



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001**

October 20, 2016

MEMORANDUM TO: ACRS Members

FROM: Maitri Banerjee, Senior Staff Engineer **/RA/**
 Technical Support Branch
 Advisory Committee on Reactor Safeguards

SUBJECT: CERTIFICATION OF THE MINUTES OF THE ACRS NUSCALE
 SUBCOMMITTEE ON AUGUST 16, 2016, ROCKVILLE, MARYLAND

The minutes for the subject meeting were certified on October 14, 2016. Along with the transcripts and presentation materials, this is the official record of the proceedings of that meeting. A copy of the certified minutes is attached.

Attachment: As stated

cc with Attachment: A. Veil
 M. Banks



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001**

MEMORANDUM TO: Maitri Banerjee, Senior Staff Engineer
Technical Support Branch
Advisory Committee on Reactor Safeguards

FROM: Michael Corradini, Chairman
NuScale Subcommittee
Advisory Committee on Reactor Safeguards

SUBJECT: CERTIFIED MINUTES OF THE ACRS NUSCALE SUBCOMMITTEE
MEETING ON AUGUST 16, 2016

I hereby certify, to the best of my knowledge and belief, that the minutes of the subject meeting on August 16, 2016, are an accurate record of the proceedings for that meeting.

/RA/

October 14, 2016

Michael Corradini, Chairman
NuScale Subcommittee

Dated

**ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
MINUTES OF THE NUSCALE SUBCOMMITTEE MEETING
AUGUST 16, 2016, ROCKVILLE, MD**

The ACRS NuScale Subcommittee held a meeting on August 16, 2016, in T2B1, 11545 Rockville Pike, Rockville, MD. The meeting convened at 1:00 p.m. and adjourned at 4:56 p.m. The entire meeting was open to public.

No written comments or requests for time to make oral statements were received from members of the public related to this meeting.

ATTENDEES

ACRS Members and Staff

Michael Corradini, Subcommittee Chairman	Gordon Skillman, Member
Ron Ballinger, Member	Jose March-Leuba, Member
Joy Rempe, Member	Dennis Bley, Member
Dana Powers, Member	Harold Ray, Member
Charles Brown, Member	Michael Snodderly, DFO
John Stetkar, Member	Maitri Banerjee, ACRS Staff*

NRC

Mark Tonacci, NRO	Mark Caruso, NRO	Nanette Gilles, OCM
Greg Cranston, NRO	Lynn Mrowca, NRO	David Werkheiser, OCM
Tony Nakanishi, NRO	Thomas Kendzia, NRO	Amanda Marshall, NSIR
John Monninger, NRO	Ann-Marie Grady, NRO	Joseph Andersen, NSIR
Rich Clement, NRO	Luis Betancourt, NRO	Swagata Som, NRR
Jo Ashcraft, NRO	Raj Auluck, NRO	Sud Basu, RES
Andrea George, NRO	Angelo Stubbs, NRO	Sheila Ray, NRR
Antonio Dias, NRO	Bob Caldwell, NRO	Ann Hove, OGC
Michelle Hart, NRO	Weijun Wang, NRO	Jinsuo Nie, NRO
Raul Hernandez, NRO	Bob Fitzpatrick, NRR	Ata Ishtar, NRO

NuScale & Public

Steven Unikewicz, NuScale	Steve Pope, NuScale
Nils Breckenridge, NuScale*	Tom Bergman, NuScale*
Jana Bergman, Curtiss-Wright	Sarah Fields, Public Participant *
Paul Colman, EPM Inc.*	

*via telephone

SUMMARY

The purpose of the meeting was to receive a briefing from the NRO staff, regarding their development of an enhanced safety focused review approach for the upcoming NuScale design certification application for a Small Modular Reactor, which is of an integral pressurized water reactor (iPWR) design. The meeting transcripts are attached and contain a description of each matter discussed during the meeting. The presentation slides and handouts used during the meeting are attached to these transcripts. Described below are significant issues discussed during the meeting with the corresponding pages in the transcript referenced:

SIGNIFICANT ISSUES	
Issues & Members' Comments	Transcript Page
In his opening remarks the Subcommittee Chairman Corradini noted the purpose of the meeting was for NRO staff to brief the Subcommittee on their development of an enhanced safety focused review approach for an effective review of the upcoming NuScale design certification (DC) application. He also noted that portions of the meeting may need to be closed to protect information proprietary to NuScale.	P5
Ms. Lynn Mrowca, NRO, introduced her staff and presented an overview of the staff plan to more fully integrate risk insights into pre-application activities and review of NuScale Small Modular Reactor DC application.	P7-77 Slides 1-36
Discussion on the NRC design specific review standards (DSRS) developed for this review.	P11-14 Slide 10
Discussion on NuScale GAP report that identified regulatory gaps.	P15-18
Members questioned the staff intent to emphasize or deemphasize parts of the review given the design of the plant including the risk assessment is on paper only, noting such a plant to be more reliable than of an operating plant.	P19-26
Graded review approach, PRA quality and thoroughness, how to address issues/items that do not show up on categorization results because they were in the "gap" and excluded. Could the new design include something that isn't addressed in NRC regulations?	P26-38 Slide 6, 7
From the last question discussion went into how the staff is addressing new or unique features, first of a kind engineering effort or testing, passive plant response, aspects of plant behavior that is not known.	P38-50
Presentation of Operational Programs – Verify capability, availability and reliability.	P51-53 Slide 8, 9
Technical review preparation by staff - Discussion on interaction with NuScale expert panel for reliability assurance program (RAP) categorization. NRC will use other area reviewers to collaborate with reviewer of RAP categorization. Involvement of NRC working group and additional training for the staff reviewers before review starts will enhance NRC review. NRC audit of the	P54-64 Slide 11-13

NuScale expert panel, lessons learned from previous reviews, staff treatment of an ESBWR non-safety but risk significant system were discussed.	
ITAAC closing experience with AP1000 was mentioned.	P64
Staff needs more detailed information to implement the SRP and DSRS. Some of the guidance will be clarified from the ongoing subject work.	P65
Member question on staff working group, process of the multi-disciplinary effort and need for adequate confidence on early assumptions regarding plant design. AP1000 experience was mentioned.	P66-71
Members' question on quality of PRA and ITAAC/DAC. Members' interest in NuScale PRA was noted.	P71-76
IAEA regulator forum two-year pilot program on three topics: graded approach; defense-in-depth; and emergency planning zones. First IAEA report due October to March time frame.	P76-77
SSC review tool and a framework for categorization - Discussion on key review considerations noted on Slide 14 (novel design, Multi-module aspects, safety margin, defense-in-depth, interaction of non-safety related systems with safety function, etc.) which will drive the scope and depth of staff review.	P78-97 Slide 14-19
Discussion on treatment of ATWS. Member questioned the level of detail one needs to go down to identify essential components and address critical functions the components perform in those systems.	P85-97
SER Documentation Approach - example containment evacuation system – discussion went into staff reviewer leveraging other regulatory and operational programs like the technical specification, maintenance rule, radiological protection program etc. to reduce review scope. Discussion on change control.	P97-109 Slide 20-23
Discussion on status of staff's program development – staff noted preliminary nature of it and that their goal was to at least have the concept in the reviewer's mind during the readiness assessment (end of September) and certainly for the application acceptance review. A question was raised about the potential error in categorizing some support systems at a level lower than the system they support.	P109-116
Planning Tool for Programmatic or Non-SSC Reviews – A tool for reviewers to determine the scope and depth of review. Members brought the past experience with safety analysis where a gross error went undetected and asked if part of the reviewer's task was to identify things like assumptions that have not yet been validated.	P117-126 Slide 24
Use of Non-SSC Planning Tool – Staff presented examples using a couple of SRP Chapter 19 review procedures. Discussion on reactor building crane.	P126-132 Slide 25
Staff wrap up emphasized the need for documenting in the SER what the reviewers emphasized or de-emphasized in their review. Staff noted the iterative nature of the process and that the SER would be a living document. Members questioned if staff had looked at lessons from large passive plants. Members raised the need for validating assumptions and to include in the SER	132-141 Slide 26, 27

the limitations regarding the reviewer's conclusion given the absence of design completion at the certification stage.	
Multi-module risk – Staff work recognizes that potential for fires and floods spreading from one unit to another needs to be included in the PRA model, and coupling and sharing of systems need to be considered. Acceptance criteria needed for SRP 19.0 reviews of pending applications for design certification. The NRC working group had developed four high level options, and recommended one. Review considerations and criteria were discussed.	P142-161 Slide 1-8
Members' questions – Staff noted that establishing new requirements or regulations was not within the current scope. Members voiced concerns that given multiple units being in close proximity and shared systems, potential multi module events could result from external events like seismic, and aircraft impact. Members noted that technical acceptance criteria for such review had not been established. Staff noted the possibility of tailoring their guidance in future to be more specific. Staff was doing an audit related to control room staffing. Discussion on multi-module risk as a prominent contributor to risk when total risk is still within acceptable range – staff pointed out that in order to be acceptable it has to be not a significant contributor to total risk.	P161-181
Opportunity for comments from members of the public attending the meeting - Chairman Corradini asked for comments from members of the public attending the meeting by being in the room or over the telephone bridge line. Some comments were provided.	P182-186
Members' comments – 1) Need for the staff to establish a review schedule where a decision on a more safety significant issue or item is not hindered by lack of information on a needed less safety significant item; and 2) comment on staff choice of the word "enhanced safety." After some discussion, members decided a follow-up Full Committee meeting and an ACRS letter were not needed at this time. A short discussion on NuScale design certification application staff readiness review took place.	P186-191
The meeting ended at 4:56 p.m.	P191

ACTION ITEMS	
Action Item	Reference Pages in Transcript
Action item 1: ACRS members requested a copy of the staff audit report of NuScale PRA.	P29
Action item 2: Members look forward to seeing more information regarding the workings of the working group.	P59

Documents provided to the Subcommittee

- a. NuScale Gap Analysis Summary Report NP-RP-0612-023, Rev. 1, July 2014, ML14212A832
- b. NRC letter to NuScale, Response to Gap Analysis Summary Report Containment regulatory Issues, March 24, 2016, ML15266A264
- c. NUREG-0800, Introduction - Part 2, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: Light-Water Small Modular Reactor Edition
- d. SRP 19.0, Probabilistic Risk Assessment and Severe Accident Evaluation for New Reactors, ML15089A068
- e. NRO Slides - NuScale Safety-Focused Review Approach, April 18, 2016
- f. NuScale Enhanced Safety-Focused Review SSC Review Tool (NRO draft)
- g. NRO Slides - 4th and 6th NuScale Safety-Focused Review Approach Working Group Meeting
- h. NuScale Slides Multi-Module Topics, September 16, 2014, ML14245A088
- i. NRO NuScale Safety-Focused Review Group charter

Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

Title: Advisory Committee on Reactor Safeguards
 NuScale Subcommittee

Docket Number: (n/a)

Location: Rockville, Maryland

Date: Tuesday, August 16, 2016

Work Order No.: NRC-2538

Pages 1-181

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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

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

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

+ + + + +

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

+ + + + +

NUSCALE SUBCOMMITTEE

+ + + + +

TUESDAY

AUGUST 16, 2016

+ + + + +

ROCKVILLE, MARYLAND

+ + + + +

The Subcommittee met at the Nuclear
Regulatory Commission, Two White Flint North, Room
T2B1, 11545 Rockville Pike, at 1:02 p.m., Michael
Corradini, Chairman, presiding.

COMMITTEE MEMBERS:

MICHAEL L. CORRADINI, Chairman

RONALD G. BALLINGER, Member

DENNIS C. BLEY, Member

CHARLES H. BROWN, JR. Member

JOSE A. MARCH-LEUBA, Member

DANA A. POWERS, Member

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HAROLD B. RAY, Member

JOY REMPE, Member

GORDON R. SKILLMAN, Member

JOHN W. STETKAR, Member

DESIGNATED FEDERAL OFFICIAL:

MICHAEL SNODDERLY

ALSO PRESENT:

JOE ASHCRAFT, NRO

MARK CARUSO, NRO

SARAH FIELDS, Public Participant *

THOMAS KENDZIA, NRO

LYNN MROWCA, NRO

TONY NAKANISHI, NRO

MARK TONACCI, NRO

MAITRI BANERJEE, ACRS*

NILS BRECKENRIDGE, NUSCALE POWER*

PAUL COLMAN, EPM INC.*

TOM BERGMAN, NUSCALE POWER*

*Present via telephone

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P R O C E E D I N G S

1:02 p.m.

CHAIRMAN CORRADINI: Okay, we'll come to order.

This is a meeting of the NuScale Subcommittee of the Advisory Committee on Reactor Safeguards.

My name is Mike Corradini, Chairman of the NuScale Subcommittee.

ACRS members in attendance today are Ron Ballinger, Harold Ray, Dick Skillman, Dana Powers, Dennis Bley, John Stetkar, Jose March-Leuba, Charles Brown and Joy Rempe.

Mr. Mike Snodderly is the Designated Federal Official for this meeting.

Today, we have members of the NRO staff to brief the Subcommittee on the Enhanced Safety Focused Review Approach they are developing for an effective review of the NuScale design certification application.

The application will be for their design of the Small Modular Reactor that uses integrated pressurized water reactor technology and is expected to be submitted in December of '16.

The rules for participation in today's

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1 meeting were announced in the Federal Register on
2 August the 1st, 2016.

3 The meeting was announced as an
4 open/closed to the public meeting which means that
5 we can close the meeting to discuss any sensitive
6 issues, if they arise, and presenters can defer
7 questions that should not be answered in the public
8 session.

9 So, I'll let you guys tell us if we
10 stray into what needs to be closed, we'll just hold
11 off.

12 As I had asked the staff, if we go into
13 direction, to warn us.

14 We've not received any requests from
15 the public for making a statement to the
16 Subcommittee. We have a bridge line established
17 for members of the public to participate in the
18 meeting. The bridge number and password were
19 published in the agenda posted on the NRC Public
20 website.

21 To minimize disturbances, the public
22 line will be put in a listen in only mode. The
23 public will have the opportunity to make a
24 statement or provide comments at a designated time
25 towards the end of this meeting.

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1 We also have members of the NuScale and
2 NRC staff attending the meeting over another bridge
3 line.

4 To avoid disturbance, I request that
5 those attendees put their telephones in mute and
6 other listening devices, like cell phones, in a
7 noise free mode.

8 So, let me invite Lynn Mrowca to -- of
9 the NRO staff to introduce the presenters and start
10 us off.

11 MS. MROWCA: Yes, good afternoon.

12 We appreciate the opportunity to share
13 --

14 CHAIRMAN CORRADINI: Mic on? Green
15 light? At the very bottom.

16 MS. MROWCA: Oh, it's a green light but
17 not brilliant green.

18 So, good afternoon.

19 We appreciate this opportunity to share
20 with you our progress on planning for the NuScale
21 design certification review.

22 My name is Lynn Mrowca and I'm the
23 Chairperson of the NuScale Enhanced Safety Focused
24 Review Working Group.

25 So, with me are some of the working

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1 group members. We have Mark Caruso, Tom Kendzia
2 and Tony Nakanishi.

3 And, other group members are in the
4 audience or might be on the phone and they might
5 want to share their opinions or comments from time
6 to time.

7 So, let me start by saying, why do we
8 call it, and many have asked, why is it an Enhanced
9 Safety Focused Review? Don't we already do safety
10 focused reviews?

11 And, hopefully, that will be a little
12 bit more evident by the end of the presentation.

13 But, in summary, we expect the
14 framework of this review to enhance the
15 effectiveness of our already safety focused review
16 by applying lessons learned from previous reviews
17 and using a more integrated, holistic and risk
18 informed review process.

19 MEMBER POWERS: So, previous reviews
20 were not integrated?

21 MS. MROWCA: They were to some extent.
22 I think we're trying to challenge and raise the
23 level of what we do in terms of integration.

24 Next slide, please?

25 So, as an overview, we're going to

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1 update you on the progress since your last meeting
2 on Small Modular Reactor review plans.

3 The issue guidance in NUREG 0800, I'll
4 give you some background on operational programs as
5 they might be able to be used in the review,
6 provide an update on the Design Specific Review
7 Standard and what we are doing to prepare for the
8 design cert review as well as actions we have left
9 to complete and some challenges and benefits of
10 this review approach.

11 So, the background, the last time I
12 think you engaged in some of these topics, not
13 excluding the DSRs, was a briefing to the Future
14 Plant Design Subcommittee on February 9th of 2011
15 regarding the proposed staff response to the SRM.

16 So, two of the things that they talked
17 about in that SRM was the development of a
18 framework to more fully integrate risk insights
19 into pre-app activities and Small Modular Reactor
20 reviews and to align a review focus, our resources
21 to risk significant, structure systems and
22 components and other aspects of the design that
23 contribute most to safety to enhance the efficiency
24 of the review process.

25 And so, since that meeting -- next

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1 slide, please?

2 So, the staff response, and I think
3 they provided a draft of this SECY-11-XXXX at the
4 time, and issued it nine days later, February 18th,
5 SECY-11-0024.

6 To integrate the use of risk insights,
7 it sounds very familiar to the SRM, into the pre-
8 app activities and the review of applications to
9 align the review and focus the resources to risk
10 significant SSCs and other aspects of the design
11 that contribute most to safety, enhance the
12 effectiveness and efficiency of the review process.

13 So, the Commission approved the staff's
14 plan for the iPWR design applications in SRM dated
15 May 11th. So, as a result, the staff has issued
16 NUREG-0800 Introduction Part 2 in January of 2014.

17 And, also issued the NuScale Design
18 Specific Review Standard. I think I saw entries as
19 late as Sunday, August of 2016. So, they're all
20 issued now.

21 CHAIRMAN CORRADINI: So, if I might
22 just stop you there so I've got this in mind.

23 The DSRS which the Committee chose not
24 to comment on, but we had -- the Subcommittee's
25 understanding --

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1 MS. MROWCA: Yes.

2 CHAIRMAN CORRADINI: -- of what's kind
3 of part of the standard versus the DSRS. It's
4 still in force and what we're going to hear today
5 is a process to apply this to the application, is
6 that a good way of characterizing this?

7 I'm trying to understand --

8 MS. MROWCA: Yes.

9 CHAIRMAN CORRADINI: -- what this is in
10 relation to the DSRS.

11 MS. MROWCA: Yes, and we'll talk about
12 maybe some of the challenges that we had with the
13 information we had at the time of development of
14 the DSRSs and how we're supplementing that now and
15 clarifying the guidance that's in there.

16 CHAIRMAN CORRADINI: Okay.

17 MEMBER BROWN: Could I ask a question
18 also, please?

19 MS. MROWCA: Sure.

20 MEMBER BROWN: You said they're all
21 issued now? They're available?

22 MS. MROWCA: I'm looking at my --

23 MEMBER BROWN: Or something like that.

24 MS. MROWCA: Yes, I am getting a thumbs
25 up from the audience.

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1 MEMBER BROWN: Okay. And, I guess I'm
2 particularly interested in Chapter 7, obviously.

3 MS. MROWCA: Yes.

4 MEMBER BROWN: And, we had not seen
5 these yet. Are we going to get an opportunity?

6 MS. MROWCA: They're available
7 publically. So, they're available to you now.

8 MEMBER BROWN: Okay. So, if we go off
9 -- if we have somebody go off and get them for us,
10 we can get them? That's all I wanted to know.

11 MS. MROWCA: Yes, you can.

12 CHAIRMAN CORRADINI: To follow up
13 Charlie's questions, because I can kind of guess
14 where he's going, he had seen the --

15 MEMBER BROWN: Yes, let me -- I'll
16 phrase it.

17 CHAIRMAN CORRADINI: Thank you.

18 MEMBER BROWN: We had done one DSRS for
19 mPower which we fully did, reviewed with the staff
20 and made comment, the staff accommodated those
21 comments, incorporated them.

22 I was then told subsequently that
23 NuScale's Chapter 7 would be, quote, I'm going to
24 use these words carefully, identical to the mPower
25 one.

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1 Now, I know it's not going to be
2 exactly identical, but I guess my interest then is,
3 and I will go look personally line by line when I
4 get it, that the main concepts that we agreed to
5 incorporate at mPower will be incorporated and
6 still retained in NuScale.

7 So, I hope that's the -- I'm not trying
8 to be pejorative or -- I'm just very interested.

9 MS. MROWCA: Just checking?

10 MEMBER BROWN: I'm just checking.

11 MS. MROWCA: I'm getting another thumbs
12 up from the audience.

13 MEMBER BROWN: Whose thumb is that
14 anyway?

15 (Laughter.)

16 MEMBER BROWN: No, you have somebody --
17 or a thumbs up, I'm happy.

18 CHAIRMAN CORRADINI: Are you absolutely
19 certain that that was a thumb?

20 MS. MROWCA: Yes, I was.

21 MEMBER BROWN: The thumb has arrived.

22 MR. ASHCRAFT: Well, this -- yes, tap
23 on it, I think it's working. Yes, there we go.

24 This is Joe Ashcraft, I&C.

25 So, yes, we were before the ACRS four

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1 times with our mPower DSRS.

2 MEMBER BROWN: Yes.

3 MR. ASHCRAFT: And, I think we heard
4 you. And, helped --

5 MEMBER BROWN: We need more. We need
6 more.

7 MR. ASHCRAFT: So, we didn't make any -
8 - there was a few insignificant changes that, you
9 know, were forced upon us by the answers.

10 But, generally, what you saw before is
11 what you'll see.

12 MEMBER BROWN: Okay. I did see your
13 all's incorporation of our Subcommittee meeting
14 input and I was just hoping that it translated into
15 the NuScale one.

16 MR. ASHCRAFT: Right. And, a part of
17 what they're going to discuss today is one of the
18 areas that you guys had a concern with and I think
19 that'll explain it better with the A1, A2, B1, B2.

20 MEMBER BLEY: I've got to jump in.

21 Our Subcommittees don't do
22 recommendations or speak for the Committee, if you
23 were the Subcommittee, you didn't guidance from me.

24 MR. ASHCRAFT: No, I didn't imply that
25 we did. We got our instructions --

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1 MEMBER BLEY: Okay. We made comments
2 and you all did something with them, that's it. We
3 did not give you any guidance. I understand that
4 very clearly.

5 MR. ASHCRAFT: Okay.

6 MEMBER BLEY: All right, proceed.

7 MEMBER REMPE: Actually, could I ask
8 since we're kind of wandering about here?

9 There was this GAP report and your
10 response to the GAP report, is that something
11 that's just associated with this enhanced review
12 thing or is that something that's pretty standard?

13 Like, I know in the old days, the gas
14 reactor and some of the advanced designs, you did
15 that. I'm not sure if that was done with the
16 AP1000, but it just seems like a good process that
17 might be used to some of the stuff being talked
18 about now a days in the popular press.

19 MR. TONACCI: So, I'll respond to that.
20 I'm Mark Tonacci, the Branch Chief for the
21 licensing of the NuScale application.

22 So, NuScale sent to us a GAP report
23 that identified the regulatory gaps. It's the
24 first time I've actually seen something like that.

25 So, we took that opportunity to respond

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1 to them on the staff perspectives on those
2 regulatory gaps whether we agreed with them
3 technically or disagreed or suggested a different
4 licensing path or whether we needed the Commission
5 involvement on those gaps.

6 So, that's what we did with those.
7 And, those positions, all that we've written, there
8 are six letters, they're all publically available
9 if you want to take a look at those.

10 And, along the way, as appropriate,
11 those were done, for the most part, after the
12 DSRs, either concurrent or after the DSRs.

13 CHAIRMAN CORRADINI: Mark, just one
14 clarification.

15 We, in the packet we received to kind
16 of prep us for this, we had one communication,
17 right?

18 MEMBER STETKAR: Four. We have NRC --
19 at least I have, I don't know --

20 MR. TONACCI: Four documents.

21 MEMBER STETKAR: I've got on AFW Atlas,
22 one on containment, one on electrical systems and
23 one on reactor systems. So, we have four of those
24 response letters.

25 You said there are six now, Mark?

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1 MR. TONACCI: There are six. There's
2 another one on controlling staffing, and I don't
3 remember this, there's one more.

4 MEMBER STETKAR: We should probably get
5 those. They're kind of interesting.

6 MS. MROWCA: And, I -- those are
7 available. We have a SharePoint site that we put
8 together actually for this working group, but
9 they're also available, I think, on the NuScale
10 SharePoint.

11 MR. TONACCI: We can get that to you.

12 MEMBER STETKAR: For those of us who
13 don't know through the bazillions of places to look
14 for these things that you do, I searched for them,
15 silly me, on, you know ADAMS and they're certainly
16 not there.

17 MEMBER REMPE: I thought that was a
18 good exchange that you might want to emphasize in
19 the future with all the stuff going on in the
20 popular press.

