication.
Manufacturing license expansion	Expanded activities to include fabrication of entire reactor including fuel loading.
Two tier safety criteria structure	Eliminated two-tiered approach to safety criteria
Unify QA requirements (allow broader set of codes and standards)	Enabled flexibility in using codes and standards; QA requirements consolidated in rule and aligned with Appendix B to 10 CFR Part 50
Normal operations	Decoupled requirements for normal operation from those for LBEs
Add requirements for safe, stable end state conditions	Added requirement and clarified in Statements of Consideration



Major Industry Feedback

Feedback	NRC Staff Perspectives
Not require or rely on just LMP or International Atomic Energy Association approach; Part 53 can be methodology neutral	Created two distinct frameworks within Part 53 to provide clarity and predictability for applicants using either approach; developed DG-1413 and AERI approach
Questioned as low as reasonably achievable (ALARA) in regulations	Staff has added Part 20 references to Part 53. Clarified to recognize that a combination of design features and programmatic controls may fulfill ALARA requirements, as appropriate.
Special treatment for non-safety related but safety significant SSCs	NSRSS SSCs reduce sole reliance on safety-related SSCs; Requirements can be scaled to achieve desired capability/reliability/overall risk
Facility safety program (FSP)	Staff views FSP as an operational benefit. Allows continued use of PRA for evaluating changes, managing risks, and improving the relationship between the NRC's licensing and reactor oversight programs.
More guidance is needed to clarify regulations	Staff agrees and has aligned with industry on future guidance needs



Industry Feedback on Framework B

Feedback	NRC Staff Perspectives
Objectives for chemical hazard requirements are unclear	Preamble discussion includes amplifying information to address this feedback. Chemical hazards in question would include substances commingled with licensed material or those produced by a reaction with licensed material, consistent with similar requirements in Part 70
Rule language is not technology-inclusive in some areas (e.g., references to mitigation of beyond-design-basis events [MBDBE] requirements in § 50.155)	Staff revised several sections to ensure that the proposed rule is technology-inclusive, including MBDBE requirements
PRA development at CP stage is not reasonable	The requirement to have a PRA developed to support a CP application is consistent with the 50/52 rulemaking and other Commission policies
Proposed entry conditions for AERI are too conservative	AERI entry conditions distinguish between plants with relatively straightforward designs and plants with relatively complicated designs that warrant the development of a PRA in order to understand their risk. The proposed AERI option is a departure from current Commission policy, which requires all new plants to have a PRA



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/ARCAP (NEI 21-07)
- 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
- Change Evaluation (Southern Nuclear Operating Company-led)
- QA Alternatives (NEI-led)
- Facility Training Programs
- Materials Compatibility ISG

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, FFD
- Part 26, Fatigue Management
- Part 73, AA
- Part 73, Cyber Security
- Part 73, Security Programs

Future

- Analytical Margin
- Chemical Hazards
- Manufacturing
- Technical Specifications
- FSP
- Framework B Content of Applications

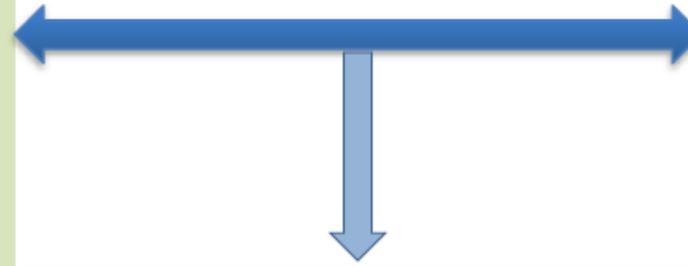
TICAP / ARCAP – Nexus

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

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

Additional SAR Content –Outside the Scope of TICAP

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



Audit/inspection of Applicant Records

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

Additional Portions of Application

- Technical Specifications
- Technical Requirements Manual
- Quality Assurance Plan (design)
- Fire Protection Program (design)
- Quality Assurance Plan (construction and operations)
- Emergency Plan
- Physical Security Plan
- SNM physical protection program
- SNM material control and accounting plan
- Cyber Security Plan
- Fire Protection Program (operational)
- Radiation Protection Program
- Offsite Dose Calculation Manual
- Inservice inspection/Inservice testing (ISI/IST) Program
- Environmental Report
- Site Redress Plan
- Exemptions, Departures, and Variances
- Facility Safety Program (under consideration for Part 53 applications)

- Safety Analysis Report (SAR) structure based on clean sheet approach

* TICAP chapter 2 supplemented by ARCAP ISG Chapter 2, "Site Information."

Additional contents of application outside of SAR are still under discussion. The above list is draft and for illustration purposes only.