21 MS. MROWCA: Okay, thank you. And,
22 like I said, at least for the staff working on
23 this, we've tried to, and we'll talk about later,
24 this SharePoint site, we put together to try and
25 facilitate more sharing amongst staff, especially

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1 on technical issues.

2 MEMBER BROWN: Yes, just, you talked
3 about the NuScale one. I presume that's the July
4 2014 GAP analysis paper -- report that they
5 submitted? That's the one we got in background
6 documents.

7 MR. TONACCI: That sounds like it. I
8 don't remember the date exactly.

9 MEMBER BROWN: I ground my way through
10 that to see what it looked like. So, and that's
11 okay. It was two years old, that's the only reason
12 I was making sure we had a current one. Thank you.
13 I've got them all right here.

14 MS. MROWCA: Okay, moving on into
15 NUREG-0800, Introduction Part 2, the -- I'll bring
16 up three bullets of this Introduction Part 2.

17 And, one is that the Technical Branch
18 Chief and the reviewer established the scope and
19 depth of the review. And, as much as we think PRA
20 staff are broad, we do not want to take the
21 official responsibility as a decision maker on
22 that, but we will certainly be around for any kind
23 of guidance that we can provide to the Technical
24 Branch Chief and reviewer.

25 The second bullet is emphasizing or de-

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1 emphasizing particular aspects of the Standard
2 Review Plan sections for the specific application
3 and documenting these aspects in the safety
4 evaluation.

5 As a group, we had some -- a lot of
6 discussion about those words, emphasizing and de-
7 emphasizing. And, I think those are similar to
8 risk informed, in that, a lot of people, when you
9 bring up the term risk informed, they think that
10 that means all we're going to do is reduce.

11 And, we quickly corrected that to say
12 that risk informed means you also may look on the
13 other side and may need to emphasize certain
14 things. So, it goes both ways.

15 And, then, the third bullet is, it says
16 that the framework is applicable to the review of
17 all SSEs but is not applicable to the review of
18 programmatic, procedural, organizational or other
19 non-SSE topics. We'll talk about that more later.

20 MEMBER POWERS: May I ask another --

21 MS. MROWCA: Sure.

22 MEMBER POWERS: question about this --

23 MS. MROWCA: Yes.

24 MEMBER POWERS: -- emphasis and de-
25 emphasis?

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1 Certainly understand that if I had risk
2 information about a plant that highlighted
3 something that I had not particularly focused on in
4 past views, new information that quite --

5 But, if you came along and said, gee,
6 I've done this risk assessment and this thing that
7 you used to emphasize the hell out of just doesn't
8 show up in our risk assessment. Is that a
9 statement about the area of examination or is that
10 a statement about the risk assessment?

11 MS. MROWCA: No, I think that one thing
12 we're trying to emphasize is just as in risk
13 informed decision making, there are many factors
14 that go into a decision about what you might want
15 to emphasize and de-emphasize. So, we'll talk
16 about all those things that we're looking at right
17 now.

18 MEMBER POWERS: This doesn't talk to
19 about all those other factors. And, so, I just
20 wanted -- I'm perfectly comfortable with the idea
21 that there are a lot of factors.

22 But if you come along and you say, the
23 risk assessment doesn't say this particular thing
24 and has no importance, do I just de-weight that
25 because you're doing a risk assessment on a plant

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1 that hasn't been built, hasn't been operated, don't
2 know anything about it?

3 MS. MROWCA: Well, you might want to
4 investigate the risk assessment first just to make
5 sure that something wasn't missed. Because, we
6 know that's always been brought up. There could be
7 something that was missed.

8 MEMBER POWERS: You can look at it
9 until the cows go home, until you've built the
10 plant and operate it, that you're not going to know
11 for sure.

12 MS. MROWCA: I'm not sure I know how to
13 answer your question.

14 MEMBER POWERS: Really, the question is
15 just understanding how you approach this.

16 CHAIRMAN CORRADINI: I don't mean to
17 interrupt you, evidently the phone lines for
18 connecting us up are not functioning. So, let us
19 try to rehook everybody up.

20 So, we don't want to miss all these
21 words of wisdom going between the two of you.

22 (Off mic comments.)

23 CHAIRMAN CORRADINI: All right, Dana,
24 sorry.

25 MEMBER POWERS: I'm just trying to

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1 understand operationally how you approach this risk
2 assessment. The emphasis, yes, if the finding is,
3 gee, there's a hazard that we really hadn't
4 recognized or not recognized enough in the past, I
5 understand what you do there. Okay?

6 But, here, you've got something comes
7 in and says, well, you just have to give this much
8 attention because it's just really unimportant
9 according to our risk assessment.

10 But, your risk assessment is plagued by
11 the fact that you have a completely paper plant
12 here which tend to be much reliable, much more
13 robust and have fewer confounding factors than real
14 plants.

15 And, so, how do you approach it? I
16 mean, I certainly have colleagues within the risk
17 assessment community in Europe that say ignore it.

18 MS. MROWCA: That's a good question.
19 I'm not sure if I can answer it very well.

20 And, you're talking about at the review
21 stage?

22 MEMBER POWERS: Yes. I mean, you're
23 designing your review here and you undertake this
24 review. You've got a finite number of resources,
25 you can't possibly look at everything. I mean,

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1 it's just not humanly possible to do so.

2 MS. MROWCA: Right.

3 MEMBER POWERS: And, even if it were,
4 it would take forever.

5 MS. MROWCA: Yes. Unless I don't
6 understand, I mean, I would say are other
7 considerations are something that would help us
8 figure out exactly what we need to do for that
9 area.

10 Even if the risk assessment is, you
11 know, doesn't show it as being significant, there
12 are other things.

13 So, maybe if -- it might be good to
14 hold your question and then ask that during the
15 considerations, once you've seen that, to see if
16 we're missing a point or --

17 CHAIRMAN CORRADINI: I guess,
18 operationally, I had his question differently. I
19 was looking for an example as to something that is
20 obviously in the -- for want of a better -- in the
21 B2 category, you would de-emphasize it. I'm still
22 struggling what de-emphasize mean. I think that's
23 --

24 MEMBER POWERS: Kind of the same thing
25 I'm --

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1 CHAIRMAN CORRADINI: And, we can wait.

2 MS. MROWCA: Okay. Yes, you can try --

3 CHAIRMAN CORRADINI: If you want to
4 come back later, we can wait.

5 MS. MROWCA: I think they'll be talking
6 about that, too. And, we have a couple of examples
7 to show you.

8 CHAIRMAN CORRADINI: And, my also --
9 part of it was is, I assume that you're not going
10 to rely on the applicant's risk assessment.
11 There'd be other things that would worry you based
12 on other considerations. But --

13 MS. MROWCA: Yes, there's --

14 CHAIRMAN CORRADINI: -- when the time's
15 appropriate, I think we've got to address Dana's
16 question.

17 MS. MROWCA: And, there's a lot that we
18 go into decision about what you look at and what
19 you don't look at and how you look at it is really
20 maybe more so than de-emphasis, it's how you look
21 at it, what you do.

22 Did you want to add something, Mark?

23 MR. CARUSO: Well, yes, I mean, I think
24 it's, you know, we have a number of other tools and
25 ideas about, you know, you know, examining the

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1 design or design review, our experience with
2 systems, our concepts of defense in depth and how
3 it's maintained and included in the design.

4 And, it's like any analysis, you get a
5 result from an analysis and you, you know, you
6 immediately say, let me put my engineering hat on,
7 my operations hat on, to see, you know, do I really
8 believe this or is there questions or uncertainty?
9 And, I might not want to accept what it's telling
10 me.

11 And, I think that that's the heart and
12 soul of what we're going to talk about today is all
13 the other stuff beside the PRA that's going to help
14 us sort of sort out what is important.

15 MEMBER POWERS: How good is
16 your engineering judgment on a plant that's
17 never been built and never been operated?

18 MR. CARUSO: Well, it's got a lot of
19 systems and components and aspects to it that are
20 not that confounding. In fact, it's a fairly
21 simple design.

22 So, yes, I mean, and those areas, you
23 know, and there's areas where we really need dig
24 into, especially the ones that we are unfamiliar
25 with. In fact, that's part of what this process

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1 does. It focuses on saying, those are really key
2 areas regardless of what the PRA says, the new
3 novel stuff.

4 You can't, you know, you know, you're
5 not going to be de-emphasizing that unless you're
6 completely convinced that it's new and novel and
7 not important.

8 MS. MROWCA: And, we're going to do our
9 best to understand the design and learn as much as
10 we can about it to help us make those kinds of
11 decisions.

12 So, maybe it's good if we get a little
13 bit further and then see if we're answering your
14 question or if you still have questions, please
15 don't hesitate to ask.

16 MEMBER POWERS: Okay. It's good that
17 you reminded us of that because the Committee is
18 known to be so shy. So, retiring, so afraid to ask
19 questions. It's just terrible.

20 MS. MROWCA: And, we're always willing
21 to listen.

22 The next slide, please?

23 I know this is a hard slide to read,
24 but it's the risk informed and integrated review
25 framework presented to you back in February of 2011

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1 and it's in the NUREG-0800 Introduction Part 2.

2 So, a couple things I want to say about
3 this, it's noted as it being a graded review
4 approach based on both safety classification and
5 risk significance.

6 On this slide, you can see that the
7 left bottom diamond represents safety related or A.
8 And, then, on the right side of the diagram, the
9 diamond or B, is non-safety related.

10 And, so, below that, we have four
11 boxes, risk significance has been designated as
12 either, (1) risk significant; or (2) not risk
13 significant. So, you can see the A1, A2, B1, B2.
14 And, this is kind of critical into as you
15 understand our presentation as we go.

16 So, generally, the idea is to have a
17 more focused review on the A1 and less on the B2.
18 But, as we talked about before, that's not always
19 the case.

20 MEMBER BLEY: So, then, if we're going
21 to have the PRA guide the NRC's review, you need to
22 be convinced of the quality and thoroughness of the
23 PRA very early on. How are you going to do that?
24 Or, are you going to come to that later?

25 MS. MROWCA: Yes, yes, and that, we're

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1 going to touch on that, too.

2 But, one of the things that we want to
3 say is, I did note that as something that you had
4 an issue with back in 2011.

5 MEMBER BLEY: Don't you have an issue
6 with it?

7 MS. MROWCA: Yes, except for these
8 other considerations. So, until you know what they
9 are, I think everything together makes a good risk
10 informed decision about what you look at.

11 So, risk informed doesn't mean PRA-
12 based. It's one factor that's going --

13 MEMBER BLEY: Well, it doesn't, but, if
14 you're doing this kind of stuff, the PRA is heavy
15 input into this.

16 MS. MROWCA: Yes.

17 MEMBER BLEY: And, it better be pretty
18 good if it's not only going to guide the applicant
19 in their understanding of the risk, but going to
20 guide the NRC's review process.

21 MR. CARUSO: This is Mark Caruso.

22 And, I think there's two issues here.
23 One is the quality of the PRA as a guiding tool and
24 the second one was the idea of you're starting the
25 review and you haven't reviewed the PRA yet.

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1 That's what you were saying, don't you have a
2 problem with that?

3 And, I think one of the things we're
4 trying to do is work out ways to deal with that
5 issue. And, I think we'll be talking about those.

6 MS. MROWCA: Yes.

7 MEMBER BLEY: Have they shown you any
8 of the PRA in these preliminary --

9 MS. MROWCA: Oh, yes, we --

10 MR. CARUSO: We did an audit about a
11 month ago.

12 MEMBER BLEY: Of the PRA?

13 MS. MROWCA: Yes.

14 MEMBER BLEY: Okay.

15 CHAIRMAN CORRADINI: Since you brought
16 it up, I'll ask the question now. I figured it was
17 going to come up eventually.

18 Can we get a copy of the audit?

19 MS. MROWCA: Yes, there's a public
20 audit summary report that was done. There is some
21 proprietary information, so that would be --
22 there's a nonproprietary version.

23 CHAIRMAN CORRADINI: I think that the
24 Committee would like to see both give --

25 MS. MROWCA: Okay.

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1 CHAIRMAN CORRADINI: -- given what
2 Dennis has asked.

3 MR. SNODDERLY: Yes, send it to me.

4 CHAIRMAN CORRADINI: Yes, Mr. Snodderly
5 is our field catcher that will catch all the
6 documents.

7 MS. MROWCA: Okay.

8 CHAIRMAN CORRADINI: Okay? Thank you.

9 MS. MROWCA: So, as we said, the
10 applicant initially proposes these categorizations
11 and our review of them will be discussed on the
12 next slide.

13 But, again, we said, at least three
14 times now, I guess, about important to note that
15 there's other considerations that could affect the
16 review and Tony is going to be our designated
17 person to talk about those things.

18 MEMBER POWERS: I've, perhaps
19 incorrectly, that when I make the adjudication that
20 something is A1 or A2, that because of what you
21 call other considerations, some of the A2 can leak
22 into the A1 category?

23 MS. MROWCA: Yes.

24 MEMBER POWERS: Can it leak the other
25 way? A1 leaking into A2? Can it go any further?

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1 MS. MROWCA: Yes, the same thing can
2 happen.

3 MEMBER POWERS: Yes, but you can't get
4 an A to a B leakage?

5 MS. MROWCA: From -- no, based on
6 staff.

7 MEMBER SKILLMAN: Lynn, let me ask this
8 question.

9 MS. MROWCA: You could -- the staff's
10 review could and that's what I'm going to on the
11 next slide, could influence that whether something
12 is safety or non-safety.

13 MEMBER SKILLMAN: Let me ask this
14 question, both Joy and Charlie brought up the
15 question about the GAP analysis.

16 And, even though that GAP analysis is
17 dated, the staff response to the GAP analysis
18 identified seven or maybe 12 items, at least, that
19 I think are significant in terms of how industry
20 has classically handled the renewal vent lines,
21 things of that nature.

22 I would go so far as to say some of
23 those items that were identified as gaps are basic
24 plumbing or basic technology issues that we have
25 dealt with for decades.

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1 If I coupled the thought that NuScale
2 identified these items as things that they didn't
3 think that they had to do, which is why they were a
4 gap, and I coupled that with the emphasizing and
5 de-emphasizing comment from your prior slide, it
6 brings to my mind the question of thoroughness.
7 How thorough is the process with which you've
8 identified A1 and A2 and B1 and B2?

9 So, here's the real question. Have
10 things been excluded such that they do not show up
11 on A1 or A2 or B1 or B2 because they were in the
12 gap?

13 MS. MROWCA: Can we hold that thought
14 for a second?

15 MEMBER SKILLMAN: Yes.

16 MS. MROWCA: Okay. We might go into
17 that, I don't -- maybe the panel can or working
18 group can maybe think of some examples.

19 But, let me go through the slide seven
20 real quick, too, just to kind of let you know what
21 we're thinking about and how we have to handle the
22 review.

23 We don't know everything at this point,
24 but we are trying to learn. And, we certainly know
25 more now than we did when we wrote the DSRs.

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1 So, if we start on slide seven, the
2 first bullet talks about the safety related
3 classification. This is what the staff will do.
4 So, either A or B. So, we'll review that as part
5 of SRP Section 3.2 which is for the seismic and
6 system quality group classification.

7 So, again, initially, we need to use
8 what the applicant has given us. And then,
9 sometimes, we may right away have an assessment of
10 whether or not it is something we want to look at
11 in more detail.

12 But, there could be things coming up
13 from this safety-related classification review that
14 could affect our review, that could change it and
15 say, we don't agree that this thing is non-safety.
16 We think it should be safety.

17 So, we're going to have to be a little
18 bit flexible as we go through this process.

19 The same thing is true of risk
20 significance determination. We need to accept
21 initially what the applicant gives us, so, as risk
22 significant or not.

23 And, notice how we didn't say that that
24 is only because of the PRA. That's reviewed as
25 part of SRP Section 17.4, the Design Reliability

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1 Assurance Program.

2 So, there's many factors that go into
3 that. But, we listed just three of them here.

4 So, one, and this may get back to what
5 Dennis was saying earlier, the PRA is one of them,
6 obviously. There's criteria that we use about
7 significance, risk significance.

8 But, also, we, per our guidance, have
9 swept in the regulatory treatment of non-safety
10 systems, all RTNSS will be part of this risk
11 significant.

12 In addition, we have an expert panel
13 who are supposed to look at not only probabilistic,
14 but also deterministic needs. And, there's more in
15 SRP 17.4, page 8 that talks about what goes into
16 the Reliability Assurance Program.

17 And, a little bit about, like, the
18 qualifications for the expert panel, so you know
19 where they're coming from.

20 So, we just wanted to emphasize that
21 it's not just the quantitative PRA, but there are
22 other things that we look at to see if we can, you
23 know, for risk significance.

24 MEMBER SKILLMAN: But, Lynn --

25 MS. MROWCA: Yes?

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1 MEMBER SKILLMAN: -- when you
2 introduced this slide --

3 MS. MROWCA: Yes?

4 MEMBER SKILLMAN: -- bullets one and
5 two, I believe I heard you say you're using the
6 list that came from NuScale?

7 MS. MROWCA: We start with that and
8 that's the key, we start with that and then the
9 last bullet, additional review may be necessary
10 based on the changes resulting from the staff's
11 review.

12 So, again, if we don't agree with the
13 risk significance determination from the applicant,
14 or the safety classification from the applicant,
15 then, those Als and BIs, in our opinion, are going
16 to shift.

17 MEMBER SKILLMAN: But, what about
18 things that should have been A1 or B1 and don't
19 show up yet? Or, don't show up at all?

20 CHAIRMAN CORRADINI: I think what Dick
21 is asking --

22 MEMBER SKILLMAN: Is thoroughness.

23 CHAIRMAN CORRADINI: -- is something
24 totally missing? Not that it's there and it's in
25 the wrong box, but it's just not there?

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1 MEMBER SKILLMAN: Bingo. That's what
2 I'm asking about. Because, the GAP analysis, if I
3 can use the word, was very clever and they used
4 terms that we hadn't seen before that doesn't apply
5 here. We don't do that, not applicable to the
6 NuScale design.

7 So, that leaves me wondering, okay, is
8 something of importance absent in the accounting
9 that, if we understood what it was, we'd have said,
10 by golly, that should be an A1 or that should be a
11 B2.

12 But, because it isn't there and we
13 don't know what we don't know, are we now lulled
14 into thinking everything's fine when it isn't fine?

15 MR. CARUSO: This is Mark Caruso.

16 And, one of the considerations we have
17 in this process, and Tony's going to talk about is,
18 it's called, I think, new approaches to licensing
19 but it includes the gap stuff. It includes the,
20 I'm going to submit an exemption for this because
21 my design doesn't do this.

22 We've highlighted that as an area where
23 reviewers should be thinking hard about do you
24 agree? Is, you know, look at that closer because -
25 - just for that very reason of that's something

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1 that is not what we typically do a lot of.

2 You know, look at designs that are, you
3 know, don't seem to me what Calvert Cliffs does or
4 AP1000. And, that that should be an area where you
5 focus in and think about it.

6 And, I think DC Power is a good example
7 of that. That's one area where they're deviating
8 quite a bit from what they've done before and it's
9 because of their design and we're looking at it
10 very hard.

11 MEMBER BLEY: Their GAP analysis looked
12 at all the regulations and decided which ones
13 applied and which ones maybe didn't apply or they
14 didn't think it apply.

15 How have you looked, because they don't
16 seem to have looked, for things about their new
17 design that maybe require something that wasn't
18 already there in the regulations?

19 MR. CARUSO: Because we don't have the
20 design yet. We don't have the submittal yet.

21 MEMBER BLEY: How are you going to look
22 once you have the submittal, Mark?

23 MR. CARUSO: Well, we've identified for
24 reviewers in those areas, you know, that that's
25 something you need to be focusing on, especially if

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1 you're looking at something that's very new and
2 novel like their ECCS system or whatever.

3 I mean, so, I mean, that's all you can
4 do. I mean, I, you know, I'd be aware and to focus
5 and, you know, try and think outside the box.

6 MEMBER BLEY: Tom looked like he had
7 something he wanted to --

8 MR. KENDZIA: All right, I'm on now.
9 This is Tom Kendzia, NRO.

10 Yes, if you, first of all, as far as
11 completeness of their submittal, they still are
12 responsible to submit a complete design.

13 So, they should be addressing all those
14 things. All systems will be classified as Alpha,
15 Bravo 1, 2. So, there shouldn't be anything
16 missing because they're required to submit the
17 complete design.

18 But, getting into new and novel, that
19 isn't obviously a concern. We're trying to focus
20 on those areas early, CVCS valves to make sure that
21 we're getting the proper reviews up front.

22 You know, Tom Scarbrough's actively
23 involved with looking at those valves and design of
24 those valves, for watching qualification and
25 testing. And, we've learned some of that from the

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1 AP1000 experience.

2 Aspects of what's new that we haven't
3 thought of, in our training, we're also going to be
4 training the reviewers on first of the kind
5 testing. If there's a new or unique feature new to
6 the U.S. or a unique feature, something we haven't
7 reviewed before, that is a new feature. They
8 should be proposing some sort of first of the kind,
9 maybe first plant only type testing.

10 So, these are things that, yes, the
11 staff needs to be thinking about as we're looking
12 at this new item. And, overall, you know, we are
13 going to try to help train the staff so that they
14 can think about these things as they do it and
15 then, as an overall group and with the oversight we
16 get through our management and through the ACRS,
17 additional questions will come up.

18 MEMBER POWERS: There is a rich
19 literature on first of the kind engineering. The
20 RAND Corporation has been particularly active in
21 that area and has reported, what I find submitted
22 fine finding.

23 I'm less familiar with the literature
24 on first of a kind test. Can you give me some hint
25 what the literature look like in that field?

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1 MR. KENDZIA: What we have in the NRC
2 regulation is related to prototypes and that type
3 of stuff. And, I would have to -- I don't have the
4 regulation off the top of my head.

5 There is some definition that we've
6 worked on --

7 MEMBER POWERS: It's really not the
8 regulation that I'm interested in.

9 MR. KENDZIA: Okay.

10 MEMBER POWERS: It is really what is
11 the experiential base that industry at large has
12 with first of a kind testing? Because the
13 experiential base on first of a kind engineering is
14 distressing enough, but it's been the object of
15 fairly intensive study, trying to find ways to, I
16 mean, for instance, RAND examined 67-some first of
17 a kind engineering projects and found that, on
18 average, they cost twice as much as anticipated and
19 performed at a level of about 80 percent of
20 expectations.

21 And, similar kinds of things, there
22 have been some notable catastrophic failures in
23 first of a kind engineering despite fairly heroic
24 efforts on the front end and what not.

25 And, what I'm worried -- I'm interested

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1 in what's, you know, and you think about these
2 things, first of a kind things, the batting average
3 is not good.

4 And, people have not been stupid. They
5 have, you know, most people are going into a first
6 of a kind engineering effort, put a lot of front
7 end on that because they know this is an adventure
8 that may not have a happy outcome.

9 So, what is the experiential base with
10 -- across, I mean, it doesn't have to be just in
11 the nuclear industry, but at large, that we have on
12 first of a kind testing?

13 MR. KENDZIA: There's two aspects to
14 that question. First of a kind means first of a
15 kind for us to have reviewed it.

16 MEMBER SKILLMAN: Exactly. That's
17 exactly the definition, yes.

18 MR. KENDZIA: So, that's the simple --

19 MEMBER SKILLMAN: It's not that
20 nobody's ever reviewed it, it's that you, in
21 particular, have not reviewed it. That is the
22 exact definition to use.

23 MR. KENDZIA: So, that's first of a
24 kind. Then, you get into, okay, is there other
25 experiences? Is this a new engineering product?

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1 What are the expectations? And, that's where we're
2 involved with those valves because it is a new
3 application. It's a new design.

4 So, looking at how they're testing and
5 qualifying it up front to ensure that it's going to
6 meet our requirements and the most important thing,
7 it's going to be able to perform its function is
8 critical that we do that early on so that any of
9 the hard spots are identified soon.

10 But, there may be other things out
11 here. We know that there's some stuff with
12 instrumentation that's new and unique that we're
13 getting into, you know, trying to stay abreast of.

14 Obviously, we have to get information
15 from NuScale to be able to look at that.

16 So, there's different aspects out there
17 and I don't even know what they all are since we
18 don't have the design and I won't know, just from
19 my review anyway.

20 But, yes, that's a focus area. And, it
21 is a challenge area.

22 MEMBER SKILLMAN: Let me make one
23 comment here that is a concrete example of the
24 exact thing that I'm trying to point to. Okay?

25 It's what, you don't know what you

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1 don't know is what I'm starting with. Safety or
2 systems either A1, B1, A1, A2, B1, B2, so the
3 presumption is, the systems that you've been
4 presented by NuScale are the full sweep. It's
5 everything you're supposed to be thinking about.

6 Let me read something to you.

7 There is no reasonable likelihood that
8 an accumulation of noncondensable gases in the RCS
9 or the reactor pressure vessel could inhibit post-
10 core cooling flow. For this reason, the venting on
11 noncondensable gases does not have a safety related
12 function specific to ensuring long-term cooling.

13 Now, I have a couple of examples where,
14 if we had not had venting, we would have been in
15 real trouble. And, I know, a lot of us went around
16 industry eight or ten years ago chasing high point
17 vents on ECCS.

18 And, I know that even in non-nuclear
19 systems, gases accumulate in high point piping and
20 block flow. Particularly if you're depending on
21 siphon.

22 And, so, if what you've reviewed does
23 not have the full sweep of what one would
24 reasonably believe is necessary, then there may be
25 systems reviewed have not categorized because they

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1 simply are not there yet, emphasis on yet.

2 MS. MROWCA: And, I think that might be
3 a good example where these other considerations
4 come into play. And, part of it is based on the
5 experience of the reviewers and things they've seen
6 in previous reviews.

7 So, for instance, the reviewer may
8 question that. And, we have one of the
9 considerations is new or novel. So, you would say,
10 that would be new or novel. We haven't reviewed
11 something like that, that may not make a lot of
12 sense to me now, you know, understanding where did
13 that come from. But, you know, maybe they're a
14 design that works, but I'm going to look at that
15 more.

16 So, maybe it's initially classified, in
17 fact, I'm not sure what case that it, what it's
18 classified as, but I would tick the box under new
19 and novel and say, I need to review that more,
20 hence, I'm going to emphasize that in my review
21 because I need to make sure that that's correct
22 where ever it falls in the list.

23 So, it's this decision making of
24 looking at everything and looking at the full suite
25 of these considerations that you say, regardless of

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1 what is A1, A2, B1, B2, I've got some overriding
2 concerns so I'm going to look at it a little bit
3 more even if it's a B2.

4 CHAIRMAN CORRADINI: So, if I might
5 just -- since Dick happened to pick one --

6 MS. MROWCA: We're taking Tony's
7 thunder away.

8 CHAIRMAN CORRADINI: Okay. Well, we'll
9 let him thunder about something else.

10 But, I mean, Dick actually picked an
11 example which spurred a question I had later one
12 which is, clearly, NuScale is different than large
13 passive plants.

14 On the other hand, all the large
15 passive plants rely on small pressures to drive
16 flows in ways that we hope are the right flow rate
17 to remove decay heat or provide this long-term
18 cooling.

19 So, my -- what I was going to ask
20 later, but I'll just bring it up relative to Dick's
21 question is, I'm assuming you're going to go back
22 to the AP1000 crowd and the ESBWR crowd because we
23 rehashed some of these issues a whole lot. I mean,
24 I won't even go to instrumentation.

25 And, he can't speak, but we just talk

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1 about the flows with small pressure drops drive
2 relative to the ability to remove long-term
3 cooling.

4 I'm assuming this team is going back to
5 pick up those sorts of things because all these
6 questions will re-arise.

7 MR. CARUSO: Can I --

8 CHAIRMAN CORRADINI: Sure.

9 MR. CARUSO: Yes, that, you know, I'm
10 not going to go into my thinking about the
11 similarities and the thermal hydraulic phenomena
12 between the NuScale design.

13 CHAIRMAN CORRADINI: Oh yes.

14 MR. CARUSO: But, I just wanted to say,
15 with regard to looking at new and novel designs and
16 design features, you know, as an organization,
17 that's not new to us. I mean, digital I&C came in
18 and we had to review that.

19 Large passive designs came in with
20 their stuff. We had to look at that and look at
21 new and novel features.

22 So, it's not something new and
23 definitely, you know, that's, I think, one of the
24 reasons when, you know, we're in the same, you
25 know, you want for those particular situations, you

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1 want you're A-team on those. You want the people
2 that have been down the road on these other designs
3 to look at those things, too.

4 So, those are the things you can do.
5 And, it's not like this is the first time we've
6 ever had to deal with something that's a brand new
7 technology.

8 MEMBER REMPE: So I'd like to jump in
9 too to make sure I understand things. But with
10 this gap analysis and your response back NuScale
11 would say well, I don't think this regulation
12 applies, or I think I need an exemption.

13 And your response back was yes, the
14 underlying reason of that regulation still applies,
15 containment integrity. And you need to give us a
16 good analysis.

17 You didn't say you get away with this
18 or not. You basically are helping establish a path
19 forward and that's why I like that exchange of the
20 gap analysis and the response back to it.

21 Because yes, it's not claiming -- in
22 fact, you have lots of disclaimers on every single
23 one about we don't have a design yet. This is just
24 our first thing.

25 But it doesn't mean they've hit

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1 everything. But it's a good way to interact with
2 an advanced reactor designer. And so that's why
3 I like this process of what I see.

4 Whether it's with this enhanced safety
5 thing or not I thought it was a good way to move
6 forward.

7 MS. MROWCA: And it's important for the
8 reviewers assigned to this review to understand
9 everything that's gone on in those interactions,
10 like the gap letters. Hence the SharePoint site to
11 help facilitate that sharing.

12 And I'll talk a little bit more later,
13 or maybe I'll just say it now so I won't talk later
14 about the working group itself and the discussions
15 that we've had internally has really helped us take
16 that integrated review to another level to have the
17 senior people that we do on this working group.

18 MEMBER BROWN: On the same subject of
19 the gap type stuff they went through and discussed
20 they wanted to resolve to negotiate with you in
21 what was called a pre-application phase.

22 When I read your letter back -- and
23 that was in the gap analysis. We'll do all this in
24 the pre-application phase. This is relevant. This
25 is non-relevant. All these great agreements.

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1 In your letter back I got the
2 implication that because you made statements like
3 we haven't seen the design yet, therefore we can't
4 agree or disagree, that that kind of pushed this
5 agreeing on all this stuff in the pre-application.
6 Some of these relevant and non-relevant, that you
7 pushed that off the table.

8 Is that a valid conclusion?

9 MR. TONACCI: Yes.

10 MEMBER BROWN: That's a great answer, I
11 like that. Thank you.

12 MR. TONACCI: So our conclusion is in
13 the safety evaluation that we write at the end of
14 this. And as you can see without seeing -- you
15 have a PowerPoint a year ago when we're working
16 through this.

17 We need to see that application. We'll
18 see it here in another month. We'll get a better
19 feel for it. We'll hopefully accept it a few
20 months later and then we'll really get into the
21 mode of writing the safety evaluations and deciding
22 whether the underlying technical foundation is
23 sufficient to grant exemptions or go down --

24 MEMBER BROWN: But based on the
25 application itself and the technical --

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1 (Simultaneous speaking.)

2 MR. TONACCI: Based on the application.

3 MEMBER BROWN: Because the gap
4 analysis, there were a lot of those that just said
5 this is not relevant and therefore there's no sense
6 in us even dealing with it. I'm paraphrasing
7 slightly. Pejoratively maybe, but paraphrasing.

8 So the answer is yes, you're not really
9 going to have to settle on a design which you can
10 write a safety evaluation on fundamentally.

11 CHAIRMAN CORRADINI: He's satisfied.
12 Let's move on.

13 MEMBER BROWN: Yes. I quit. Well, for
14 right now.

15 CHAIRMAN CORRADINI: Let's keep moving.

16 MEMBER POWERS: By the way, you can't
17 quit. Slaves have to be sold.

18 MEMBER BROWN:

19 CHAIRMAN CORRADINI: Let's not take
20 this on the record. Let's keep on going.

21 MS. MROWCA: Okay, so one of the ways
22 that we might be able to spend less time during the
23 review is to leverage operational programs.

24 So we need to understand maybe back in
25 the day of the NUREG-0800 guidance we're coming

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1 down to another level and so we do need to
2 understand how they apply, or may be used for
3 credit, or not.

4 So Tom Kendzia is going to talk more
5 about that.

6 MR. KENDZIA: So, Operational Programs.
7 This first slide is an update of a previous slide
8 that was presented.

9 And it shows you were tech specs which
10 is not an operational program, it's really an
11 operational requirement, right.

12 You have to follow tech specs, have to
13 meet them.

14 But tech specs actually affects
15 capability, availability. It verifies that it's
16 capable and available.

17 Reliability assurance program actually
18 as went over is an input into the classification
19 and the classification determines maintenance rule
20 program applicability.

21 And maintenance rule program looks
22 at capability, availability and reliability
23 during operation.

24 The initial test program and ITAAC
25 overlap and they do the same thing. They verify

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1 the initial construction testing and will operate.
2 The function can be met with the initial testing
3 that's performed.

4 They verify that can be met. It
5 doesn't verify the operational portion of it, and
6 it doesn't verify anything with availability and
7 reliability.

8 So this is just an update. On the
9 original slide we have one about maintainability.
10 But maintainability is really a combination of
11 capability, availability and reliability so we
12 dropped that off.

13 So, what is Operational Programs? If
14 you look there was really a SECY paper 05-197 that
15 actually defined what Operational Programs were.
16 And they're listed below there at the bottom.

17 In addition, the IMC 2504 which is the
18 Inspector Manual Chapter 2504 addresses operational
19 programs and decides the operational programs and
20 addresses the completion of ITAAC.

21 So we're including all that in here.
22 That will provide guidance to the tech reviewers as
23 to what these do so that they can credit them or
24 not credit them based on what they do.

25 The operational programs depend on the

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1 appropriate review by the reviewers as part of the
2 SRP or DSRS.

3 So preliminary programs for rad
4 protection includes systems and programs. So it's
5 not just programs, but it includes the systems like
6 for rad protection or fire protection are included
7 in the SRP or the DSRS. And that review has to be
8 performed and verified that they're acceptable
9 before you can take credit for any portion of them.

10 Well, they'll be in parallel but to
11 take credit for them they have to be verified
12 adequate.

13 So, the second one. Tech reviewer
14 verifies the SSC.

15 A key aspect is the function
16 classification like we talked about. A-1, B-2,
17 whichever it is, verifying that's very important to
18 the whole review.

19 They'll responsible for ITAAC. They'll
20 get help from the ITAAC group, but they're
21 responsible for looking through how ITAAC are
22 selected. Design and ITP requirements.

23 Any of these programs don't necessarily
24 verify those aspects, so the reviewer needs to
25 verify those aspects which are inputs to programs.

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1 And commitments or exemptions.

2 MEMBER BLEY: Let me interrupt you a
3 second, Tom.

4 How does the expert panel that we saw
5 some slides ago interact with the reviewer on this
6 point?

7 Because I thought we were told the
8 expert panel would be looking to make sure the
9 categorization was appropriate and complete.

10 MR. KENDZIA: The expert panel inputs -
11 - first of all, NuScale has an expert panel also
12 requirement, and they're helping determine what the
13 classification is going to be, risk-significant,
14 non-risk significant.

15 MEMBER BLEY: Of course. But on your
16 side I take it it was your own expert panel.

17 MR. KENDZIA: Correct. On our side we
18 have a review, plus the tech reviewers can question
19 that at the end.

20 This is all part of the review. It's
21 not set. You know, NuScale has a proposal. That
22 proposal isn't approved by us. We have a written
23 safety evaluation. We do that at the end of our
24 review.

25 So during that review there will be

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1 some interactions. It could be over dc power. It
2 could be over different functions that they have
3 that they say are B-2 that we say well, no, this
4 should be a B-1.

5 Even though it's not risk-significant
6 from a deterministic standpoint we still think it's
7 important and needs to be B-1. So there will be
8 interaction I would expect on this.

9 MEMBER BLEY: Back to what I asked,
10 does that expert panel -- how do you envision them
11 performing? Are they going to look at all of the
12 assignments? A-1, A-2, B-1, B-2?

13 Or do they get called in on special
14 things? Will the reviewer have already had the
15 advantage of the expert panel having gone through
16 all of those? Or have you not worked that out yet?

17 MR. KENDZIA: I have to defer to Lynn
18 on that.

19 MS. MROWCA: I think when I was talking
20 about expert panel that was associated with the
21 applicant.

22 MEMBER BLEY: Oh, that's the
23 applicant's expert panel.

24 MS. MROWCA: To determine the risk
25 significance. Yes.

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1 MEMBER BLEY: Okay. So you don't
2 really have one.

3 MS. MROWCA: And we do the same -- yes,
4 we do the same thing though. Our reviewer does
5 look and determine whether deterministically --

6 (Simultaneous speaking.)

7 MEMBER BLEY: Your reviewer, not your
8 expert panel.

9 MS. MROWCA: Our reviewer, yes. We
10 don't have what you might call an expert panel
11 except a group of reviewers.

12 MEMBER BLEY: That's why I was asking.
13 Okay. So that's the applicant --

14 MS. MROWCA: That's the applicant --

15 MEMBER BLEY: The applicant had their
16 PRA. They do their deterministic analysis. They
17 have their expert panel.

18 They give it to you. And now your
19 individual system reviewers are looking at it.
20 Okay.

21 MR. CARUSO: This is Mark Caruso. I
22 might just add one thing here.

23 Normally in the past the review of what
24 the expert panel does and their decisions, whether
25 or not we agree was primarily basically the -- the

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1 assurance program reviewer.

2 And they'll have the lead for that this
3 time around.

4 But one of the things we want to do is
5 gather in inputs from all the other reviewers that
6 are looking at this and draw them in to help look
7 at these things and get their input.

8 So I think that's one thing that we're
9 hoping will be a little bit different. There will
10 be more involvement from the rest of the tech staff
11 on looking at systems structure and components, and
12 getting some deterministic inputs or experience.

13 And not just leaving it up to the 17.4
14 reviewer which is usually someone from the PRA
15 group.

16 MEMBER BLEY: Is there somewhere in
17 your slides or in something you've written that
18 kind of explains how that works? Or is this just
19 what you think is going to happen?

20 MR. CARUSO: Well, that's what I think
21 we're going to make happen. We haven't written
22 down. I mean, we have -- I mean, that's a good
23 suggestion.

24 We should write that down. We should
25 make that part of our working group stuff and get

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1 it in there. Thank you very much.

2 MS. MROWCA: That is part of our --

3 MEMBER BLEY: Getting slicker.

4 (Laughter.)

5 MR. CARUSO: I know I'm not supposed to
6 take any guidance.

7 (Laughter.)

8 MR. KENDZIA: One of the things the
9 expert panel, they have their expert panel to
10 provide a proposal.

11 But the reviewers have the expertise
12 in-house to look at that and question it based on
13 their knowledge and expertise as does the
14 reliability and assurance program.

15 And one of the things this working
16 group has brought together is all these people
17 together to help discuss these items.

18 And one of the reasons that we've
19 already had -- we're going to have additional
20 training for the staff before the review starts is
21 to help go over these concepts with all this
22 interaction in getting to the right point in our
23 review process.

24 MEMBER BLEY: You envision this working
25 group continuing as the review goes on? Kind of

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1 overseeing it?

2 MR. KENDZIA: At least through the
3 beginning start of it.

4 MS. MROWCA: Yes, I don't think we've
5 gone that far yet. We're still in the planning
6 stages. But that could be something.

7 I know in the past here has been a
8 proposal to say that why don't we just have a
9 multi-discipline team to -- in like a branch to do
10 the review. So that was years ago proposed.

11 But I think the working group would say
12 that since we've got such a good variety of people
13 and that the discussions that we've had have helped
14 us realize the huge benefit we can get from more
15 closely sharing this information among ourselves.

16 And that's why I would say holistic,
17 integrated, because we are learning from each
18 other. Which we know has happened in the past, but
19 maybe it was not as intense as what we're doing
20 right now.

21 MEMBER BLEY: Okay. I would look
22 forward to seeing more how that works.

23 Let me ask you one more question about
24 the applicant's expert panel and your expectations
25 vis-a-vis that.

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1 You will certainly get from the
2 applicant a list of A-1, A-2, B-1, B-2 for
3 everything.

4 On areas where the expert panel has
5 moved things around based on their judgment will
6 you get some kind of a report on their basis for
7 whatever they did as an expert panel? Or will you
8 just get the things categorized?

9 MS. MROWCA: We have asked questions
10 about that in the past. What items were put into
11 the reliability assurance program based on the
12 expert panel.

13 MEMBER BLEY: Or removed, perhaps.

14 MS. MROWCA: Yes, we've done audits on
15 that too, to look at their meeting minutes to see
16 what kind of discussions they've had, looking at
17 their procedures to see what guidance they give to
18 the expert panel.

19 MEMBER BLEY: So you can at least audit
20 their minutes.

21 MS. MROWCA: And we do that every time.

22 MEMBER RAY: Could you characterize
23 briefly to what extent this plan reflects lessons
24 learned from AP1000 experience?

25 Not just through the original design

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1 cert, but as it continues.

2 MS. MROWCA: That's true. Well, the
3 next slide talks about in the DSRS's that we did
4 try and include lessons learned from previous
5 reviews. And that may not be the depth of what
6 you're thinking or talking about.

7 But I guess we're doing our best based
8 on the experience of the different reviewers.

9 I can't say we've done a systematic
10 review of what we've learned from AP1000.

11 But I do know that the DSRS's not only
12 included the initial concept of technology
13 differences, not as much risk information, but they
14 did try and improve based on lessons learned.

15 Did you have a specific example from
16 AP1000?

17 MEMBER RAY: I don't want to go into it
18 here.

19 I mean, it has been a long process.
20 There have been experiences from which you would
21 hope the agency would draw lessons learned from.

22 But this isn't the place to try and
23 analyze that. I just wondered how you would
24 describe that.

25 MS. MROWCA: Well, we're certainly open

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1 to that.

2 MR. CARUSO: This is Mark Caruso. I
3 think there's one and it's in relation to what we
4 were just discussing which is I think in the ESBWR
5 review there were written systems.

6 There was also -- we had risk insights
7 about stuff that was important. Remember FAPCS
8 non-safety system, but it had a safety function.

9 And it was difficult at that time to --
10 outside the PRA branch to engage some technical
11 staff in looking at some of these things because it
12 wasn't their normal thing. They didn't have an SRP
13 or it was safety-related. We don't look at non
14 safety-related.

15 And there had to be some pushing to try
16 and draw people in.

17 Remember, there are no requirements for
18 shutdown. There's no regulations for shutdown.
19 There's no SRP.

20 And so the PRA staff is out there on
21 their own trying to figure these things out.

22 And there were a number of issues,
23 thermohydraulic issues with how are you going to
24 use the isolation condenser when you were in mode
25 5, and how you were going to heat up.

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1 And so the idea of engaging the rest of
2 the technical staff to help look at some things
3 that are non-safety, or non-safety but risk-
4 significant, I think we have a whole different
5 perspective now on that given this approach that
6 we've been going down, and especially since we've
7 gotten the working group together.

8 But I think the NUREG-0800 part 2 paved
9 the runway for that.

10 And I would say the working group
11 itself is part of the lessons learned, that we
12 formed the working group ahead of time in this
13 review to figure out what we can do, and what we
14 can do better.

15 And we've already figured out, we've
16 already had some information exchange with NuScale
17 for the reviewers.

18 And we're going to have training for
19 the reviewers before they even start the
20 acceptability review so that we can get everybody
21 up to speed.

22 We're trying to give better tools so
23 that the review can be better focused and people
24 would know interactions better.

25 So, this is all a part of that learning

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1 experience.

2 MEMBER MARCH-LEUBA: Following back on
3 what Harold was saying, we were visiting AP1000
4 last month.

5 And one concern they have is the ITAAC.
6 It's very easy during the review process to just
7 delay to an ITAAC.

8 Another found -- they have hundreds of
9 ITAACs all of which are due two months before
10 startup.

11 And not only are they concerned about
12 them being able to do it, they're more concerned
13 about the staff being able to review them.

14 So I would consider during the process
15 if something can be resolved, or at least a stage,
16 don't put an ITAAC for the last two months before
17 startup.

18 MS. MROWCA: Okay, thank you. Duly
19 noted. We appreciate those kind of comments.

20 I think the only other thing that I
21 wanted to say about the DSRS's is that we did
22 include interim staff guidance as necessary.

23 But they were issued in 2016 and as you
24 know the process that we have to go through
25 including public comment periods and everything.

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1 When we started writing them the design
2 was at a certain stage. Today it's at a different
3 stage.

4 And so that's one of the things we
5 realized is that we need more detailed information
6 to actually implement the NUREG-0800.

7 And one of those pieces I'll say from
8 the risk information is I know when staff might
9 have started writing a DSRS and they would come to
10 us and say we need your risk information.

11 Well, if the applicant doesn't have
12 much, or only has a very limited part of their risk
13 information then we don't have much to give them.

14 So, the initial concept of including it
15 in the DSRS is great. The hard part is the timing
16 of getting it in.

17 So, we hope that what we're doing is
18 going to help clarify some of that guidance that
19 was written.

20 So, we've already talked about forming
21 the working group. We talked about 29 members
22 including the Office of General Counsel. And I
23 think we'll show you why later.

24 And every NRO division sometimes by the
25 technical branch. And most of them are senior

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1 reviewers. So it's been a great experience to try
2 and work on this holistic review approach.

3 And as Tom already said we had some
4 information exchange sessions.

5 CHAIRMAN CORRADINI: So, I don't want
6 to get into process, I just want to understand.

7 That's kind of a large group.

8 MS. MROWCA: Yes, it is.

9 CHAIRMAN CORRADINI: So, how do you
10 deal with that? I have faculty to deal with and
11 God forbid. So I assume that senior reviewers are
12 a reasonable similarity to senior faculty.

13 So what I'm trying to get at is the
14 dynamics of this piece. I think this sounds good
15 as long as it's structured in a way that somebody
16 feels with their experience that in this area this
17 is an issue and you guys have to kind of talk it
18 out.

19 And then from that will come sort of
20 action. Am I understanding this?

21 MS. MROWCA: Yes, and we do. And we
22 look, like, if there's one branch representative
23 but there will be multiple reviewers from that
24 branch looking at NuScale then we want that person
25 to be the bridge, to share the vision of what this

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1 group is doing.

2 And really what we're trying to do, our
3 mission is to help the reviewers and their branch
4 chiefs to find the scope and depth of the review.

5 So we're trying to understand more that
6 we can communicate.

7 And we initially figured out a process
8 and tools which we'll get into that kind of help us
9 systematically do that.

10 MEMBER POWERS: I'm going to rise to
11 the defense of the staff.

12 I don't think faculty members are a
13 prototype for senior reviewers in the agency.

14 And in fact, I think -- it is my
15 impression, and the staff is free to correct the
16 errors of my thinking, the NRC staff is better at
17 this multidisciplinary activities projects than any
18 organization I've ever seen.

19 That doesn't mean you can't improve.
20 And in fact, I would heartily recommend that you
21 keep accurate notes on this, and that at the
22 conclusion of this activity you write a paper on
23 this subject.

24 Because NRC leads the world in my
25 impression in multidisciplinary activities where

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1 you have to bring together many different
2 disciplines to focus on an activity. You do that
3 better than any organization I've ever seen.

4 And I think you need to document what
5 it is that you do. Because you do it better. And
6 I see a lot of organizations. NRC is just
7 outstanding at multidisciplinary activities.

8 MS. MROWCA: Well, on behalf of the NRC
9 we thank you, Dana.

10 MEMBER POWERS: I didn't say -- you can
11 correct the errors of my thinking here.

12 MEMBER RAY: This isn't a correction,
13 but I have to I guess say something more here
14 because of what you just were saying.

15 We're making modifications now in
16 AP1000 based on having determined that some
17 analysis assumptions early on were incorrect.

18 When we're doing what you're describing
19 here inevitably and excepting what Dana just said
20 you're relying on assumptions that are yet to be
21 proven.

22 That's why all these ITAAC wind up down
23 the road. People do not want to invest in all the
24 testing and so on that's necessary until they're
25 further down the process of licensing and

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1 certification.

2 And the more dependent you are on those
3 assumptions the more likelihood there is to unravel
4 a lot of things that you have assumed at this point
5 in time when it comes to classification importance,
6 risk significance and so on.

7 And I guess I'm just striving to find
8 out if this tension between having information that
9 you're certain of early on, and this is what we're
10 talking about, early on, or putting at risk the
11 whole structure that you've assumed to verify much
12 later and find out that oh my gosh, we can't
13 validate this assumption. And what do we do now.

14 Now, what do we do now. You know what
15 we're doing now on AP1000. We're running around
16 and making changes in plants that are halfway out
17 of the ground.

18 So, I just think that I'd like to get
19 some sense that that's recognized and that
20 therefore if we're going to structure the process
21 the way you're describing we're going to have to
22 insist on more confidence, or not more confidence,
23 an adequate confidence in what the assumptions are
24 that we're making, and what they're based upon,
25 other than just.

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1 And you know, these were very competent
2 people who made these assumptions. They were just
3 wrong.