FRN
Section VII
Specific
Requests for
Comments

Part 53

- Overall organization
- Use of QHOs
- ALARA
- DID
- Earthquake Engineering
- Construction and Manufacturing
 - Use of references
- Manufacturing licenses
- Staffing and GLROs
- OnShift engineering expertise
- Training program accreditation
- Use of simulation facilities

FRN
Section VII
Specific
Requests for
Comments

Part 53

- FSPs
- Integrity assessment programs
- Decommissioning
- PRA information
- Changes to manufacturing licenses
- Specific requirements for Technical Specifications
- AERI
- Reporting
- Financial qualifications

Discussion

Final Discussion and Questions



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

AA	Access authorization	DBA	Design-basis accident
ACRS	Advisory Committee on Reactor Safeguards	DBE	Design-basis event
AERI	Alternative evaluation for risk insights	DC	Design certification
ALARA	As low as reasonably achievable	DG	Draft regulatory guidance
AOO	Anticipated operational occurrence	DID	Defense-in-depth
ARCAP	Advanced Reactor Content of Application Project	DRA	Division of Risk Assessment
ASME	American Society of Mechanical Engineers	DRO	Division of Reactor Oversight
BDBE	Beyond-design-basis event	EPA	U.S. Environmental Protection Agency
CFR	Code of Federal Regulations	ESP	Early site permit
COL	Combined license	FFD	Fitness for duty
CP	Construction permit	FR	<i>Federal Register</i>
DANU	Division of Advanced Reactors and Non-Power Production and Utilization Facilities	FRN	<i>Federal Register</i> Notice

Acronyms

FSP	Facility safety program	LWR	Light-water reactor
GLRO	Generally licensed reactor operator	MACCS	MELCOR accident consequence code system
HFE	Human factors engineering	MBDBE	Mitigation of beyond-design-basis events
ILCFR	Individual latent cancer fatality risk	ML	Manufacturing license
INL	Idaho National Labs	NEI	Nuclear Energy Institute
ISG	Interim staff guidance	NRC	U.S. Nuclear Regulatory Commission
ISI	Inservice inspection	NRR	Office of Nuclear Reactor Regulation
IST	Inservice testing	NSRSS	Non-safety related but safety significant
KSAs	Knowledge, skills, and abilities	NUMREL	Number of released plume segments
LBE	Licensing basis events	NUREG	U.S. Nuclear Regulatory Commission technical report designation
LCF	Latent cancer fatality	OL	Operating license
LMP	Licensing modernization project	PAG	Protective action guideline

Acronyms

PRA	Probabilistic risk assessment	SNM	Special nuclear material
QA	Quality assurance	SOARCA	State-of-the-art reactor consequence analyses
QHO	Quantitative health objectives	SRM	Staff requirements memorandum
REM	Roentgen equivalent man	SRO	Senior reactor operator
RES	Office of Nuclear Regulatory Research	SRP	Standard review plan
RG	Regulatory guide	SSCs	Structures, systems, and components
RO	Reactor operator	STA	Shift technical advisor
SAR	Safety analysis report	Sv	Sievert
SDA	Standard design approval	TEDE	Total effective dose equivalent
SECY	Office of the Secretary	TICAP	Technology Inclusive Content of Application Project
SMR	Small modular reactor	WG	Working group

Backup Slides

Nuclear Energy Innovation and Modernization Act (NEIMA)

January 2019

- NEIMA Section 103(4) requires the NRC to complete a rulemaking to establish a technology-inclusive, regulatory framework for optional use for commercial advanced nuclear reactors no later than December 2027
 - (9) REGULATORY FRAMEWORK—The term “regulatory framework” means the framework for reviewing requests for certifications, permits, approvals, and licenses for nuclear reactors.
 - (14) TECHNOLOGY-INCLUSIVE REGULATORY FRAMEWORK—The term “technology-inclusive regulatory framework” means a regulatory framework developed using methods of evaluation that are flexible and practicable for application to a variety of reactor technologies, including, where appropriate, the use of risk-informed and performance-based techniques and other tools and methods.

Part 53 Rulemaking Plan

- SECY-20-0032, “Rulemaking Plan on Risk-Informed, Technology-Inclusive Regulatory Framework for Advanced Reactors,” dated April 13, 2020 (ADAMS [ML19340A056](#)).
- In SRM-SECY-20-0032, dated October 2, 2020 (ADAMS [ML20276A293](#)), the Commission provided direction to the staff.
- On November 2, 2020, staff submitted a Commission memorandum responding to the SRM direction to provide a schedule with milestones and resources to complete the final rule by October 2024 (ADAMS [ML20288A251](#)).
- On November 23, 2021, the Commission approved the NRC staff’s schedule extension request

Part 53 Rulemaking Objectives

1. Continue to provide reasonable assurance of adequate protection of public health and safety and the common defense and security,
2. Promote regulatory stability, predictability, and clarity,
3. Reduce requests for exemptions from the current requirements in 10 CFR Part 50 and 10 CFR Part 52,
4. Establish new requirements to address non-light-water reactor technologies,
5. Recognize technological advancements in reactor design, and
6. Credit the response of advanced nuclear reactors to postulated accidents, including slower transient response times and relatively small and slow release of fission products.

Subparts H & R: Leveraging and Combining Existing Licensing Processes