4 MS. MROWCA: And that's a good point.
5 And I will tell you that we have people who are
6 skeptical.

7 And so I actually appreciate that
8 skepticism because that makes us better. If people
9 ask questions and we can do due diligence to answer
10 them then I feel like we've gotten stronger.

11 Might we miss something? Well,
12 reasonable assurance. We do the best we can.

13 MEMBER RAY: We can't dwell on this too
14 much. All I'm trying to say is we have some recent
15 current examples.

16 MS. MROWCA: Yes.

17 MEMBER RAY: And they should lead us to
18 -- and there is a tension. The tension isn't going
19 to go away. The tension is between I've made this
20 assumption. I'll demonstrate it later because it's
21 very expensive and I can't do everything now.

22 And that needs to be recognized. And
23 the best way to recognize it is to point to some
24 very recent experience.

25 MS. MROWCA: Right.

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1 MR. KENDZIA: Exactly. What I wrote
2 down was to include in the tech staff training
3 lessons learned from recent reviews such as the new
4 issues that have come up with the AP1000.

5 And there might be some others on the
6 KHNP. I know some of their initial test program
7 stuff was inadequate that they submitted.

8 So, I just made a note to add that to
9 the lessons learned to make sure we're touching
10 with that with the reviewers, similar to operating
11 experience.

12 MEMBER MARCH-LEUBA: This time I'm
13 going to say we huddle. I'm sorry.

14 I think the staff should take up the
15 PRA that the applicant is giving you, believe it
16 100 percent and run with it.

17 In parallel they're going to review the
18 PRA, and review all the assumptions, and you're
19 going to find something wrong in which case you
20 change.

21 So it is the responsibility of the
22 applicant to send the staff a good PRA. And it is
23 their fault if we don't meet the schedule.

24 So whenever you make a commitment of a
25 two-year, four-year, we hear this four-year month

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1 schedules all the time, it's contingent on you
2 sending us the correct information.

3 So whenever we go ahead and review the
4 PRA we find out that you missed completely the
5 containment, well, sorry.

6 MEMBER STETKAR: A couple of
7 clarifications.

8 (A) the staff does not review the PRA.
9 They simply perform selected audits.

10 And (B) the quality requirements for
11 that PRA are the absolute minimum quality
12 requirements that you could ever think about for
13 PRA.

14 So the PRA that the staff has
15 interpreted as submitted is known to be a subpar
16 quality PRA.

17 And furthermore the staff doesn't
18 review that. They've decided that according to the
19 regulations they can't review it.

20 MEMBER MARCH-LEUBA: My point is you
21 don't need to wait to do this subpar review to
22 start the review. You can go ahead and run with
23 it.

24 And you can guarantee you're going to
25 find something later on. It will probably the

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1 later schedule. And the applicant needs to know
2 that they're running a risk by not providing us all
3 the information correctly.

4 MS. MROWCA: we have to start somewhere
5 and we do the best we can.

6 You know, I mean that's one reason why
7 we have two meetings with the ACRS also in the
8 process of going through our technical review in
9 case there's, you know, with your expertise if
10 there's something you think that was missed then
11 that's the time we catch it.

12 Just multiple, multiple avenues I guess
13 to make sure we do a good job. Mark had something
14 to say.

15 MR. TONACCI: This is Mark Tonacci. I
16 just wanted to make sure that we understand ITAAC.

17 If I understood the comment a minute
18 ago ITAAC is to verify that the plant is built as
19 we expect it to be built.

20 It is not to verify the design
21 assumptions. The design assumptions are verified
22 during the design through audits, through spot
23 checks on the calculations and so forth.

24 And if necessary perhaps through start
25 up testing, or first of a kind testing.

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1 But the ITAAC is not there to verify
2 design assumptions. I just wanted to make sure
3 we're on the same page.

4 MEMBER MARCH-LEUBA: Well, my comment,
5 and I'm paraphrasing on what AP1000 was telling us
6 is that now we have, how many were there, 700
7 ITAACs that are due in the next few months?

8 And not only they had concerns about
9 them being able to meet it, they have real concerns
10 about the staff being able to review them.

11 So, anything that we can do to minimize
12 the number of those. Don't just kick the can down
13 the road. If it can be fixed now, fix it.

14 MR. TONACCI: So we've been working
15 with NEI over the past I think year and a half to
16 come to alignment on the standard set of ITAAC for
17 new plants. And NuScale is the first plant to take
18 those on.

19 MEMBER BLEY: Just two quick things
20 following all this discussion.

21 If NuScale decides to have DAC that's a
22 kind of ITAAC that falls a little different than
23 others. And there's some history with the
24 Commission and an SRM in that area that matter if
25 we're going ahead.

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1 I don't know if they will, and nobody
2 knows I guess until they really submit.

3 Two, given what John pointed out which
4 is the requirements under Part 52 that goes back to
5 my earlier comment that if, in fact, this design
6 and this review are heavily driven by the PRA the
7 normal approach to the PRA for Part 52 would not
8 seem to apply for me.

9 And there ought to be some kind of
10 agreement that's reached between the staff and the
11 applicant to deal with that. And we're very
12 interested in that.

13 MS. MROWCA: Okay. All right. We
14 should move on.

15 I just wanted to point out also that
16 there's more than what we're doing than is
17 currently written in NUREG-0800.

18 We've challenged the staff to also
19 consider improvements for the non-framework topics
20 like programmatic, procedural, organizational and
21 non-SSC.

22 So, for instance, we're doing that in
23 Chapter 19 for the PRA review.

24 And I know that other branches may
25 already have done that in their DSRS's or SRP's.

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1 And we've assigned from the PRA group
2 technical advisor that can help branch chiefs or
3 technical reviewers in there with thoughts and
4 insights on how they might be able to do some
5 improvement.

6 And I will make a note that we do
7 listen, and we also participate in the IAEA SMR
8 Regulators Forum Graded Approach Working Group.

9 So some of those concepts we've
10 borrowed from our international friends.

11 One of them is technical advisors. I
12 know in other countries the PRA group may actually
13 direct what is reviewed and what's not reviewed.

14 So we're not doing that. We're
15 following the risk-informed decision-making and
16 supporting rather than directing.

17 MEMBER BLEY: Before you go on. I
18 haven't followed what IAEA has been doing in this
19 area. Have they got any tech docs out in this area
20 or anything? Reports.

21 MS. MROWCA: I would say --

22 MEMBER BLEY: I'll go look, but I
23 thought you might know if you've been talking with
24 them.

25 MS. MROWCA: There's a pilot -- this

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1 regulator forum is actually on a two-year pilot
2 program.

3 MEMBER BLEY: Oh, it's new.

4 MS. MROWCA: They're looking at three
5 topics. One is graded approach, one is defense-in-
6 depth and one is emergency planning zones.

7 So Mark's on defense-in-depth, I'm on
8 the graded approach. And so we're trying to pull
9 in, learn from our colleagues.

10 And so we've kind of expanded that too,
11 and we'll share with them the things that we've
12 learned from the NuScale review.

13 MEMBER BLEY: Great, thank you.

14 MR. CARUSO: This is Mark Caruso. We
15 are heading towards a first report of the work
16 that's been done over the last two years which I
17 think will be done sometime in the October to March
18 time frame completely.

19 But the working groups are finishing up
20 their inputs to the reports right now.

21 MEMBER BLEY: And these will be IAEA
22 reports, not CSNI reports?

23 MS. MROWCA: They will be IAEA. Okay.
24 And then the next slide, the transition slide of
25 the products.

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1 Because if you have a working group you
2 do want to be productive. I mean, we have met 11
3 times since April.

4 So we've put together a summary
5 document on operational programs again to help us
6 understand what we can credit or not credit in the
7 operational programs.

8 We've developed an SSC review tool and
9 a framework for doing a programmatic review. Not
10 that -- for programmatic I think the reason that it
11 wasn't included in the scope of NUREG-0800 back
12 before 2014 is it's very hard to say that one way
13 to do all of those fits.

14 So we're just encouraging people to do
15 the best they can and then develop the internal
16 SharePoint site for sharing the information.

17 And so now Tony will talk about this
18 mysterious SSC review tool that we have been
19 alluding to and the key review considerations
20 associated with that.

21 MEMBER BLEY: Any chance we can get a
22 big copy of one of these?

23 MR. NAKANISHI: It's available on
24 SharePoint.

25 MEMBER BLEY: No doubt. I'm sure you

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1 haven't cleared us for being on SharePoint, but at
2 least you can let Mike get a look at it.

3 MS. MROWCA: We can do that. But some
4 of the information on there was proprietary so we
5 thought just sharing the concept today would be the
6 best way to do it.

7 CHAIRMAN CORRADINI: Smart move.

8 MEMBER BALLINGER: Is there any chance
9 of you telling us what these colors mean?

10 MS. MROWCA: Yes. Tony.

11 CHAIRMAN CORRADINI: Just to clarify,
12 we all have -- we have this.

13 MEMBER BLEY: Buy a bigger computer.

14 MR. NAKANISHI: So, just to address
15 your comment immediately there are some color
16 indicators for obviously the safety significance
17 classification that we've been talking a lot about.

18 And also the yellow is really sort of
19 the areas of focus if you will based on this review
20 approach that I'll get into in a little more
21 detail.

22 So I have about 10 slides. And we
23 talked kind of at a high level, NUREG-0800
24 introduction part 2 providing the general framework
25 for the graded approach, and the DSRS sort of

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1 mainly addressing the technology differences
2 between the large light water reactor and the
3 NuScale SMR.

4 So we sort of came to the conclusion
5 that we needed a little more detailed
6 implementation level guidance to really try to
7 effectively implement this effort.

8 And I just want to restate what we're
9 trying to accomplish here. It boils down to
10 identification of the appropriate level of scope
11 and depth of review such that we focus on matters
12 that are most important to safety, and not so much
13 areas that are not that important.

14 And so what we try to do here is to
15 come up with a structured approach. And you see
16 the key review considerations here noted.

17 The idea is to sort of walk through
18 this thought process. And in the end we're hoping
19 that this will help with providing a little more
20 detail in terms of what A-1 means, you know what B-
21 2 means.

22 We're thinking that just because
23 something is A-1 it doesn't necessarily mean you
24 focus emphasis on all aspects of the review.

25 Just because it's B-2 that doesn't mean

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1 you de-emphasize everything.

2 So, really that's the objective, to try
3 to bring it down a level deeper to figure out how
4 to do this thing.

5 And I just want to make a little plug
6 for Mark if we have time. He's going to talk a
7 little bit about the non-SSC type of review and how
8 this thinking might apply.

9 We think that these considerations are
10 very well applicable. It's generic and it could
11 apply to non-SSC topics.

12 I don't want to dwell too much on that.
13 I think we really focused on this already.

14 But I'll just kind of say that there's
15 the safety-related, or non safety-related aspect
16 that's part of it.

17 We talked about DRAP which is also the
18 whole risk significance portion that's not, you
19 know, I think it's really important to emphasize
20 that PRA is just one input.

21 And there's a lot of other
22 considerations that determine the risk
23 significance, you know, B-1 or B-2.

24 CHAIRMAN CORRADINI: Maybe you're going
25 to get to it, but just to alert you and you can

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1 postpone the answer.

2 So, the initial run-through of all the
3 structures, systems and components that you have on
4 the list was based on what?

5 MR. NAKANISHI: So, initially we
6 received some information from NuScale.

7 And what we've done since is obviously
8 as we prepared this review approach with the
9 working group and eventually with the reviewers
10 really the PRA group kind of -- we also went to, we
11 recently went to NuScale to understand more about
12 their PRA, gather risk insights. And we'll provide
13 that, the audit report to you.

14 So those kinds of things all informed
15 the current list.

16 So we think it's a fairly good list.
17 Obviously we may see some changes. Likely will.

18 CHAIRMAN CORRADINI: I expect you will.
19 But to say it briefly, you took what they might
20 have classified these, and you went through and
21 went and modified it according to your judgment.

22 MR. NAKANISHI: Correct. Correct.

23 CHAIRMAN CORRADINI: And this is the
24 working group, or a subset of the working group?

25 MR. NAKANISHI: A subset of the working

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1 group.

2 CHAIRMAN CORRADINI: Kind of struggled
3 through --

4 MR. NAKANISHI: The way we're working
5 with this is this is really one of the advantages
6 of the working group is that anybody could actually
7 provide comment as to, or question the
8 categorization and we would discuss that.

9 CHAIRMAN CORRADINI: So this is a
10 living document that could be changed as time
11 marches on --

12 MR. NAKANISHI: Oh, absolutely.

13 CHAIRMAN CORRADINI: -- and you learn
14 more about the design.

15 MR. NAKANISHI: Absolutely. This is
16 entirely a living document.

17 CHAIRMAN CORRADINI: Okay.

18 MR. NAKANISHI: One other thing I want
19 to emphasize here is, I think we talked about it,
20 but the staff has to agree with the categorization.
21 And that's going to be the basis for the review.
22 So, let me move on here. Yes.

23 MEMBER REMPE: In your discussions you
24 also include the licensee or applicant in that at
25 all? Do you have the spreadsheet? Or you've not

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1 shown them that at all?

2 MR. NAKANISHI: No.

3 MEMBER REMPE: And you don't intend to?

4 MR. NAKANISHI: We don't know. As part
5 of the review we would probably engage. And if we
6 have disagreements with categorization we would
7 certainly be.

8 But I'm not sure if we'll be sharing
9 that database if you will.

10 MR. KENDZIA: At this point the tool is
11 not even going to be part of like the DCD record,
12 or the SE record. It's a separate tool to help.

13 MEMBER REMPE: Okay, thanks.

14 MR. NAKANISHI: So, moving on. Again,
15 I'd like to walk you through each of the
16 considerations just so that you have an
17 understanding of what's involved.

18 Regulatory compliance is something
19 that's sort of an obvious item because we have to
20 always ensure regulatory compliance.

21 But we wanted to acknowledge here that
22 since the purpose is to look at the scope and depth
23 of the review we want to make sure that -- there
24 may be certain areas where we might consider as
25 non-safety significant potentially, but there may

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1 be a very prescriptive regulation.

2 So there may be some review that has to
3 be done no matter what. And so those are the
4 things that we want to capture also.

5 MEMBER STETKAR: How do you get around
6 the nonsense that ATWS stuff by definition is risk.
7 So therefore by definition you have to really pay
8 attention to that. Whereas some other stuff that's
9 more important to risk is -- might get a lower
10 priority.

11 MR. NAKANISHI: Well, ATWS. Well,
12 RTNSS is not a regulation. So, I think --

13 MEMBER STETKAR: I'm sorry, there are
14 criteria.

15 (Simultaneous speaking.)

16 MEMBER STETKAR: It's not a rule.

17 MR. NAKANISHI: It's not a regulatory
18 requirement. It's a policy that we usually --

19 MEMBER STETKAR: Not usually, you
20 always.

21 MR. NAKANISHI: We make sure that's a
22 criteria. It's something that we would consider.

23 MEMBER STETKAR: What I'm trying to get
24 at is if this is truly supposed to be a risk-
25 informed process ought not some of those holdovers

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1 from some hobbyists 30 years ago be subject to
2 question?

3 And I use those words purposely because
4 the arbitrariness of what you shall and need not
5 consider in the context of RTNSS is just somebody,
6 oh yes, obviously ATWS is always important to
7 anybody.

8 MR. NAKANISHI: So, I think we would at
9 least have to get back to the Commission on that
10 because it's a Commission policy. So we would have
11 to --

12 MEMBER STETKAR: Okay, well that's what
13 I'm asking. Because you don't have Commission
14 policy up here. You've got regulatory compliance
15 and you've got a whole bunch of things.

16 MS. MROWCA: In our review I think we
17 would be reasonable about that in terms of what we
18 look at and what we don't.

19 So if we look at it and we say, gee,
20 that really doesn't apply as importantly in this
21 design, it's not -- I don't want to use those words
22 -- safety significant then we might do less of a
23 review.

24 MEMBER STETKAR: Do you have an
25 example?

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1 MS. MROWCA: I don't.

2 MEMBER STETKAR: I was searching for
3 one in the current incarnation of this where you
4 did that.

5 MS. MROWCA: I don't have one. But I
6 think the possibility is there.

7 We're trying to be reasonable when we
8 look at each one based on all of these
9 considerations.

10 MEMBER STETKAR: Go on. Sorry, Tony.

11 MR. NAKANISHI: No problem. No, that's
12 a great comment.

13 MEMBER SKILLMAN: Tony and Lynn, let me
14 make a comment here.

15 I'm looking at the tool which is your
16 spreadsheet. It's 154 rows.

17 And column 1 is identified as SSC. But
18 in reality your SSCs are actually systems.

19 MR. NAKANISHI: Correct.

20 MEMBER SKILLMAN: But here's the lesson
21 that I would offer we are all well aware of.

22 Let's take the AP1000 and let's take
23 the containment. And there is this steel thing.
24 And we know what that looks like. We can touch it,
25 we can feel it, we can measure it.

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1 And by golly, it happens to be the
2 surface condenser that returns important water back
3 to the integrated refueling water storage tank in
4 which there's a decay heat removal gutter that is
5 passive. The big P in the AP1000.

6 But guess what? Hanging on the inside
7 of that great big steel thing are girders, and
8 gutters, and down spouts.

9 Those are really the SSCs. And if the
10 column for the AP1000 had been just the containment
11 we would miss the importance of the down spouts,
12 the gutters and those types of things.

13 So I would challenge you on your column
14 1 to go down one level to make sure that you've
15 captured the essential details.

16 I want to remind you of another
17 example. If you remember when we ruled out the
18 procurement rule, the proxima rule we had relays.

19 And we could rebuild the relays because
20 we could buy the relays commercial grade.
21 Remember? We could buy them commercial grade.

22 But there were phosphor bronze fingers
23 on those relays, and some of those phosphor bronze
24 springs, contacts were 3 mils, 5 mils, 7 mils.

25 And those had to do with the tension

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1 and the wiping tension when the relay closed. And
2 unless the closing tension was great enough those
3 little teeny contacts which are just the size of a
4 head of a pin wouldn't make up properly.

5 So we learned that if you're going to
6 do a change you've got to go into the critical
7 safety function and know what that function is.

8 I would suggest that your row 1 needs
9 one layer of more detail that identifies what is
10 the critical function on those systems.

11 Because if you don't go to that level
12 then you will miss, for instance, the gutter and
13 the down spout detail that is really the essential
14 portion of the SSC.

15 MR. NAKANISHI: That's a great point.
16 I'll just point out that the SSC column is exactly
17 right. It's just system. We use this SSC tool
18 because that's sort of how we refer to things in a
19 lot of our documents and things like that.

20 But one additional thing I want to
21 point out is it does go into the function level, if
22 you go further to the right.

23 MEMBER SKILLMAN: I see it. Fourth
24 column.

25 MR. NAKANISHI: Right.

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1 MEMBER SKILLMAN: I see it.

2 MR. NAKANISHI: So but --

3 MEMBER SKILLMAN: If I see in detail, I

4 --

5 (Simultaneous speaking.)

6 MR. NAKANISHI: I understand. And the
7 component level, I think that's maybe something
8 that's tied to what we were talking about earlier
9 with the novel design issue, and that's one of the
10 considerations. That's where we may need to make
11 sure we have the right people going through this
12 exercise to hopefully identify those component
13 level issues.

14 MS. MROWCA: I think systems was a good
15 place to start, but we do have structural folks on
16 our working group and we just had a conversation
17 about what does this review mean to them, because
18 we have that question within the staff. So maybe
19 because it's SSC there are certain things that we
20 need to add, because we really do expect each
21 reviewer to think about their own review and how
22 the concept of what we're doing relates. So I
23 could see that list growing to include structures
24 if necessary, components if necessary.

25 And the good thing about having this

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1 one tool and having it available to all the
2 reviewers is that we're transparent, easily
3 transparent on what factors go into our decision
4 about what we emphasize and de-emphasize. So
5 that's the beauty of it. So don't think of this as
6 a final tool. As I think someone said earlier,
7 that it's definitely -- it's dynamic. We don't
8 expect it to change. It may stay dynamic through
9 the review as we learn new things and the staff's
10 review actually impacts some of the decisions that
11 are made; for instance, on the classification. So
12 think of it that way, as an initial list. We have
13 to start somewhere, but it can certainly grow.

14 CHAIRMAN CORRADINI: Don't let it grow
15 too much.

16 MR. NAKANISHI: So one other thing I
17 want to mention about novel; and actually this
18 applies to the next two also, the sharing across
19 the modules and the licensing approach. Just
20 because something is novel, what we're really
21 looking for here is issues of importance with
22 respect to the review, and by that safety
23 importance. So something might be novel, but it
24 may not be important. So those -- we're trying to
25 make sure we characterize those things as well.

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1 Multi-module aspects, there's a lot of
2 coupling as we know with this plant between the
3 modules and -- but certain things are more
4 important than the others. Like if there's a
5 potential for multi-module trip, for example, we
6 may want to focus a little more in terms of the
7 reliability of those systems.

8 Licensing approach, we talked a little
9 bit about the gap issues and things like that, but
10 obviously those things will influence the scope and
11 depth of the review.

12 Just moving on, safety margin is
13 something that's a little tricky to apply. It's
14 kind of line with where do we start? There's a
15 claim that there's a lot of safety margin with this
16 plant, but there needs to be some assurance, some
17 confidence that there is indeed that margin. At
18 the same time though you have to sort of start
19 somewhere. So I think we're trying to come up with
20 a way to have that feedback loop to consider.
21 Nonetheless, I think we think safety margin is an
22 important consideration for --

23 CHAIRMAN CORRADINI: So --

24 MR. NAKANISHI: Yes?

25 CHAIRMAN CORRADINI: So let me just

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1 make sure I understand. So when I looked at your
2 draft spreadsheet, I interpreted safety margin to
3 be connected to the safety function three columns
4 to the left, or whatever it is.

5 MR. NAKANISHI: Correct.

6 CHAIRMAN CORRADINI: So it strikes me
7 that as long as you're careful about what you
8 thought the systems function is to be, then the
9 margin to satisfy that function ought to be
10 quantitatively estimated. Is that fair? Sometime
11 eventually you're going to have to say that the
12 decay heat removal system for the NuScale design
13 which has X valves and X piping and X heat
14 exchanger can remove some many megawatts, and
15 that's two times more than immediate -- you see
16 what I'm getting at?

17 MR. NAKANISHI: Right. Right. Yes.

18 CHAIRMAN CORRADINI: Is that the level
19 of detail here or is this just strictly qualitative
20 and once you get the design, you're going to kind
21 of go back and just work through it?

22 MR. NAKANISHI: So I think, Mark, you
23 could help me, too, but I think there's sort of two
24 levels: the function-level margin and also plant-
25 level. Sort of one example is -- a claim is that

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1 there's no core uncover, for example, for design-
2 basis events. So you could sort of look at it that
3 way. Again, you have to have some --

4 CHAIRMAN CORRADINI: Well, but the only
5 reason I'm asking the question -- and I just want
6 to make sure that the safety margin being
7 identified here is directly related to the function
8 of the system it's supposed to perform, assuming
9 it's in A-1 or a B-1.

10 MR. NAKANISHI: Yes.

11 CHAIRMAN CORRADINI: That's all I'm
12 trying to --

13 MR. NAKANISHI: Yes. Like I think an
14 example I always think about is the thermal inertia
15 of this design is supposed to be such that
16 everything moves really, really slow. Well, that's
17 kind of a margin. I'm not sure how it will be
18 used, but it has to be verified. But it is related
19 to the reactor coolant system design and different
20 power levels.

21 MR. KENDZIA: And these columns are set
22 up that we'll populate them with what we know at
23 the beginning, but they'll be further populated by
24 the reviewers. As they go through the review they
25 might know that the heat exchanger capacity is

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1 twice what is required for this application. So
2 that's what we mean by it's an active tool.

3 CHAIRMAN CORRADINI: Okay. Fine.
4 Thank you.

5 MR. NAKANISHI: So defense-in-depth is
6 something that we're very interested in making sure
7 -- or it's an important consideration in light of
8 what we're trying to do. We all recognize the
9 heavy reliance on passive safety features, for
10 example, so what's the adequacy or should there be
11 appropriate consideration for the availability and
12 reliability of backup active systems, for example.

13 Operational programs, I think we've
14 talked a little --

15 CHAIRMAN CORRADINI: We've talked it
16 up.

17 MR. NAKANISHI: Yes, we've talked it
18 up. And we'll just keep moving on.

19 Non-safety related systems interaction
20 with safety function is particularly -- is an
21 important consideration for a B-2 system, for
22 example, whether it would be a seismic or other
23 aspects, just we want to make sure that just
24 because it's non-safety we need assurance that
25 there's no adverse impact on safety functions.

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1 Additional risk insights --

2 MEMBER BLEY: Do you have a breadth of
3 what kind of impacts you're thinking about there?
4 Are they inter-connected ones? Are they seismic
5 two over one kind of stuff?

6 MR. NAKANISHI: Absolutely. The
7 seismic two over one --

8 MEMBER BLEY: Are they flooding?

9 MR. NAKANISHI: -- for sure. Maybe the
10 -- depending on how the pipe is routed there may be
11 some flooding concerns.

12 MEMBER BLEY: So it's more a physical
13 interaction.

14 (Simultaneous speaking.)

15 MR. NAKANISHI: -- some potential
16 interactions between non-safety and safety.

17 MR. KENDZIA: All those things. If
18 there's electrical interaction, if -- or if -- so
19 it's any of the non-safety system failures that
20 that could affect the safety system.

21 MEMBER BLEY: Well, things like
22 electrical interactions certainly should be picked
23 up in the PRA, if it was done well.

24 MR. NAKANISHI: So speaking of PRA,
25 additional risk insights is -- it could be an

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1 qualitative or quantitative insights that might
2 influence the review. In particular, the PRA has a
3 lot of assumptions, and so things related to that
4 that are important could influence the review.

5 And other considerations is really
6 intended to be sort of a catch-all. Because of
7 this collegial approach that we're using, we're
8 actually I think anticipating using that columns
9 for -- or that column for additional insights from
10 other technical disciplines --

11 MEMBER BLEY: Mark?

12 MR. NAKANISHI: -- and things like
13 that.

14 MEMBER BLEY: Microphone.

15 MR. NAKANISHI: So in the end, again
16 the idea is to try to identify the appropriate
17 level of review scope and depth to focus on those
18 important aspects. And so, one of the other things
19 we've developed is a potential way to document this
20 in a safety evaluation approach. And I'd like to
21 use a few more slides to go over that. And I'll
22 use one specific example, system example here. So
23 this might provide a little more in terms of how
24 this may work. So what we're thinking
25 here is there's sort of two levels of documentation

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1 in the Safety Evaluation Report. I think we
2 certainly need a generic discussion in the Chapter
3 1 of SER that describes the overall approach.
4 Everything that we've sort of talked about today
5 would be in there. Again, this draft language is
6 available on SharePoint if you'd like to actually
7 look at what it looks like today.

8 And then the individual technical
9 evaluations is where the specific implementation of
10 the graded approach would be documented and those
11 individual sections could reference the Chapter 1
12 approach as needed.

13 So just so that you have a flavor for
14 what we're trying to do here, we have an example
15 here and we're using a NuScale system, containment
16 evacuation system. The idea of this slide is just
17 to provide a very brief description of the system,
18 but not to get too much into the detail of the
19 design. So this is a system that establishes and
20 maintains a vacuum in the containment. That's one
21 of the main functions of the system, but it also
22 has a safety-related risk-significant function
23 which is an isolation function, containment
24 isolation function. And it also supports the leak
25 detection function.

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1 So I need to make some disclaimers on
2 this chart before I begin because I want to
3 emphasize that we're trying to demonstrate the
4 thought process, and certainly we haven't verified
5 the categorization. We're making a lot of
6 assumptions here just so that we could sort of talk
7 through the process. And again, the idea is, the
8 big picture is to use this SSC thinking, and that
9 hopefully will inform the identification of the
10 scope and depth of the review, and that would feed
11 into the Safety Evaluation Report.

12 So this is really intended to be a summary
13 information of what we might expect out of an SSC
14 tool. Again, a lot of assumptions here.

15 MR. KENDZIA: So if you took the
16 classification containment vessel, to go back to
17 the example of the issue with the AP1000, the
18 vessel here would be -- would obviously have two
19 alpha of one requirements. One would be for heat
20 transfer out and condensation inside. And two
21 would be for pressure retention. And that would
22 show up separately here. So hopefully you wouldn't
23 miss as a reviewer the piece parts to fulfill that
24 function.

25 MR. NAKANISHI: So we're sort of

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1 summarizing here. Each of the review
2 considerations that we just --

3 CHAIRMAN CORRADINI: Sorry. I'm
4 processing what you just said.

5 MR. KENDZIA: Yes.

6 CHAIRMAN CORRADINI: Can I say it back
7 to you? So you would see the containment, but you
8 have the sub-systems to satisfy that each function
9 would out separately. Am I understanding what you
10 just said?

11 MR. KENDZIA: And that's what we did
12 here.

13 CHAIRMAN CORRADINI: Okay. Fine.

14 MR. KENDZIA: So, yes, that's correct.

15 CHAIRMAN CORRADINI: Okay. So this is
16 a sub-system of the containment system as a whole
17 and it has this classification because it's not --
18 in terms of its ability to isolate beyond that?

19 (No audible response.)

20 CHAIRMAN CORRADINI: Okay. Got it.

21 MR. NAKANISHI: So we've established
22 again -- well, maybe a better word is to say we've
23 assumed a safety significance, regulatory
24 compliance relative to GDC 2 and 60. In terms of
25 novel design, again the use of this evacuation

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1 system for operation is somewhat novel, but we're
2 assuming in this example that it's not of a
3 significance relative to this approach.

4 We've been told that this particular
5 system has no sharing between the modules. We're
6 assuming that the licensing approach is -- there's
7 no deviation from how we license.

8 Safety margin and defense-in-depth
9 we're assuming that these aren't important
10 considerations.

11 Operational programs, I sort of bolded
12 here because that ends up being sort of the focus
13 of this review approach. Containment evacuation
14 system is obviously tied to the containment
15 pressure parameter and that parameter is something
16 that's tied to reactor trip. So from that
17 perspective it would be scoped into the maintenance
18 rule.

19 And again, because of containment
20 pressure is also a tech spec controlled parameter,
21 tech spec would be applicable. And with the
22 assumption that the application will contain
23 adequate description of the test program and
24 associated commitments we think that the initial
25 test program would apply in verifying capability,

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1 for example.

2 Just to kind of finish up the list,
3 non-safety SSCs, we're assuming that there's no
4 impact on safety function, no additional risk
5 insights that are applicable. And finally, there
6 are some important interfaces with respect to
7 radiation protection and rad waste because it ties
8 directly to those systems.

9 MEMBER SKILLMAN: So, Tony --

10 MR. NAKANISHI: Yes?

11 MEMBER SKILLMAN: -- before you change
12 the slide, the vacuum systems are interesting
13 because they've got to exhaust someplace. They've
14 got to -- you've got to put the exhaust or the --

15 MR. NAKANISHI: Absolutely.

16 MEMBER SKILLMAN: -- effluent
17 someplace.

18 MR. NAKANISHI: Right.

19 MEMBER SKILLMAN: So if you've got 12
20 modules, you've got 24 of these vacuum pumps, but
21 they're all operating. You have 24 pumps operating
22 simultaneously, 12 vacuum pumps. You say they're
23 independent from each other. Not really, because
24 they probably share a common waste disposal system.

25 MR. NAKANISHI: Right.

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1 MEMBER SKILLMAN: And if that common
2 waste disposal system for any reason is not able to
3 accept that discharge, you can start backing up on
4 24 pumps and 12 modules, and you may not be able to
5 meet your tech spec requirement for vacuum in
6 modules 1, 2, 4, 7, and 9. So --

7 MR. NAKANISHI: Right. Right. That's
8 why I had my disclaimer that --

9 (Simultaneous speaking.)

10 MEMBER SKILLMAN: Yes, okay.

11 MR. NAKANISHI: Yes.

12 MEMBER SKILLMAN: But that's where the
13 devil is truly in the details.

14 MR. NAKANISHI: Exactly.

15 MEMBER SKILLMAN: To peel down into
16 those function of performance requirements and have
17 a very good understanding -- I understand the
18 design will not be perfect --

19 MR. NAKANISHI: Right.

20 MEMBER SKILLMAN: -- but to have
21 confidence and assurance that when this machine is
22 built the way it's intended to be built it will
23 function most of the time exactly the way we intend
24 it to.

25 MR. NAKANISHI: That's a good point.

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1 MR. KENDZIA: And remember, if they
2 don't meet the requirement the consequences are
3 they have to shut down.

4 MEMBER SKILLMAN: Okay. I understand.

5 MR. KENDZIA: So from a risk standpoint
6 the consequences are low.

7 MEMBER SKILLMAN: Okay. But put on
8 your HRA hat for a minute. You've got operators
9 that are going to strive to keep all of these
10 machines operations.

11 MR. KENDZIA: They'll have to meet the
12 tech spec report.

13 MEMBER SKILLMAN: They're going to
14 press hard. So they're --

15 MR. KENDZIA: And for radiological
16 protection they have to meet the program
17 requirements for monitoring of the waste paths.

18 MEMBER SKILLMAN: Okay.

19 MR. CARUSO: Yes, and it really gets to
20 the essence here of how important are those things
21 from a risk perspective and if these programs, the
22 tech specs and the maintenance rule can provide the
23 necessary control to right things if they're not
24 right, can you -- is that a basis for saying I
25 don't really need to delve into the design, the

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1 details myself in the review?

2 And that's sort of one of the essence
3 here is can you -- that's when we talk about can
4 you rely on operational programs and can you say to
5 yourself here are the real concerns I have with
6 this and it doesn't work right. (A) It's pretty
7 forgiving from a risk perspective; and (B) if it's
8 not doing it, these regulated programs are going to
9 fix it. And is that enough of a basis to say why
10 do I need to write a whole lot of stuff or issue a
11 lot of RAIs? And that's an example of one of the
12 things this activity is trying to do.

13 So if you look at tech specs for the
14 requirement to shut down, maintenance rules require
15 them -- because they'd end up increased monitoring
16 from the plant transient standpoint. Then they
17 would have to fix it. Corrective action system
18 applies to all that to look at how they're doing
19 it. And the Radiological Protection Program is
20 actually probably going to look at it in more depth
21 because they're more worried about the release
22 standpoint than the actual functional capability
23 standpoint, because they'll have to fix the
24 functional capability, but if you already released
25 it to the public, it's too late.

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1 MR. NAKANISHI: So this I think is my
2 last slide in terms of the example, but really here
3 we're focusing on the staff review criteria and how
4 we might show that they are met with this
5 particular example. So we have this A-1 function
6 that's a A-1 -- or which is isolation. And that's
7 a topical area that's reviewed in a separate DSRS
8 section, but we still need to address the GDC 2
9 issues.

10 CHAIRMAN CORRADINI: Can I just ask --

11 MR. NAKANISHI: Sure.

12 CHAIRMAN CORRADINI: -- a question?
13 I'm just thinking out loud. Everything I'm
14 thinking of is from a comparison.

15 So Beaver Valley and Surry used to be;
16 I can't remember if they are anymore, sub-
17 atmospheric. So if I were to put Beaver Valley and
18 Surry in this, they would score out similarly?
19 Forget about what the vacuum is, whether it's 12
20 psi or 1 psia. But am I not -- is that not a good
21 way of thinking about it?

22 MR. KENDZIA: Correct. Except they
23 don't use it for RCS leak break detection. It's a
24 backup system.

25 CHAIRMAN CORRADINI: Oh, they -- okay.

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1 Okay. Fine. Fine. Thank you.

2 MEMBER REMPE: Is there traceability so
3 that if -- again, this is my minutes on how things
4 all work together, but if something happens and a
5 tech spec changes, that someone will immediately
6 know to go back and say, oh, that -- because you're
7 relying on the operations program for reducing some
8 of the regulatory review. And will it ever be
9 traced back and said, oh, well, wait a second, we
10 changed that tech spec and now we need to rethink
11 something that we didn't do in the design
12 certification? Does my question make sense or is
13 it a dumb question because I don't understand it?

14 (Laughter.)

15 MR. CARUSO: No, it's a very good --

16 MEMBER RAY: It's the same thing I
17 said, Joy.

18 MEMBER REMPE: Yes.

19 MEMBER RAY: You have to go back and
20 reverse all this stuff.

21 MEMBER REMPE: Yes.

22 MEMBER RAY: Not reverse it. You got -
23 -

24 MEMBER REMPE: Okay.

25 MEMBER RAY: -- to redo it.

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1 MR. CARUSO: Well, I think -- this is
2 Mark Caruso, I think Harold Ray's concern was about
3 in the process of the review the iterative nature.
4 And yours is more about way down the line.

5 MEMBER REMPE: Yes.

6 MR. CARUSO: Years away. I changed the
7 tech spec. That's a very good question. I think,
8 I mean, when -- that would require a licensing
9 review by the staff, a changed the tech spec. And
10 most reviews will go back and look at why that tech
11 spec was there. I mean, maybe we need to put in
12 the basis. I don't know. My first answer was
13 going to be that people will see how that was used
14 through the SER, but they're not required to look
15 at the SER. So I don't think we quite have that
16 one quite completely figured out.

17 MEMBER REMPE: I just was curious.
18 Thanks.

19 MR. NAKANISHI: That's a good comment.
20 A real good question.

21 So I just want to wrap up here. In
22 terms of the B-2 function, based on sort of a
23 discussion that Tom and Mark had mentioned earlier,
24 really the question is can we leverage these
25 programs like the maintenance rule, the tech spec,

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1 the initial test program to have assurance of an
2 acceptable level of capability, reliability and
3 availability.

4 The leak rate function again is another
5 topical area that that would be reviewed in another
6 section.

7 And finally, there's an important
8 interface with the rad waste aspect.

9 So we would envision something like
10 this. At least -- well, this is a real summary
11 level depiction here, but the general thought
12 process will be what we envision in the Safety
13 Evaluation Report. So I think at this point
14 I'm going to pass it over to Mark and he'll discuss
15 sort of the approaches for non-SSC reviews.

16 MEMBER STETKAR: Before you do that,
17 how far advanced would you characterize the tool
18 that we have a picture of here? I mean, are you 90
19 percent of the way there in your A-1, A-2, B-1, B-
20 2s? Are you 10 percent of the way there, or where
21 are you there?

22 MR. CARUSO: This is Mark Caruso. I'd
23 say a very low number because, I mean, the next
24 graduation would be when we see the -- when we
25 first see the DCDs in the readiness review and the

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1 acceptance review, we will probably go back and
2 perhaps make some changes and add some information.
3 And then when we get the DCD --

4 MEMBER STETKAR: Because there are some
5 things in here that just don't make logical sense
6 to me. But if you're at a very early stage of that
7 process, then I'll wait, because I don't know
8 anything about the design and I haven't seen the
9 PRA.

10 MR. CARUSO: Yes.

11 MEMBER STETKAR: You know more about
12 the design and you've apparently seen some of the
13 PRA.

14 MR. CARUSO: I think it's fair to say.
15 Everything we're showing you here today is really
16 more of an example of what we're doing. It's not -
17 - we don't have stuff that's --

18 PARTICIPANT: Ready for prime time.

19 MR. CARUSO: -- this is ready for prime
20 time.

21 MEMBER STETKAR: Okay.

22 MS. MROWCA: Yes, we feel like the
23 structure is pretty much set in terms of the
24 considerations that we're looking at. So if you
25 have any feedback in that way -- but I think you

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1 can see after Tony's discussion how broad that is,
2 that we've tried to capture everything so that a
3 reviewer would actually think about each one of
4 those things.

5 MEMBER STETKAR: Now, these are more in
6 terms of functional relationships among things that
7 don't seem to match up that something gets a B-1
8 and something that's needed to support that gets a
9 B-2. And I don't get it, but that's -- if you're
10 still working on it, you're still working on it.

11 MS. MROWCA: Yes, I think the goal is
12 during the orientation session -- I mean, each
13 reviewer has to do this for themselves with their
14 branch chief to kind of fill that out because
15 they're the experts at the review. We've done our
16 best at like a first shot globally. And we ask the
17 reviewers, too. The other thing is we ask them to
18 look at the -- both the safety classification and
19 the risk significance and feed that back to the
20 prime reviewers of those two areas to make sure
21 that they agree that it makes sense to them based
22 on what they know. So, yes, the information in the
23 table is, like Mark said, very preliminary.

24 MEMBER STETKAR: Okay.

25 MS. MROWCA: It's the best we can do

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1 right this moment. But we have a ways to go and
2 the goal would be to try and get that filled out as
3 much as possible. At least have the concept in the
4 reviewer's mind during the readiness assessment at
5 the end of September and certainly for the
6 acceptance review when the application comes in.

7 MR. CARUSO: Yes, this is Mark Caruso.
8 Yes, we did go through it and we tweaked some
9 stuff, but --

10 MEMBER STETKAR: Oh, wait a minute.
11 It's half past August now, so you have about six
12 weeks until the end of September. If you're at a
13 very preliminary stage of these classifications and
14 you hope to have them all done by the end of
15 September, there must be a big huge ramp-up coming
16 here somewhere.

17 MS. MROWCA: Well, but the --

18 MEMBER STETKAR: So what are you going
19 to learn between now and the end of September
20 that's going to fundamentally change your A-1, A-2,
21 B-1, B-2s?

22 MS. MROWCA: Well, that classification
23 I think we're pretty much set with whatever the
24 applicant gave us for that, unless a reviewer comes
25 in and says I don't agree.

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1 MEMBER STETKAR: Okay. That's a
2 different answer than what I heard earlier.

3 MS. MROWCA: Oh.

4 MR. CARUSO: Yes, those classifications
5 are essentially based on information we got from
6 the design as it was in 2013.

7 MEMBER STETKAR: Okay.

8 MR. CARUSO: Some of those functional
9 relationships might have been something in
10 somebody's mind at NuScale.

11 MEMBER STETKAR: But let me cut to the
12 chase and get you thinking about things then,
13 because I was trying to be a bit coy. You have in
14 the chemical and volume control system, for example
15 a B-1 assigned to the injection and makeup function
16 of that system. Now, I don't know why that's a B-
17 1, but it is a B-1. It's noted that the operators
18 need to initiate that, and yet for chilled water
19 systems and control room ventilation systems that
20 support the operators a common system for all 12
21 modules you've got B-2. So apparently those guys
22 can sit in there and sweat the hell out and getting
23 hot to do something and it doesn't make any
24 difference except that the thing they got to do is
25 more important than them. I don't get it.

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1 Now, I understand the PRA probably
2 doesn't have any of that in there because the PRA
3 says you can kill the operators and it still
4 doesn't melt the core. I don't suspect we can kill
5 the operators. If you can kill the operators, then
6 the makeup function of CVCS ought to be B-2.

7 MR. CARUSO: Yes, you can --

8 (Simultaneous speaking.)

9 MEMBER STETKAR: So if you're thinking
10 about functions and you're thinking about
11 integrated risk and you've got all of these 29
12 people in your working group looking at all of this
13 stuff and it's all going to be making sense by the
14 end of September, who's looking at that stuff?

15 MS. MROWCA: That's why I say ideally.
16 It would be nice for people to have the concept.
17 If we haven't brought the reviewers in by then,
18 we'll have an orientation.

19 MEMBER STETKAR: Are you going to have
20 it done by the end of September?

21 MS. MROWCA: No. We'll have an
22 orientation session at the end of August. That's
23 about as quick as we can do that. And I say
24 ideally to have the -- each reviewer look at their
25 own part by the time that they do the readiness

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1 assessment. Whether --

2 MEMBER STETKAR: The ventilation people
3 are going to look at their part and the chilled
4 water people are going to look at their part and
5 the makeup people are going to go look at their
6 part like we've done traditionally.

7 MS. MROWCA: Well, with this concept in
8 mind. With the considerations and looking at the
9 entire package of the review tool.

10 MR. KENDZIA: And the tool is to help
11 do that in the relationship as things change.
12 Let's say that that function was a Bravo-2 and we
13 discussed with NuScale and it became Bravo-1.
14 Well, that change would show up and we should make
15 sure the reviewers are aware of that to make sure
16 the support for that meets the same thing or has a
17 justification for not doing it --

18 MEMBER STETKAR: I'm just asking --

19 MR. KENDZIA: -- to try to integrate it
20 together.

21 MEMBER STETKAR: I hear you saying all
22 of this stuff how it ought to work. I'm just
23 asking -- I originally asked you how far along on
24 how it ought to work are you? And I first heard,
25 well, we're really early on. And fine. I wouldn't

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1 be ranting here if you were -- but then I heard,
2 well, no, we expect that this is pretty well going
3 to be set by the end of September.

4 MS. MROWCA: No, we have a lot of work
5 to do. That's what I'm trying to say. This, what
6 you see in front of you is initial.

7 MEMBER STETKAR: Good. I hope somebody
8 looks at --

9 (Simultaneous speaking.)

10 MS. MROWCA: And I say the goal because
11 that would be definitely a stretched goal to have
12 every reviewer do what they need to do with these
13 considerations and this concept in mind by then.
14 But we don't always meet our goals.

15 CHAIRMAN CORRADINI: I'm going to do a
16 time check. I think if you have one minute of
17 summary, that's one thing, but if you have 15, I'd
18 like to take a break now.

19 MR. CARUSO: You want to take faster at
20 my thing?

21 CHAIRMAN CORRADINI: Well, I would
22 rather you come back and we get you after the fact.

23 MR. CARUSO: Yes, sure.

24 CHAIRMAN CORRADINI: Yes. Okay. So
25 let's take a break. We'll be back at 3:20.

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1 (Whereupon, the above-entitled matter
2 went off the record at 3:05 p.m. and resumed at
3 3:20 p.m.)

4 CHAIRMAN CORRADINI: All right. Let's
5 get started.

6 Mr. Caruso, you're on board. On deck.
7 Sorry.

8 MR. CARUSO: This is Mark Caruso and
9 I'm going to discuss briefly what's called here a
10 framework for planning scope and depth of
11 programmatic or non-SSC reviews. And this really
12 isn't rocket science. It basically is a tool. We
13 use the term "tool," but it's kind of like a
14 thought tool, and I'll get to that in a minute.

15 So what are we talking about when we
16 say "programmatic or non-SSC reviews?" We're
17 talking about things that are not strictly system
18 structures or components, like the reactor building
19 review or the containment review. We're talking
20 about the review of the Radiation Protection
21 Program or the different analysis reviews we do
22 like in Chapter 15 or Chapter 19, or we have --
23 there's requirements to have a Steam Generator
24 Program that's a bunch of programmatic stuff
25 related to steam generators, or the Reliability

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1 Assurance Program.

2 The idea was, well, you can't -- you don't
3 model those in the PRA. I mean, you do model stuff
4 that's associated with it, but you don't model the
5 programs in the PRA. It's hard to put the B-1s and
6 the A-1s and the B-2s on the programs. So that's
7 why initially there's a lot of debate back and
8 forth about how to do that. In the end they said,
9 well, let's just leave them out. And we felt like
10 -- not that we wanted to try and find a way to put
11 A-1s, B-2s and whatever on them, but just to see if
12 we could find ways to help those reviews be smart,
13 too, and focus on the most important stuff.

14 And so, basically what I've come up
15 with, and it turns out some people are saying I
16 don't think what you're doing is -- can apply to
17 me, but it's really -- it's basically just doing a
18 review of the review procedures in your SRP or
19 DSRS, a systematic walk-through of those review
20 procedures. And to try and examine from --
21 considering the review considerations we have and
22 the new information that we have about the design,
23 can you start to find ones that might be subject to
24 this crediting of tech specs or maintenance rule,
25 can you find some that are sort of

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1 -- that are -- some relationships to risk that
2 might tell you that this particular aspect is not
3 that important or not?

4 So it's really kind of a think-through
5 of each of your review procedures and to try and
6 see if you can prioritize your review in any way
7 and provide a basis for that.

8 MEMBER SKILLMAN: Mark, how would you
9 describe incorporation of operating experience? I
10 mean, if you look across the fleet for the past 10
11 years, 20 years, the ones that really pop out are
12 maintenance rule, work management, QA Program, tech
13 spec, health physics. There are I would guess a
14 dozen or less that are ones that industry has,
15 in all candor, honed to a very, very sharp level
16 knowing how important that they are. And even
17 though this a different geometric design and
18 somewhat a different thermal hydraulic design,
19 this is a design that still has an abundance of
20 radionuclides and it's the same PWR technology.
21 So it would seem that there is a body of operating
22 experience that is directly applicable.

23 MR. CARUSO: Yes, I would agree. And I
24 think that that's a consideration. In fact, I
25 think we've discussed that with the folks that are

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1 responsible for the Radiation Protection Program
2 review. If a lot of stuff we're looking at is the
3 same stuff we've been looking at for 30 years, you
4 might not have to look at it so hard this time.
5 And you should try and use whatever experience --
6 what you have from experience to help shape this
7 review. So, and that's not something I think
8 that's new or been newly invented. I think people
9 have been thinking about that.

10 So I think some cases we think that the
11 review tool considerations might be useful in doing
12 this depending on what the issue is. And I think
13 for us in PRA I think it is applicable, and I have
14 an example where I'll walk through and show that.

15 So the idea is to basically -- like I
16 said, this is like a thought tool. It's like one
17 of the things where -- like you see them in self-
18 help books. Like if you've ever looked at Richard
19 Bolles' "What Color is Your Parachute?," he's got
20 all these little helper things in there like
21 the flow diagram. Do you want to work with
22 people, things or data? And you write the stuff
23 down and you figure out where your career is
24 going to go. Same kind of thing. It's just to
25 think through your review procedures and try and
find a basis for

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1 looking at what should be looked at hard and what
2 might be able to be reduced.

3 And then to identify -- so in this
4 particular review procedure what is it I have to
5 look at? Is it -- should I be heavily focused here
6 or not so heavily focused? And what exactly will I
7 do and is it even possible for me to say what is it
8 that I have to conclude to say I've done this
9 review, this particular review procedure and I'm
10 done? Try to think of this stuff ahead of time, if
11 you can, to just be -- it's just a helpful thing to
12 help people organize their reviews. That's all
13 we're talking about.

14 MEMBER RAY: Well, but I'm still I
15 guess quite troubled by recent experience that
16 we've had. Let's take Safety Analysis, Chapter 15.
17 How is what you're describing -- because you're not
18 going to be able to say at this stage of the game
19 completed safety analyses. Would you agree?

20 MR. CARUSO: What do you mean by
21 "completed safety analysis?"

22 MEMBER RAY: Well, they're going to
23 include assumptions. Just like we've seen some
24 assumptions turn out to be correct and some not.
25 Take again condensate return. That wasn't

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1 something that was reviewed and found acceptable
2 and then turned out to be non-acceptable. It was
3 an assumption that was made that turned out to be
4 wrong.

5 Now, it's just not practical for
6 anybody to provide early on, as this is referring
7 to, completed, finalized, test-demonstrated safety
8 analyses. Is there something here that -- in which
9 you -- that's why I made a reference to Hi-Tech
10 earlier, but maybe it's not apropos exactly. But
11 as you define what is going to have to be
12 demonstrated later what assumptions you're making
13 that haven't yet been demonstrated as correct or as
14 valid, or are you imagining that you're going to
15 look at safety analyses and that's it, as you said
16 just a few -- a minute ago? It's done.

17 MR. CARUSO: No. No. Not -- no. It's
18 like do -- there may be an example. There may be
19 some code that's used. And for some transient that
20 takes forever to develop and ends in a reactor trip
21 and doesn't have a lot of -- isn't something like
22 complicated.

23 MEMBER RAY: Okay. I don't want to
24 drag this out, but the point is is part of the task
25 here to identify things that have not yet been

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1 validated in these reviews, assumptions that are
2 being made at this stage which -- it's all you can
3 do is make assumptions. You can't expect every
4 function to have -- be supported by completed
5 analyses at this stage. My gosh, that's not even
6 remotely practical.

7 MR. CARUSO: No, I agree. I guess I'm
8 missing how that's connected to what we're talking
9 about here.

10 MEMBER RAY: Well, I just look at the
11 words "safety analysis." And I hear you say and
12 we're done and I'm wondering what are you
13 imagining?

14 MR. CARUSO: Well, if I gave you that
15 impression that you don't have to do any review of
16 Chapter 15, I hope I didn't because --

17 MEMBER RAY: Well, I'm just saying this
18 says programmatic reviews and I'm wondering if the
19 review doesn't need to explicitly provide for the
20 identification of things that are yet to be
21 validated.

22 MR. CARUSO: It certainly does.

23 MEMBER RAY: Huh?

24 MR. CARUSO: It certainly does, yes.

25 MEMBER RAY: Okay. Well, I just --

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1 that would be more -- I'd be more comfortable if
2 that was explicit, if you were saying these are
3 things that we're going to assume but need
4 validation.

5 MR. CARUSO: Yes.

6 MEMBER RAY: Because it's going to be a
7 long list of things --

8 MR. CARUSO: Yes.

9 MEMBER RAY: -- is my expectation.

10 MR. CARUSO: I think you'll see that on
11 my example.

12 MEMBER RAY: All right.

13 MR. CARUSO: It looks -- there are
14 assumptions made in the example as to how it looks.

15 Let's go to the example. So --

16 MS. MROWCA: Or just in general I'd say
17 on the safety analysis we're saying maybe you don't
18 need to do all the confirmatory analysis you've
19 done in the past. We don't know. We're still --
20 we're trying to drill down one level of detail, but
21 we're not to that point to have a decision made.
22 Those reviews will be --

23 MEMBER RAY: Well, we thought we didn't
24 need to do any confirmation on condensate return,
25 didn't we:

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1 MS. MROWCA: Right.

2 MEMBER RAY: And it was the U.K. who
3 figured out that, yes, you did.

4 MS. MROWCA: Right.

5 MEMBER RAY: And it turned out it was
6 wrong. So I mean, those are lessons learned that
7 we need to pay attention to.

8 MS. MROWCA: Absolutely. And but those
9 things, they should be factored into this decision.
10 We don't know if there's any change that they would
11 make to their review. And even if they did the
12 same review they did, would they have missed
13 something like that? I don't know. Maybe we're
14 not at that level of detail now to say how does
15 what we're doing for an enhanced review affect our
16 review of the safety analysis? We don't have that
17 yet.

18 MEMBER RAY: Well --

19 MS. MROWCA: But I certainly understand
20 your cautionary words.

21 MEMBER RAY: Yes. Okay.

22 MS. MROWCA: I think we've gotten that
23 message.

24 MEMBER RAY: And I was very much
25 involved in making those assumptions too, just like

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1 you guys were. But we need to learn from that
2 experience and all I'm saying is that people's
3 expectations get set that -- just like it wasn't
4 that long ago that we had the same mindset that
5 well, that seems reasonable -- let's go with it.

6 Well, it was far from reasonable. So
7 anyway, all I'm saying is that I think an applicant
8 deserves to have identified the things and like I
9 say, it comes out kind of like ITAAC but I don't
10 know what form it takes necessarily but have
11 identified the things that are assumptions that are
12 being accepted for now because it's the only
13 practical thing to do to move forward but that need
14 to be validated.

15 MR. CARUSO: So in this example, this
16 is -- I've been going through the Chapter 19 SRP
17 that has all our review procedures in it and
18 thinking about, you know, what are the most
19 important parts of the review and what might not be
20 as important and trying to use the review
21 considerations to do it.

22 And so I have a big long table because
23 there's 30-some review procedures in Chapter 19.
24 So this is just an example of the idea and it's
25 based on -- it's based on assumptions related to

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1 what I know now -- you know, what I know now about
2 the design -- what information that I have now.

3 So the first one -- so I've got two
4 things here, two areas. One area that we have
5 review procedures in is review of the passive
6 system reliability and another area we have is the
7 treatment of high winds. But we have -- you know,
8 we have fires, we have floods in there, we have
9 level two, level one seismic margins, all kinds of
10 topics.

11 So I'll just walk through each of these
12 to give you some idea of what the thinking is. So
13 here's the review procedure that says identify all
14 the key thermo-hydraulic parameters that could
15 affect the reliability of a passive system.

16 That -- there's a procedure that tells
17 the reviewer to do that. And so, you know,
18 presumably the licensee will send them their
19 application and their section on thermo-hydraulic
20 passive system reliability.

21 They'll identify all the parameters
22 that could affect it -- you know, pipe sizes and
23 heat loads and heat transfer coefficients and all
24 these things that could affect, you know, the
25 thermal hydraulic phenomena that are the basis for

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1 not only running the plant during normal operation
2 but also in their safety systems.

3 And so right away passive systems
4 design here are very novel and so there's no -- you
5 know, this needs to be a thorough review.

6 Everything associated with the passive
7 design and the passive system reliability to us is
8 -- needs to be a thorough review -- no looking for
9 shortcuts because it's new and novel and that
10 NuScale relies -- they rely on their safety systems
11 -- their ECCS and their decay heat removal systems
12 as we know them now, those are the things that
13 protect against design-based events and they also
14 protect against core-managed events to keep the
15 core cool. So, you know, those are pretty simple
16 insights that those are very important systems.

17 So then -- so what is the reviewer
18 going to do? Well, you know, he's going to look at
19 the parameters. You know, is the parameter set
20 complete. You might go back and look at ESBWR
21 AP1000, whatever other reviews of passive designs
22 are out there.

23 I think a lot of the phenomena that
24 NuScale is using is very similar to ESBWR in terms
25 of condensation heat transfer and natural

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1 circulation and condensation cooling.

2 So, you know, he'll do that -- he needs
3 to do that and then, you know, what is it that he
4 needs to say about this -- what's he trying to
5 achieve. You know, he wants to make sure that he's
6 got the complete set of parameters to include in
7 their analysis of the uncertainty.

8 For the treatment of high winds, so
9 there we're thinking about, you know, here's the
10 review procedure that the reviewer is supposed to
11 verify the methodologies consistent with the state
12 of the art and assumptions are reasonable for us
13 demanding the CDF for high winds PRA analysis.

14 So in looking at the design and
15 thinking about their design you say well, what am I
16 concerned about with high winds. Am I concerned
17 about losing off-site power? Well, I don't want to
18 lose off-site power but this plant doesn't depend
19 on AC power.

20 Everything is inside the reactor vessel
21 inside the reactor building. As we know it now, we
22 expect that the reactor building will be quite a
23 bit more robust than a normal reactor building, and
24 I don't want to get into why that's the case
25 because I don't want to get into anything that

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1 might be proprietary.

2 But we do have an understanding that
3 their reactor building design will be quite a bit
4 more robust which, you know, relates to how
5 damaging could missiles be.

6 In addition, the reactor building the
7 pool -- the containments are all below ground. So
8 you start to think about how concerned are you
9 about missiles.

10 Are you -- are you really concerned
11 that much about missiles and damage? So initially
12 that's -- we thought, well, you know, I'm not sure
13 high winds would be a high priority, you know. I
14 think I'd be more concerned about fires and floods
15 than I would be about high winds if I was to
16 prioritize in my review.

17 And then we started to have these
18 meetings talking about -- we were talking about the
19 crane because the crane is real important in shut
20 down where they move the modules around.

21 And someone in the room said well, what
22 happens, you know, what happens if you lose power -
23 - what happens to the crane. And we started
24 thinking oh, I don't know. But that seems like a -
25 - you know, maybe high winds are important during

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1 shut down. Maybe they're more important.

2 So we might think, you know, in this
3 particular review, you know, it may be -- it may be
4 less important than power but we may need to
5 emphasize the review and shut down. I'm not sure
6 that that's the case but that's the thinking.

7 MEMBER STETKAR: You mean it's always
8 important because pretty much one module is always
9 shut down? I'll just --

10 MR. CARUSO: Well, I agree with you.
11 Yes, I agree with you.

12 MEMBER BLEY: You were -- you were
13 wanting us to do that so we'd probably do it.
14 Okay.

15 MR. CARUSO: I understand that.

16 MEMBER SKILLMAN: It would be curious
17 to look at the transcripts where we've gone over
18 some of these things about this type of issue. Is
19 one crane enough? You've got 12 modules. Do you
20 need two and what happens if you don't have power.

21 But I think in some of the old
22 transcripts you'll find some of the same types of
23 things John just pointed to and this idea of a more
24 robust building is kind of a new -- that's a new
25 piece of information. I don't think we've been

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1 introduced to that at this point. So it will be
2 curious to see what the design certification shows
3 us.

4 MR. CARUSO: So again, you know, the
5 reviewer will try and identify what would be the
6 key activities you would do and write those down
7 and also what is acceptance criteria.

8 So that's really all this is trying to
9 do. It's trying to help organize things ahead of
10 time and to help prioritize and to go back with
11 fresh eyes and the knowledge of the design and take
12 a fresh look at your review procedures and
13 acceptance criteria and see if it can help you
14 focus your review.

15 So I think that's it for me.

16 MS. MROWCA: And we have just two quick
17 wrap-up slides. So slide 26, I'll just talk about
18 the first one. Complete review tools and draft
19 safety evaluation documentation.

20 No, we do not believe that the tool we
21 have -- the information in the tool is complete.
22 We believe that the type of considerations that we
23 look at, you know, generally the information that
24 we want to have on this tool we feel like that is
25 pretty good.

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1 But the information in it, the -- for
2 instance, the categorization that's one of the
3 things that we gleaned from NuScale in the --
4 during the May 2016 audit. We did our best there
5 but they know that we would appreciate any
6 information that they can give us any time along
7 the way to help us do this better and keep growing.

8 But we do have to expand our horizon.
9 We have some examples we've worked on but we need
10 to have the actual reviewers complete their system
11 review of the table, the considerations and their
12 thoughts about what they should be emphasizing or
13 de-emphasizing in the -- in their review and then
14 to actually document it as a -- the beginning of
15 the technical evaluation portion of the safety
16 evaluation.

17 We think that's important too because
18 the information in the basis would be on this tool
19 based on all the considerations that you used to
20 make your decision and why not get started and
21 document that in the safety evaluation, draft
22 safety evaluation right now.

23 And we know that that can change but
24 for instance, that's one reason we have the Office
25 of General Council on our working group to help us

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1 try and frame that and see if what we're doing
2 makes sense. So we think that needs to be out
3 there and transparent of what we actually did in
4 the review as it relates to, like, what was put
5 into the DSRS. For instance, our guidance -- that
6 there are certain things we want to clarify based
7 on new information since the DSRS was issued.

8 MR. CARUSO: Can I make one comment
9 too? I think it's important, this idea of trying
10 to document these aspects of the review in a
11 special place in the SER is a way to keep track of
12 the assumptions we're making and the bases we're
13 doing as it goes along.

14 Remember we said this is iterative and
15 so you might have to change course down the road
16 and this -- one of the advantages of having these
17 aspects of the review, you know, explicitly
18 documented in a certain stop and have that SER be a
19 living document through the review helps realize,
20 you know, when we might need to make a change or
21 might need to do something over or go back and do
22 something.

23 CHAIRMAN CORRADINI: So I think you
24 guys -- I want to see if the members have questions
25 before we switch topics. But let me just start

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1 off.

2 So if you were to have shown this tool
3 or this process to the folks that ran the ESBWR,
4 for example, would they have said this is -- would
5 this have helped? Did they do something
6 differently to make sure all the pieces fit
7 together?

8 What I'm trying to get at is it's kind
9 of like a reversed lessons learned. If I show this
10 to the past team, what does the past team say?

11 Ahh, no, this is too much bureaucracy -
12 - it's not going to help you, it's going to slow
13 you down. Or gee, this is an interesting sort of
14 way to organize thought processes and either we
15 wish we had it or maybe if you guys do XYZ
16 differently it would actually be more effective.

17 That's what I'm trying to get at. Have
18 you ever reflected back on the other? Because the
19 large passive plants, although different, have a
20 lot of the same sort of things that Dick was
21 worried about relative to non-condensable gas high
22 point venting, about pass systems from all
23 pressures, prep for driving pressures, et cetera.

24 MS. MROWCA: I think if you go to the
25 next slide, it's kind of under the implementation

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1 challenge. I think one of the examples we used
2 was, you know, there are some systems that were in
3 the ESBWR which we didn't have an SRP for. And so
4 we had to create what the review guidance was on
5 the fly.

6 But we know that already some reviewers
7 have said that this seems like a lot of work for
8 the benefit you get out of it and so that's where
9 we need to drill down to the next level.

10 And all we're asking is for people to
11 embrace a concept and that's also what's the first
12 bullet symbol under there -- approach review
13 differently without compromising safety.

14 So that takes some getting used to to
15 do it differently. But --

16 MR. CARUSO: Well, one thing we have
17 been doing is going back and looking and seeing,
18 you know, in certain areas that maybe we think are
19 not so important. How much did we write -- how
20 many REIs did we issue for ESBWR.

21 I mean, one example I did was, you
22 know, we talked about rad waste. I went and looked
23 at liquid rad waste and we issued 52 REIs and we
24 had I don't how many pages of SER and my first
25 reaction was as a PRA analyst looking at rad waste

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1 doesn't usually come up as something that's really
2 significant.

3 But, unfortunately, I think what I
4 learned from the liquid rad waste people is a lot
5 of that is because the idea of regulatory
6 compliance. We have a bunch of stuff in there it
7 says you got to do.

8 Now, we're still asking them and
9 challenging them to go back and see, you know, can
10 they rely on operating experience in terms of rad
11 waste treatment and it's something that we've done
12 forever and it's, you know, are there areas that
13 you can look at there. But it probably wasn't the
14 best example but we haven't done as good a job as
15 we wanted to in that regard to go back and say --
16 to try and fit it and say how would ESBWR have
17 changed if we applied this process.

18 CHAIRMAN CORRADINI: Or to get their
19 reaction to it. What I guess I'm trying to get at
20 is there are enough similarities in terms of the
21 general character that the PM there or some of the
22 key individuals that went through the process might
23 have some reflections on how that -- how this might
24 help them how to make this better, how to make it
25 less complex so that the reviewers want to accept

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1 it as part of their day to day activity.

2 MS. MROWCA: And I think that's what we
3 found as a working group, that the working group
4 has found that this has been very helpful to them
5 and I think when we say holistic that, you know,
6 sometimes we get focused on our own part of the
7 review and we interface a little bit with other
8 people.

9 But we don't really do it more broad
10 and if you did you might -- you might see the
11 relativity of what you're doing compared to other
12 people and maybe that relativity will help you
13 figure out well, maybe I'm doing too much or gee,
14 I'm not doing enough and maybe right size everyone.
15 So I think that's what the working group has found
16 so that, in the end, is one of the benefits and
17 hopefully will increase effectiveness.

18 Can we say right now we're going to do
19 it with fewer hours, less time? I don't know.

20 MEMBER RAY: Mike, I would think that
21 ESBWR, to take an example, to the extent that they
22 perceive this as increasing certainty earlier,
23 they're going to say great, because that's what
24 everybody wants.

25 And I'm concerned that because I don't

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1 see enough recognition of how qualified certain
2 decisions need to be in advance of having all the
3 information that you need to have that it will come
4 across that way.

5 Here's a way that we can more quickly
6 gain the certainty that we're looking for, and
7 that's why I have said now four or five times that
8 what isn't -- where assumptions are being made
9 necessarily -- I'm not being critical but where
10 they are being made necessarily and have to be
11 subject to validation it needs to be clear.

12 MEMBER REMPE: So on Mark's slide 525,
13 if he had included somehow in this table not only
14 identifying the thermo-hydraulic parameters that
15 can affect reliability, if he had said explicitly
16 which ones need to be validated because it's new
17 versus which ones are, you know, by existing
18 things.

19 MEMBER RAY: Yes, it's a new
20 application even if the methodology is established.

21 MS. MROWCA: Then that would be a list
22 of things that the licensee needs to come up with
23 experimental data. Did that address your question?

24 MEMBER RAY: Well, yes, perhaps. I
25 mean, I don't want to over prescribe what is coming

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1 in the future. Just something that would identify
2 assumptions that have to be validated in some
3 manner is, I think, worth doing or important to do.

4 There is just too much of an
5 impression, Joy, in my hearing this that we're
6 going to be more efficient, more systematic, more
7 thorough, more transparent in arriving at a
8 conclusion that it doesn't include what the
9 limitations are of that conclusion relative to what
10 still lies in the future because the certification
11 at least all of them that have occurred so far --
12 now, there may be something new happened -- but
13 they're always perceived a lot of the analysis in
14 engineering that takes place when you actually go
15 then to implement the certification in an actual
16 plant. The certification cannot be based on a
17 completed design as much as we would all like it to
18 be.

19 And the absence of that completion --
20 design completion is something that needs to be
21 somehow recognized or you mentioned the OGC,
22 they're going to come back and say wait a minute,
23 we went through this with you before and you said
24 it was okay.

25 MR. CARUSO: Well, it's interesting.

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1 One of the things that we do in the Chapter 19
2 review is we have the applicants provide a table --
3 it's 19.8.3 I think -- a table that identifies all
4 the key assumptions in the PRA that are driving
5 results and also all of the assumptions they made
6 about the operations that the COL needs to make
7 come true, you know --

8 MEMBER RAY: But that's assumptions
9 that you may not feel warrant validation. They may
10 be just reasonable assumptions that nobody is going
11 to question. I don't know.

12 I'm just saying the things that the
13 staff is taking credit for that remain to be
14 validated somehow, whether it's by analysis, test
15 or whatever, need to be identified I think that I
16 don't want to repeat that at the end so I'll just
17 say it again now and be done with it.

18 MS. MROWCA: So in conclusion, thank
19 you for your time and you've certainly given us a
20 few things to think about and maybe tweak our
21 process.

22 CHAIRMAN CORRADINI: Are there
23 questions by the members before Mark switches
24 topics? Okay. Let's proceed. The multi modules.

25 MR. CARUSO: So today this presentation

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1 we're here to talk about guidance that is included
2 in revision three of SRP Chapter 19 which is the
3 SRP chapter for review of the PRA interactive
4 analysis guidance on approaching the review of risk
5 issues, risk associated with multi module
6 interactions in a multi module plant like NuScale,
7 which is supposed to have 12 reactor modules.

8 And we promised to come back and talk
9 to you about it since we did not talk to you about
10 it during the meetings that we had with you in
11 2014. So --

12 CHAIRMAN CORRADINI: Or even two months
13 ago. Or even a few months ago.

14 MR. CARUSO: A few months ago. What
15 are we talking about then?

16 CHAIRMAN CORRADINI: Risk significance.

17 MR. CARUSO: Oh, well, I think that's
18 where we said we would come back and talk about it.

19 So some background, basically, some
20 years ago as we were looking at these designs in
21 the pre-application stage we -- people noted that
22 there was a high degree of sharing, a high degree
23 of coupling possibly between these modules, concern
24 about, you know, it's not just hey, it's really,
25 really small -- what are you worried about.

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1 Well, when you put them all together
2 you know you got a pretty good sized station in
3 terms of the amount of radioactivity and you need
4 to worry about, you know, you need to worry about,
5 you know, having not just one accident in a module
6 but maybe accidents in several modules.

7 And this coupling perhaps suggested a
8 higher likelihood of, you know, accidents in
9 multiple reactors than you would have in, say, you
10 know, Arkansas one and two or, I don't know,
11 Calvert Cliffs.

12 In addition, I think we noticed that
13 the current regulatory framework wasn't really well
14 suited for addressing this. We have the commission
15 safety goals for a single reactor. If you were
16 going to look at, you know, looking at, you know, a
17 -- an appropriate way to look at multi-unit
18 accidents would be to have a level three PRA but
19 they're not required.

20 There's some research going on in that
21 area. We look at the standard and we found there's
22 some things in the PRA standard that addressed this
23 with respect to shared systems and the potential
24 for fires and floods spreading from one unit to
25 another unit needs to be included in the model.

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1 You need to account for these things in
2 the initiating events. Initiating events on a
3 model created by one unit created by, you know,
4 issued at another unit.

5 If there's coupling it does recognize
6 that that should be accounted for in the PRA. So
7 we have a little bit of stuff but not a lot.

8 So I think we felt that we needed to
9 express our expectations on this as to what we --
10 what we expected from the applicant and that to do
11 -- we wanted to do this in terms of incorporating
12 criteria and guidance in our SRP.

13 CHAIRMAN CORRADINI: So you don't have
14 to answer it now but I'm still struggling. What
15 differentiates a multi module from a multi-unit?

16 MR. CARUSO: Well, I think --

17 CHAIRMAN CORRADINI: Is it proximity?

18 MR. CARUSO: -- I think it's a
19 continuum and in terms of, you know, proximity
20 issues, with the amount of sharing of systems,
21 sharing of -- is there more sharing of safety
22 systems, more sharing of non-safety systems,
23 sharing of operators. It's a degree issue, I
24 think, really, because we -- you know, we're
25 looking at -- and we're looking at NuScale in terms

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1 of not reactor modules.

2 That's their term. We don't really
3 know exactly and we certainly know what it means or
4 what they're saying but we see -- we see that they
5 have 12 individual units.

6 They have a reactor, they have steam
7 lines, they have feed lines, they have feed water
8 pumps and they have turbines and they make
9 electricity. One, two, three, four, five, six,
10 seven, eight, nine, ten, eleven, twelve.

11 And so the issue is how coupled are
12 those and where are the shared safety systems and
13 shared non-safety systems that can affect those.

14 MEMBER BLEY: Mark, how should we look
15 on your slides? I know we had some slides that the
16 possible applicant has used in this area. Are
17 these kind of responses to them?

18 Are these your independent thoughts a
19 priori? What are these things like right now?
20 What do they mean?

21 MR. CARUSO: Well, the bulk of this is
22 really just basically reviewing what happened --
23 how we got to where we got to the guidance in 19
24 zero. We want to tell you the facts of here's how
25 got to where we got to and how we got there and

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1 what we went through.

2 CHAIRMAN CORRADINI: Okay.

3 MR. CARUSO: And then at the end, I
4 have some -- I have a couple slides that talk about
5 approaches that we will take, things we will focus
6 on when we do the NuScale review that relate to
7 multi module issues. I have just one slide to help
8 see that.

9 But the bulk of this is to tell you
10 what we went through in the period between 2011 and
11 2014. So back in the day after we had decided we
12 needed to have something and to articulate some
13 expectations I put together a working group of --
14 to work on this problem.

15 Office of New Reactors was the
16 chair that was in our branch, Lynn's branch, in new
17 reactors. We had representatives from Office of
18 Nuclear Reactor Regulation and the Office of
19 Nuclear Regulatory Research.

20 The group of staff worked up four
21 options and I want to say up front these are high
22 level options. These are not well developed
23 options in terms of detail -- implementation detail
24 or anything. It's just approaches one might go
25 down and the idea was we didn't want to expend a

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1 lot of resources and energy on something and then
2 find we didn't have buy-in from management on that
3 approach.

4 So the next slide. So yes, so the -- I
5 want to just go over the options with you and some
6 of the pros and cons.

7 So the first option was really, I would
8 say, it was to say look, we'll have the -- you
9 know, the traditional single module risk criteria
10 CDF/LRF and the traditional, you know, single
11 module PRA but we'll look at, you know, make sure
12 that we look at and maybe look at the interactions
13 between modules so that you can identify initiating
14 events that could happen on that single module from
15 other -- from other modules or other reactor units.

16 And in addition to that, with respect
17 to the potential for multiple accidents or
18 simultaneous accidents, we would try and come up
19 with some qualitative criteria that could be used
20 to demonstrate that, you know, they have made those
21 kinds of things unlikely.

22 So it really wasn't all that desirable
23 an option for most people. I think we felt like
24 this was one that was very easily implemented
25 within the current framework of what we have.

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1 It wouldn't require any policy issues.
2 But it clearly would provide a clear measure or
3 clear characterization of station level risk.

4 Option two was basically the same as
5 option one but it said okay for -- you know, for
6 potential multi module simultaneous accidents. We
7 want to have some kind of metric for and perhaps
8 core damage frequency for multiple core damages.

9 We felt that, you know, that would --
10 either than the first option in the sense that it
11 gave you a quantitative criteria for multiple core
12 damage accidents, the con with that one was that we
13 would need to go down a road of developing some new
14 metric. We would -- it would require ACRS review,
15 commission review, public review.

16 It would be something on the order -- I
17 use the analogy of, you know, what it took to do
18 Reg. 174 when you're starting to develop some new
19 metric. It's not something that the staff could
20 just do on their own and put in the SRP.

21 The third option was to basically
22 establish some quantitative health objectives at
23 the station level instead of the single reactor
24 level to use a level three probabilistic risk
25 assessment in conjunction with perhaps a frequency

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1 consequence criteria to do the evaluation.

2 Basically, what I'm talking about is an
3 approach very similar to what DOE proposed for the
4 next generation nuclear plant, the high temp module
5 -- the high temperature gas reactor.

6 If you remember, those discussions were
7 they had used the frequency consequence curve that
8 was anchored at the very low frequencies to the
9 QHOs.

10 So to us -- you're dealing with an
11 approach like that you're getting much closer to,
12 you know, characterizing risk in the appropriate
13 way in the most clearest way.

14 But the level of effort and time is
15 going way up because there are a number of policy
16 issues that would have to be dealt with.

17 You know, you would need a requirement
18 for a level three probabilistic assessment -- risk
19 assessment which we didn't have. You would -- you
20 would be creating implications for what's going on
21 at operating reactors in terms of one dealing with
22 multi-unit actions.

23 So there would be coordination in that
24 area. So there's a lot of -- a lot of complicated
25 issues that would have to be solved to do that.

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1 Not commensurate with --

2 MEMBER REMPE: Could you repeat what
3 you said for the existing multi-unit? You just
4 said you're planning to retrofit?

5 MR. CARUSO: I don't know. That's the
6 whole idea is you have -- you know, the issue has
7 got raised with Fukushima. The -- you know, the
8 commission didn't decide anything. We have this
9 project going on. It's an issue that's out there.
10 So if new reactors -- we were to go ahead and say
11 okay, let's move forward here and develop all this
12 stuff, you couldn't do it just from new reactors.
13 You would have to think in terms of what did it
14 mean to operating reactors too.

15 And would this QHO just apply to new
16 reactors or would they apply to old reactors. So
17 it just -- it would be another, you know, another
18 complicated issue that would have to be worked
19 through in terms of reaching a goal.

20 And so we're bouncing that against, you
21 know, where are we timewise in terms of when do we
22 need this guidance and we're looking at -- at the
23 time, we're looking at mPower coming in for an
24 application in -- I don't know, I think they were
25 giving us, you know, dates in the 2013, 2014 time

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1 frame.

2 MEMBER REMPE: So in these discussions
3 it hasn't been that long ago where I thought the
4 commission basically said the existing fleet is
5 safe enough so advanced reactors do not have to
6 have a more stringent type of requirement with
7 respect to releases and all four of these options
8 to me it sounds like you're got to be more
9 stringent than what's imposed on current reactors.
10 Is that true and did that get discussed in this
11 working group?

12 MR. CARUSO: Yes, it did. It was part
13 of, you know, option three and four. That was one
14 of the -- one of the issues was to -- the
15 complications with it.

16 MEMBER REMPE: Well, one and two also,
17 if you do something about considering interactions
18 between modules you're being more stringent and
19 which you are to the current fleet, right? And so
20 all of these I think --

21 MEMBER POWERS: No.

22 MR. CARUSO: No, I didn't consider
23 other options.

24 MEMBER REMPE: It's releases, right?
25 You don't, like, in CFR 100 to then and license

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1 them, right?

2 MEMBER POWERS: We consider
3 interactions among plants.

4 MR. CARUSO: We're not talking about
5 Part 100.

6 MEMBER REMPE: When you license them --
7 oh, this would not be --

8 MR. CARUSO: This is about core damage
9 and release. This is about --

10 MEMBER REMPE: Okay. So for severe
11 accidents then you do consider multi modules. I
12 guess I had not recognized that.

13 MR. CARUSO: I probably didn't make it
14 clear. I didn't make it clear. Now, there are --
15 there are issues with design basis that we've been
16 thinking about but we're not ready to talk about
17 that yet.

18 So long story short, I think we
19 felt that three and four were just not
20 practical. We thought one wasn't good enough
21 and we felt -- the working group felt that two
22 was the best way to go.

23 CHAIRMAN CORRADINI: So I figured you
24 might end up there. So repeat for me what two is.

25 MR. CARUSO: Two is --

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1 CHAIRMAN CORRADINI: Some numbers, just
2 in case I don't get it.

3 What is the traditional risk
4 number for a single module and then a new risk
5 metric for multi module but is not three.

6
7 MR. CARUSO: Well, the traditional
8 order of a metric for a single module is just like
9 it is for a single large advanced reactor. It's
10 the commission's surrogate for the safety goals of
11 ten to the minus four for core damage frequency,
12 ten to the minus six for large release frequency,
13 initial containment failure probability those are
14 the metrics that we have used for ESBWR AP1000 and
15 that's what we will use in looking at their single
16 module PRA.

17 In addition to that, we think there
18 should be something in addition which would be a --
19 some sort of metric multiple, you know, core
20 damage frequency of multiple reactors.

21 You might call it core damage
22 frequency. We wouldn't say how to do that. We
23 wouldn't go again to what are the implications for
24 a PRA that can handle that.

25 I think you can imagine that you would

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1 have to get into that if you were to go down that
2 option. But we felt that, you know, that's the one
3 we should recommend and pursue.

4 CHAIRMAN CORRADINI: And that was two.

5 MR. CARUSO: And that was two. So we
6 took this discussion of the options to
7 management and they basically said, well, we'd like
8 to but we don't quite understand what your
9 criteria are and we're not -- we have
10 concerns about establishing some new
11 quantitative criteria for multi modal.

12 So please go back and think about
13 criteria in a more detailed way and make it
14 qualitative.

15 So --

16 CHAIRMAN CORRADINI: And do what?

17 MR. CARUSO: And come up with
18 something qualitative for your treatment of multi
19 module actions. So in a sense, you're kind of like
20 back to one, which is what was said.

21 So that's what we did and --

22 CHAIRMAN CORRADINI: This was
23 more of a conversation with management?

24 MR. CARUSO: Yes. We have our
25 traditional program and readings while we bring

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1 things to -- they give us guidance and we follow
2 it.

3 So we went back and we developed the
4 criteria that are qualitative and -- do we have
5 them on there, the criteria?

6 So this is what we came up with. The
7 first paragraph there is sort of a prelude as to
8 what we do in the review and the criteria were
9 basically two things.

10 One is we want them to have a robust
11 systematic process that goes in and identifies what
12 sequences there could be leading to multi module
13 core damage or release and describe them. So we
14 want them -- you know, we want to see a rigorous
15 assessment and look for what could be the sequences
16 and identify them.

17 And the second feature of it is to then
18 describe to us basically what design features,
19 strategies they've put in place to make the
20 sequences basically insignificant contributors.
21 And regarding --

22 MEMBER RAY: Mark, you keep using the
23 term sequences. Is that because we're not
24 including external events which is --

25 MR. CARUSO: No, no. We're including

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1 external events too.

2 MEMBER RAY: Because an external event
3 I don't think of as a sequence. But that's okay.

4 MR. CARUSO: Well, no, no. That
5 definitely is included, and the models secure were
6 basically -- essentially the commission's approach
7 to using PRA for advanced reactor design, which
8 basically the objectives that they laid out was,
9 you know, to go and look for vulnerabilities and to
10 design them out.

11 And so this is a similar kind of
12 concept. It's also a similar -- it's also the
13 concept that's kind of behind the aircraft impact
14 rule which says, you know, go identify, you know,
15 the scenarios that could lead to core damage or
16 containment failure and incorporate design
17 features and functional capabilities to make them
18 go away.

19 CHAIRMAN CORRADINI: So can I
20 paraphrase the two sub-bullets? Sub-bullet one
21 says make sure you're as complete as possible.
22 Sub-bullet two says once you're complete make sure
23 all interactions are minimal. Is that really what
24 I'm seeing?

25 MR. CARUSO: Yes.

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1 CHAIRMAN CORRADINI: If there was a
2 large PWR with four units on a site, would I come
3 up with any other different conclusion than that?

4 MR. CARUSO: Well, if they had shared
5 systems, and most do.

6 CHAIRMAN CORRADINI: I mean that is why
7 I initially started with proximity and you said
8 degree. So --

9 MR. CARUSO: Yes. I mean the --

10 CHAIRMAN CORRADINI: And there is no --
11 I'm just going to ask one last question. There is
12 no quantitative value in anybody's mind as to what
13 is minimal.

14 MR. CARUSO: No. No, there's not. I
15 think this is going to be, you know, it is going to
16 be more of an engineering deterministic review in
17 terms of -- you know we will look at what they have
18 done and looking at it from a perspective of do we
19 think the features they have in place, do we think
20 they have identified all the bad factors and do we
21 think they have features in place that would
22 reasonably preclude these from having some kind of
23 significant frequency or whatever consequence.

24 So, the next slide -- well, so yes,

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1 this is a summary of the criteria. So then, next
2 slide, please.

3 I think I skipped over one slide, which
4 was sort of after we came up with the criteria,
5 before we published them in the SRP 19.0, we had a
6 public meeting. We drafted a white paper in 2014.
7 We issued the criteria for comment in December of
8 2014. And we got no comments from the public on
9 them. We then published them in SRP 19.0 in 2015,
10 December.

11 So, now we can skip to the last slide.
12 I think in doing this review, all I have done here
13 is identify some of the areas where we have
14 concerns about multi-module designs, shared non-
15 safety related SSCs. The concern here is events
16 that initiate incidents on multiple modules or six
17 unit trips at the same time.

18 And the review focus here will be on
19 how reliable are these shared non-safety related
20 SSCs in terms of doing what they are supposed to do
21 and not resulting in lots of reactor trips.
22 Reactor trips are not good because sometimes you
23 have reactor trips with complications. That is one
24 of the reasons we put the maintenance rule in

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1 place.

2 And so we will be looking here in terms
3 of what have they done to minimize the possibility
4 of tripping a bunch of units at the same time.

5 Shared safety-related systems, here we
6 will be looking at things like the pool and the
7 reactor building. How are they protecting those
8 shared systems? How are they meeting GDC 5, which
9 requires that they assure that the safety functions
10 provided shared safety systems are available to all
11 the units, if there is an accident in one unit?

12 So, we will be looking at what are the
13 hazards they need to protect against, particularly
14 external hazards. And what protection are they
15 providing?

16 For identical SSCs in multiple modules,
17 I think this is a traditional issue that we deal
18 with in PRA. We will be trying to utilize the PRA
19 and see if there is some issue here.

20 Proximity dependencies, concerns here
21 about events propagating from one module to the
22 other, one of the examples that we use a lot is a
23 steam line break from the perspective of is there
24 damage that the broken line on one unit could do to

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1 the other units. Could it propagate to the other
2 units?

3 If I break a line in the reactor
4 building, I presume it would steam up the whole
5 reactor building, which how does that affect the
6 other modules? Does it affect the modules?

7 I remember when Maine Yankee cracked
8 open their feedlines in 1983. The first thing that
9 happened was all the fire spray headers went off
10 because they thought it was smoke. And the
11 operators immediately tripped the unit.

12 So you kind of wonder what could be the
13 issues with this. I don't know what they are. We
14 don't. But that is the idea there in terms of
15 proximity dependencies.

16 Another experience I had was I was on
17 the inspection team for the Surry and they had a
18 drain line break in the turbine building. And the
19 damage was quite extensive. I mean it was probably
20 the size of this room.

21 Now, I don't think NuScale has 14-inch
22 pipes but that is the kind of concern. How far
23 would the damage extend?

24 Human dependencies, I think the key

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1 issues there are if they are going to be sharing an
2 operator among modules, to what extent can such an
3 operator deal with simultaneous events? What
4 potential is there for operators initiating
5 accidents on their own module?

6 So, these in organizational
7 dependencies, I don't think there is really -- I'm
8 not sure there is much we can do in the design
9 review to deal with that. That is an issue that
10 applies to multi-unit plants as well. So, I think
11 we will probably try to deal with that in the
12 traditional way.

13 So, I'm just trying to give you some
14 idea here of how we are going to approach this
15 review without the luxury of some quantitative
16 criteria or quantitative analysis.

17 So, that is really all I have.

18 CHAIRMAN CORRADINI: So -- I'm sorry.
19 Let me ask members to see if they have questions.

20 MEMBER SKILLMAN: I do. Mark, back to
21 your slide -- I'm looking for a number here. It's
22 seven, slide 7.

23 Why wouldn't a reasonable approach be
24 to require -- first of all, this is not two 1,000

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1 mega-watts plants sitting a quarter mile apart or
2 800 yards apart.

3 MR. CARUSO: Right.

4 MEMBER SKILLMAN: These are 12
5 enclosed, approximately we are talking like a 300
6 megawatt core is a midget and in actuality, it is
7 not. That has pretty close to a billion curies at
8 full decay heat load.

9 MR. CARUSO: Three hundred megawatt
10 core?

11 MEMBER SKILLMAN: Thermal core.

12 CHAIRMAN CORRADINI: He's just taking
13 50 times 6.

14 MEMBER SKILLMAN: Actually, I am taking
15 TMI-2, 15 billion and dividing by about 8 is what I
16 am really doing.

17 Why wouldn't for this technology the
18 NRC simply say no matter how convincing the NuScale
19 argument is, we are going to assume that half the
20 operating modules, for whatever reason, have a
21 common incident that requires attention to half of
22 the then operating modules; if 12 are operating,
23 presume 6? Do something that is unpredictable.

24 Instead of saying you are looking at it

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1 from the perspective of what is the multi-unit
2 risk, why isn't there the idea that the way you
3 approach this is with an overwhelming attention to
4 what might go wrong and follow that thread?

5 It is a different approach. Instead of
6 saying we are just going to calculate what the risk
7 might be, say regardless of what that risk might
8 be, we are going to presume that we have a multi-
9 module, I don't want to say catastrophe but a
10 multi-module challenge that will require a very
11 energetic and prompt response?

12 MR. CARUSO: Well, I mean in this
13 activity, the idea of establishing new
14 requirements, new regulations was not within our
15 purview.

16 I mean I think in a sense we are trying
17 to identify, make sure that those accidents that
18 could lead to a severe multi-core accident, core
19 damage accident would be extremely rare.
20 Generally, what you would like to see is you would
21 like to see each of these reactor units, from a
22 safety perspective, functioning like one of those
23 units that is two miles apart. That is what we
24 would like to see.

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1 The idea here is multi-modules should
2 not be a factor. It should be a factor that has
3 been, to the extent possible, eliminated. It
4 doesn't mean you might not have a six-unit trip. A
5 six-unit trip, you know I mean each unit is
6 designed to trip. It has got safety systems. The
7 normal expectation on a common trip of six units
8 would be that the rods would go in and go on decay
9 heat removal.

10 But the idea of having that happen at
11 some moderate frequency or whatever, that is what
12 is unpalatable and that is the kind of thing that I
13 think we are suggesting is a risk not to entertain.

14 But I don't know if that answers your
15 question or not.

16 MEMBER SKILLMAN: Well, I think what
17 you have just told me is new regulation relative to
18 this type of challenge is not something that the
19 agency is willing to pursue and that the benevolent
20 hope is that there will never an incident that is
21 of that serious nature. I understand that.

22 But another way to approach this is to
23 say whether it makes sense or not, we are going to
24 simply assure that if that were to occur, we have

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1 the policies, the procedures, the training, the
2 equipment to make sure that it will be a non-event
3 at the end of the day when it occurs.

4 And perhaps one would say all of that
5 is in place but I think that ought to be
6 demonstrated. This is -- I guess what is bothering
7 me is there is this kind of undercurrent that this
8 is all technology we fully understand and I don't
9 think we do. I think having more than three or
10 four of these online at the same presents a
11 challenge that we haven't grappled with yet.

12 MR. CARUSO: That's true. I mean when
13 you start to think about external events and you
14 start to think about loss of a large area of the
15 plant, and you start to think about aircraft
16 impact, you will have multi-module events.

17 MEMBER SKILLMAN: That is exactly what
18 I am thinking about.

19 MR. CARUSO: There will have to be
20 provisions in place.

21 I don't think we are trying to say we
22 are going to do a review that at the end of the
23 day, since they don't have to do anything because
24 they made them all go away, that is not defense-in-

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1 depth. And I don't think that is our intent.

2 You know I mean in the future, we may
3 find from this experience that in the agency they
4 find in the future that it is appropriate when some
5 of these even newer advanced reactor designs come
6 in that we need a different approach. So, this is
7 the first cut.

8 MEMBER SKILLMAN: Mike, that was my
9 question. Thank you.

10 MR. CARUSO: Okay.

11 CHAIRMAN CORRADINI: Other questions?

12 MEMBER REMPE: Basically, you have been
13 forced back to Option 1, then, basically, because
14 you are going to apply --

15 MR. CARUSO: Yes, Option 1 prime.

16 MEMBER REMPE: -- the CDF and the LRF
17 for a single module to multiple modules. And when
18 you look at multiple module events, such as a
19 seismic event, you will divide the allowable CDF or
20 LRF to the multiple units. I mean, basically, you
21 are going to deal with it and penalize them.

22 And that is currently only applied to
23 advanced reactors. I mean Dan told me at this
24 meeting that that is done but it is not done to the

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1 existing fleet, right?

2 MS. MROWCA: I think Mark talked about
3 the standard and that it does address in a couple
4 of places the sharing of systems and what to
5 do about that. But I thought I would add another
6 thought on it.

7 When we first approached this in the
8 working group, one of the things that we wanted to
9 do, there was a question of unit versus module and
10 what does that mean. And since there was a
11 proposal at that time, I don't remember when it was
12 actually -- when we got a response back from the
13 Commission about licensing each module as like a
14 unit so, each module has a license.

15 So, if you say okay, then it functions
16 like a unit, the Commission has repeatedly told us
17 in risk space that we were not going to have a
18 metric associated with multi-units. So, a site-
19 type risk metric.

20 And so applying that to NuScale or any
21 other multi-module SMR, we are trying to understand
22 what that meant for us. And so we said well,
23 what we really are concerned about is this
24 close proximity intimate sharing versus a
current large

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1 light water reactor and its sharing of systems and
2 that knowing that the site Level 3 Project was
3 going on in progress that one of the results
4 conclusions for that may be that we reopen the
5 question of multi-unit risk metric. And then these
6 SMRs would be under what Commission direction was
7 given associated with multi-unit.

8 And so I think that is why we were kind
9 of staying away from having a multi-unit type
10 metric or expectation in terms of risk.

11 Does that help?

12 MEMBER REMPE: Okay, basically, there
13 is -- I guess I have actually pulled this document
14 out of ADAMS that you have referenced and it kind
15 of sounds like that there is a standard draft 3 to
16 NUREG-0800 does basically say that the technical
17 acceptance criteria for such a review has not yet
18 been established.

19 So, it is real fuzzy to me exactly what
20 is done. And frankly, in your slide here, there is
21 a lot of -- basically you are supposed to
22 demonstrate that they are not a significant
23 contributor to risk. That does mean that it has to
24 be one-tenth of the plant risk? Does it mean it

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1 needs to be -- multi-module events need to be --
2 that is a fuzzy.

3 MR. CARUSO: It's a fuzzy.

4 MEMBER REMPE: So, it is not real clear
5 now.

6 MR. CARUSO: Rare exception. It is a
7 rare exception.

8 MS. MROWCA: But we wanted to make sure
9 that we addressed that, that proximity or if there
10 was something unique that was different because of
11 the design, different from what the large light
12 water reactors were. We wanted to make sure that
13 that was captured in terms of the risk but we
14 didn't feel that we could bridge over into a multi-
15 unit type risk metric.

16 MEMBER REMPE: But whatever happens
17 with NuScale will probably set the bar of what
18 others have to go through and what is considered
19 acceptable.

20 MS. MROWCA: And when we see what they
21 do, then we might have more questions about that
22 that tailor our guidance to be a little more
23 specific. We don't know. We are in new territory.

24 CHAIRMAN CORRADINI: Other questions

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1 from other members?

2 MEMBER BROWN: I just want a
3 calibration here. There is 12 units. They all
4 share the reactor pool. Isn't that correct? The
5 reactor pools are coupled to all of them. I just
6 went back and looked at picture and unless it has
7 changed, they are all coupled.

8 MR. CARUSO: As far as we know, yes.

9 MEMBER BROWN: So, if you had one
10 containment failure with a reactor accident where
11 you had core damage and you had stuff gets out, it
12 is going to contaminate the entire pool.

13 MR. CARUSO: You could have it, yes.

14 (Simultaneous speaking.)

15 MEMBER BROWN: And the reactor building
16 is not a containment.

17 MR. CARUSO: Correct.

18 MEMBER BROWN: It is open and
19 ventilated, I presume ventilated. It is not even a
20 confinement. I couldn't find any words on
21 confinement anywhere.

22 So, I'm just trying to relate this to
23 current LWRs. Now, I don't remember how big each
24 one of these is but it is 12 times a unit equals

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1 one of our new large water reactors.

2 MR. CARUSO: No.

3 MEMBER BROWN: It's smaller, isn't it?
4 Yes, that is what I thought.

5 So, I am trying to look at
6 consequences. And if you come up with a different
7 basis for thinking about it and one of these really
8 did burp like that, you have ended up with
9 something probably with your core damage
10 frequencies and alert metrics, that may be less
11 difficult for the public, even though the reactor
12 building is not a containment or a confinement, it
13 is still a barrier of somewhat. And then you would
14 only have to look at what is the consequences of
15 some impact or something that damages the building
16 like we had at Fukushima, where everything gets
17 opened up and spewed across the country. But even
18 then, it seems like it is relatively -- and I'm
19 being devil's advocate a little bit with my
20 comments.

21 And the rest of the stuff I read on
22 NuScale, it looks like they keep maintaining that
23 their containment will never fail. That seems to
24 be in most of their commentary.

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1 MR. CARUSO: Well, we do have bypass
2 sequences.

3 MEMBER BROWN: Yes, well, there is
4 stuff coming in so something can open it up. I was
5 just trying to make sure I had the right
6 perspective on this, relative to --

7 MR. CARUSO: I want to look at the
8 audit report because there is some discussion in
9 there --

10 MEMBER BROWN: Okay.

11 MR. CARUSO: -- about some particular
12 accidents and what they are doing to look at
13 consequences.

14 MEMBER BROWN: Okay. All I was trying
15 to do is put in perspective the single reactor or
16 even single on a multi-unit site relative to this
17 and see what consequences can be evaluated and at
18 somewhat different metric possibly, in terms of how
19 you do the overall evaluation.

20 I mean if you are willing to accept a
21 single unit, which you have, and evaluate those, we
22 evaluate they could fail and we evaluate what the
23 boundary conditions are. I'm not saying I favor
24 that. The fact is I don't really favor that. Just

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1 a little contrarian.

2 So anyway, I just wanted to confirm
3 that my thought process is based on what I looked
4 at was still valid, based on some of our earlier
5 presentations. Thank you.

6 CHAIRMAN CORRADINI: Other questions?

7 MEMBER BALLINGER: One of the
8 advantages of this NuScale has to do with staffing,
9 I presume, minimized staff because with 12 modules
10 all in one pool and everything. But when you talk
11 about these multi-module what did Dick call them,
12 challenges, is there likely to be any kind of at
13 least theoretical effect on staffing required to
14 deal with a situation where you have more than one,
15 like six modules that are just something bad has
16 happened?

17 Has anybody thought about staffing?

18 MR. CARUSO: Yes, that is one of the
19 issues I had mentioned there under --

20 MEMBER BALLINGER: I must have bene
21 asleep.

22 MR. CARUSO: And there is also that is
23 another issue, just a fundamental regulatory issue
24 that is being dealt with as far as design basis.

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1 How do you deal with design-basis accidents if you
2 are sharing operators? And I think there is --

3 MR. TONACCI: So, your question is
4 good. As a matter of fact, it is so good that we
5 have an audit team out at NuScale this week looking
6 at that very topic. What is the highest possible
7 workload that you could have with a multi-module
8 series of events and can the number of operators
9 they plan to use handle that many?

10 MEMBER BALLINGER: Because that sort of
11 acts, at least in theory, defeat one of the
12 advantages of a multi-unit plant like that.

13 MR. TONACCI: Right. So, they know
14 they have to demonstrate that in the worst case of
15 multiple accidents and multiple modules having
16 events, they have got enough staff to do it.

17 That is what we are out there looking
18 at now, just to see how they are going through the
19 development process before they actually submit the
20 application to us.

21 MEMBER BLEY: When we were out there a
22 couple of years ago, whenever that was, years ago,
23 they ran through a drill where they did a whole
24 bunch of these. Their underlying way out of this

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1 is you open two valves and you don't have to look
2 at it again, no matter what is going on. And that
3 was their process is you start getting more units
4 involved, you start putting more of them into that
5 state. You have got to prove that works.

6 MEMBER BALLINGER: I remember that
7 great demonstration in a zillion TV screens and
8 they are doing this but that is different than
9 people out in the plant actually having to do
10 stuff, you know mechanical stuff.

11 MEMBER RAY: I asked the question
12 earlier and it was affirmed that external events
13 are included in multi, even though a lot -- I am
14 looking through here and it seems like we are just
15 talking about one unit affecting the other unit but
16 there are external events that affect all the
17 units. My guess would be that that may be the
18 largest, most probable cause of a multi-unit event
19 is an interaction between the units but it is
20 something from outside. But you confirmed that
21 that is being considered as well.

22 MEMBER BROWN: And Harold's question of
23 external events, if something drained the reactor
24 pool, all the water flushed out and you have got

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1 12, and is there a scheme of decay heat removal and
2 all that kind of stuff within the containment that
3 is supposed to take care of all that automatically
4 without any problems, if there was no water at all
5 in the reactor pool?

6 MR. CARUSO: You know I think you are
7 in serious trouble if you don't have water in the
8 reactor pool.

9 MEMBER SKILLMAN: That is the ultimate
10 heat sink, Charles.

11 MEMBER BROWN: That is what I went back
12 -- that is what I thought. But that seemed to me a
13 single point.

14 CHAIRMAN CORRADINI: Let me just put a
15 contrarian view. That is no different than some of
16 the designs we have looked at of larger units which
17 have one ultimate heat sink for two to four units.
18 So, if I lost that ultimate heat sink, I would have
19 exactly the same very bad day.

20 MEMBER RAY: Yes, that's right. It has
21 got to be not a credible --

22 CHAIRMAN CORRADINI: Yes, but I am not
23 saying it is credible. I'm saying --

24 MEMBER RAY: Well, this isn't the place

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1 to discuss this, I don't think because we are not
2 reviewing --

3 MEMBER BROWN: No, I'm just trying to
4 get my head around some of the comments that you
5 guys that have been in plants around it. My memory
6 on the ultimate heat sinks, we have looked in some
7 of the other plants when we have reviewed stuff,
8 didn't seem to be as susceptible to loss of the
9 ultimate heat sink as this one does, because of the
10 way it is designed. And I am not a mechanical guy,
11 okay? I just don't remember all the details.

12 MEMBER RAY: You can lose the ultimate
13 heat sink on multiple units in many places.

14 MEMBER BROWN: Okay, well reeducate me.

15 MEMBER BLEY: There were some we talked
16 about a lot. We can share that offline.

17 MEMBER BROWN: Well, reeducate me when
18 we get to that point.

19 MEMBER BLEY: Okay.

20 CHAIRMAN CORRADINI: Other questions by
21 the members?

22 So, I had one, which is slightly
23 different, which is the way you have set this up,
24 you have not given yourself flexibility.

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1 So, what if the applicant comes in and
2 says you know I can easily meet the CDF ten to the
3 minus 4. It is an order of magnitude lower but my
4 interaction effects are not minimal, since you
5 don't have a number for that I will say are not
6 minimal but less than minimal -- more than minimal.
7 But the sum total of all these more than minimal
8 effects is still meets the CDF. Would that be
9 acceptable?

10 MR. CARUSO: Well I mean you know the
11 single module PRA, yes, I mean if they consider all
12 the potential initiating events that can lead to
13 core damage of large release and they show they
14 meet or they are way below the safety goals, which
15 is -- that part is fine.

16 CHAIRMAN CORRADINI: I am kind of
17 basically saying what Dick is asking you except if
18 the applicant comes in and does it, is it
19 acceptable? Not that the NRC prescribes it but as
20 Dick is asking, it comes in as an applicant that
21 says we need it because 12 times small is still
22 small.

23 MR. CARUSO: No, that's -- no, I think
24 the criteria we have in place would give us the

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1 flexibility to push back on that and say --

2 I think the criteria that we have put
3 in place give us the flexibility. It is a two-
4 edged sword. You know it is murky for what they
5 are supposed to tell us but it is also murky about
6 what we will accept.

7 CHAIRMAN CORRADINI: Okay.

8 MR. CARUSO: And we have made it clear
9 that we will be looking at the design and be
10 focused on the design features.

11 CHAIRMAN CORRADINI: Well, the reason I
12 am asking the question the way I am is that if the
13 applicant comes in with it, it is different than
14 the staff requiring it. If the applicant comes in
15 with it and shows a bounding calculation, then the
16 bounding calculation from the beyond design basis
17 case is still a factor of two or three smaller than
18 a large one single LWR, then --

19 MEMBER REMPE: The second bullet, not a
20 significant contributor.

21 CHAIRMAN CORRADINI: But the reason I
22 am asking the question the way I am is the way
23 those words are stated, that flexibility doesn't
24 appear to be there. The way you answered me is

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1 completely consistent with the wording, which means
2 you could be driving him down a path to minimize
3 interactions where I'm not sure this design
4 inherently can minimize them to whatever minimal
5 is. That is what I am -- yes.

6 Do you see my question? It is almost
7 inherent the way the design is made. The proximity
8 benefits them. Therefore, they have to take
9 advantage and assess it for extreme events.

10 Is the proximity of the design allows
11 them to get away with essentially a totally passive
12 plant at all modes? And by this, at least what
13 concerns me is you might drive them to do something
14 in the design that maybe doesn't really make any
15 sense by the inherent way the design has evolved.
16 It more makes more sense to do a bounding
17 calculation and say I am still okay.

18 MR. CARUSO: Well, A, I don't think we
19 will drive them -- knowing what I know, I don't
20 think we will drive them to do anything that --

21 CHAIRMAN CORRADINI: I understand.

22 MR. CARUSO: And B, I will not be
23 surprised in the least if they come in with some
24 sort of quantitative characterization of multi-

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1 module risks.

2 CHAIRMAN CORRADINI: Okay.

3 MR. CARUSO: They told us at a public
4 meeting some time ago that they were working on
5 that.

6 CHAIRMAN CORRADINI: Okay.

7 MR. CARUSO: They had their own ideas.
8 And these criteria do not preclude that.

9 CHAIRMAN CORRADINI: I understand.

10 MR. CARUSO: And we will be more than
11 happy to entertain that information.

12 CHAIRMAN CORRADINI: Okay.

13 MEMBER REMPE: So, have they come in
14 and said something publicly that they view that the
15 interactions for multi-modules are a low fraction
16 of the whole plant risk, which I have heard in
17 meetings is very low? So, you already know that,
18 so that is why you are --

19 MR. CARUSO: They have said that they
20 are very comfortable with these criteria in a
21 public meeting and we are going to address that.

22 MEMBER REMPE: Okay.

23 CHAIRMAN CORRADINI: Okay, other
24 questions by the members?

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1 All right, I think this is a good time
2 that we go to the public, we open the phone lines
3 first and see if people are in the audience that
4 have comments from the public.

5 Did the red light go on? Okay, so
6 there is nobody in the room.

7 We will go to the phone line. If
8 anybody is out there on the phone line, can you
9 please at least identify yourself so that we know
10 that the line is open? It sounds crackly, so there
11 is a good sign.

12 MR. BERGMAN: Yes, I'm on the line.
13 This is Tom Bergman with NuScale Power.

14 MS. FIELDS: I'm on the line. This is
15 Sarah Fields with Uranium Watch.

16 CHAIRMAN CORRADINI: Okay, Ms. Fields,
17 do you have any comments you would like to make?

18 MS. FIELDS: Yes. Are you also taking
19 questions?

20 CHAIRMAN CORRADINI: You can send your
21 questions to our Federal Designated Official, Mike
22 Snodderly at the ACRS website -- at the ACRS email.

23 MS. FIELDS: Okay, I have his contact
24 information.

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1 Okay, I do have a couple of comments.

2 CHAIRMAN CORRADINI: Yes, ma'am.

3 MS. FIELDS: At the very beginning, the
4 sound went off to the members of the public on the
5 phone. You had on your -- on your agenda you had a
6 phone number to use to contact anyone with the ACRS
7 during the meeting. I and other people on the
8 phone line called that number but nobody answered.

9 So, we were trying to get through to
10 you the idea that no one could hear you anymore.

11 Okay, I think it would have been
12 helpful if all those slide presentations had been
13 posted along with the agenda. I mean even within
14 an hour of the meeting so those on the phone line
15 could actually see what you were looking at. And I
16 trust that they will be posted on somewhere on the
17 NRC website or on ADAMS.

18 CHAIRMAN CORRADINI: Just to clarify,
19 let's have one of our staff members clarify that
20 point.

21 MR. SNODDERLY: This is Mike Snodderly,
22 the Designated Federal Official. This meeting is
23 being transcribed and eventually that transcription
24 and with that, the slides will be part of that

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1 transcript and then that will be the same place
2 where the agenda was. That is where you will be
3 able to get access to that information.

4 And I'm sorry that no one was on that
5 phone number and we will take that feedback and try
6 to be better about that, get that corrected.

7 CHAIRMAN CORRADINI: Go ahead.

8 MS. FIELDS: Yes, okay. Also, it would
9 have been helpful on the agenda to put a list of
10 some of the acronyms because you were talking in
11 terms of how to refer to various documents and
12 various things. And it would have been helpful to
13 have a list of those things.

14 And there is a lot of noise now on the
15 phone line. I don't know why that is.

16 CHAIRMAN CORRADINI: That is typical of
17 our high-quality government phone line when all the
18 line are open.

19 MS. FIELDS: Okay. It is somewhat
20 quiet now.

21 The only proposal I know of right now
22 for the use of a NuScale 12-unit reactor is a
23 proposal to put one at Idaho National Labs. In
24 some of the public statements by UAMPS, which is a

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1 Utah utility, and I am in Utah, is if they would
2 maybe start with just the operation of a few units.
3 I don't know if that means that they would only put
4 maybe three or four units initially or whether they
5 would have the full 12 units in the reactor vessel
6 or containment building and then just operate a few
7 of them but I think as you are reviewing this that
8 you have to take into consideration that they might
9 just have -- they might start with a few units and
10 then work up to 12 units. I think that is an
11 issue.

12 Also, one thing I was wondering when
13 you would think about the types of license
14 conditions that would need to be in the license for
15 one of these reactors, like UAMPS, in their license
16 at the very beginning because once these things are
17 up and operating, it is the license conditions that
18 rule. I mean you have your regulations but it is
19 the license conditions are extremely important.

20 And my understanding is that the
21 Department of Energy is funding this application.
22 I don't know how that impacts your whole process.
23 And that one of the reasons they are doing this is
24 to set up systems for provision of electricity for

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1 the atomic weapons laboratory. I don't think you
2 made any mention of that. I don't know how it
3 would impact your design of your process. But I
4 think those of us out here in the rest of the
5 country are only aware of this and aware of the
6 pressure from the Department of Energy on this
7 whole design and licensing process.

8 Thank you.

9 CHAIRMAN CORRADINI: Thank you, ma'am.

10 Is there anybody else on the phone line
11 that wants to make a comment? Okay, hearing none,
12 can we close the public line?

13 And let me turn to the members and ask
14 any final comments that you have. And I have a
15 question for all of us but I will go around the
16 table.

17 Ron?

18 MEMBER BALLINGER: I'm all set, thank
19 you.

20 CHAIRMAN CORRADINI: Harold?

21 MEMBER RAY: Nothing more.

22 CHAIRMAN CORRADINI: Dick?

23 MEMBER SKILLMAN: Nothing more, thank
24 you.

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1 MEMBER POWERS: Nothing more.

2 MEMBER BLEY: Nothing.

3 MEMBER STETKAR: I'll have to say it.
4 When you finally get to your reasonably stable
5 version of your review tool, just make sure that
6 when you bring all of your analysts together to go
7 look at that that you carefully consider how
8 everything fits together, so that you don't get
9 those anomalies, I found another one, where
10 something is judged to be important on let's say D-
11 1 and yet stuff that it needs is for some unknown
12 is assigned a much lower priority.

13 So, make sure. I have no idea if it is
14 modeled in the PRA or not. It doesn't make any
15 difference but just from a fundamental support
16 system sort of approach to life that somebody
17 thinks about that stuff.

18 Thank you.

19 MEMBER STETKAR: Nothing to add.

20 MEMBER BROWN: Nothing else.

21 MEMBER REMPE: Well, I, for one, am
22 glad to see you try and think of a different way
23 that has more efficiency in the review process.
24 You might think about in the U.S. today words are

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1 very important. So, you might not want to say
2 enhanced safety. You might want to say it is a
3 more efficient way, I think. And again, it is not
4 clear yet but I think that is the underlying
5 objective.

6 And again, I was real happy with the
7 gap analysis and the respond to the gap analysis
8 exchange going on that could be applicable to other
9 ongoing efforts. Thanks.

10 CHAIRMAN CORRADINI: Okay, so I wanted
11 to thank the staff for their time today to go
12 through this. I think we will still come back and
13 have more discussions on this.

14 My question to the subcommittee is do
15 we want to write a letter for this in September, as
16 currently scheduled. I have an opinion but I would
17 like to get other people's views.

18 MEMBER SKILLMAN: I think it's too
19 soon. Once we have a design cert where we can
20 begin to rally get into it, that would be the time.

21 MEMBER BLEY: A PowerPoint review
22 process isn't suitable for a letter from us.

23 MEMBER STETKAR: And I agree,
24 especially with this notion of how far along are

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1 you in the thought process and even how it might be
2 fleshed out.

3 That isn't saying that it kind of sort
4 of sounds like it might sort of kind of be a good
5 idea, if it is finally implemented. I don't know
6 what the full committee might be able to say along
7 those lines.

8 CHAIRMAN CORRADINI: Okay. I guess my
9 personal feeling is that this is a process question
10 and it is early in the game. So, I'm not seeing
11 the need to do anything but I wanted to see if the
12 members wanted to weigh in with a letter.

13 Okay, good. Then I will take your
14 advice and we will come back to P&P in September
15 and provide comments. Okay?

16 MEMBER RAY: I think we were going to
17 probably have a context, a broader context on that
18 at P&P in September also.

19 MEMBER BLEY: Don't close the meeting.

20 CHAIRMAN CORRADINI: I'm not going to
21 close the meeting. I actually had a schedule
22 question.

23 So, right now the intention is that you
24 will get the certification in December. Is that

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1 still holding firm?

2 MR. TONACCI: As best we know, yes.

3 CHAIRMAN CORRADINI: And so the DSRS
4 and the SRP --

5 MEMBER BROWN: Did you mean
6 certification? You mean an application.

7 CHAIRMAN CORRADINI: Application. An
8 application --

9 (Simultaneous speaking.)

10 CHAIRMAN CORRADINI: The DCD will
11 officially be provided to the staff.

12 MEMBER BROWN: Okay, thank you.

13 CHAIRMAN CORRADINI: So, working
14 backwards from that, since the DSRS and the SRP are
15 settled, when do you start the readiness review, in
16 September? I'm still trying to get the schedule in
17 my mind.

18 MS. MROWCA: Readiness review is in
19 September, the last two weeks, basically.

20 CHAIRMAN CORRADINI: Okay. All right.

21 Dennis, I'm sorry.

22 MEMBER BLEY: We had a full committee
23 meeting scheduled for September. I'm just
24 wondering if that goes away.

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1 CHAIRMAN CORRADINI: That does go away.

2 MEMBER BLEY: Okay.

3 CHAIRMAN CORRADINI: I would think it
4 would go away, given the --

5 MEMBER BROWN: I would think so, too,
6 but I wanted to double check before I cancel it.

7 CHAIRMAN CORRADINI: -- unanimous view
8 that we don't need a letter.

9 MEMBER BROWN: And that doesn't create
10 problems for you folks.

11 CHAIRMAN CORRADINI: Okay, any other
12 comments?

13 And tomorrow we are back with Mr.
14 Stetkar's Fukushima.

15 All right, we are adjourned. Thank
16 you.

17 (Whereupon, the above-entitled matter
18 went off the record at 4:56 p.m.)

19

20

21

22

23

24



Presentation to the ACRS NuScale Subcommittee: NuScale Enhanced Safety-Focused Review Approach

**Lynn Mrowca, Tom Kendzia,
Tony Nakanishi, Mark Caruso
Office of New Reactors**

August 16, 2016

Overview

- Background
- NUREG-0800, Introduction – Part 2
- Operational programs
- Design Specific Review Standard
- Technical review preparation
- Path Forward
- Challenges/Benefits

Background

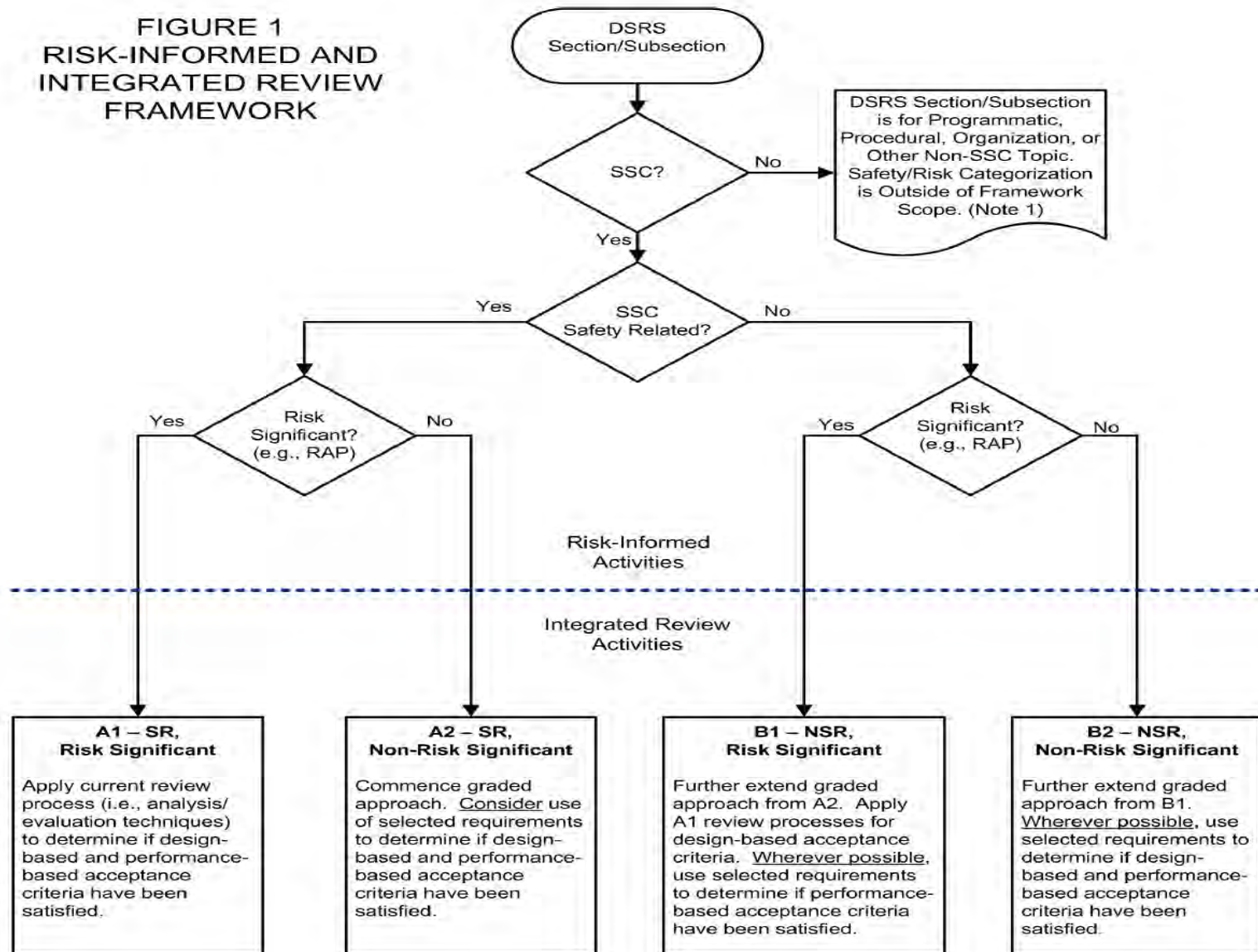
- Briefing to ACRS Future Plant Design Subcommittee on February 9, 2011, regarding proposed staff response to SRM-COMGBJ-10-0004/COMGEA-10-0001
 - Development of a framework...to more fully integrate risk insights into pre-application activities and small modular reactor (SMR) reviews
 - Alignment of review focus and resources...to risk-significant structures, systems, and components (SSCs) and other aspects of the design that contribute most to safety to enhance the efficiency of the review process

Background

- Staff response: SECY-11-0024 (February 18, 2011)
 - Integrate the use of risk insights into pre-application activities and the review of applications
 - Align the review focus and resources to risk-significant SSCs and other aspects of the design that contribute most to safety
 - Enhance the effectiveness and efficiency of the review process
- Commission approved staff's plan for integral pressurized water reactor (iPWR) design applications: SRM-SECY-11-0024 (May 11, 2011)
- Staff issued:
 - NUREG-0800, Introduction - Part 2 (January 2014)
 - NuScale Design Specific Review Standard (DSRS) (ADAMS Accession No. ML15355A295)

- NUREG-0800, Introduction - Part 2:
 - Technical branch chief and reviewer establish the scope and depth of review
 - Emphasizing or de-emphasizing particular aspects of standard review plan (SRP) sections for the specific application and documenting these aspects in the safety evaluation
 - Framework is applicable to the review of all SSCs, but is not applicable to the review of programmatic, procedural, organizational, or other non-SSC topics

**FIGURE 1
RISK-INFORMED AND
INTEGRATED REVIEW
FRAMEWORK**



- Safety-related classification (A or B) is reviewed as part of SRP Section 3.2
- Risk-significance determination (1 or 2) is reviewed as part of SRP Section 17.4:
 - Probabilistic risk assessment (PRA)
 - Regulatory treatment of non-safety systems
 - Expert panel
- Additional review may be necessary based on changes resulting from the staff's review of the categorization

Operational Programs: Performance-Oriented Acceptance Criteria & Performance-Based Program Requirements

	Acceptance Criteria Attribute		
Program Requirements	Capability	Availability	Reliability
Technical Specifications	✓	✓	
Reliability Assurance Program	✓	✓	✓
Maintenance Rule Program	✓	✓	✓
Initial Test Program (ITP)	✓		
ITAAC (inspections, tests, analyses and acceptance criteria)	✓		

Operational Programs (& ITAAC) to Support Enhanced Review

- Technical reviewer for operational programs performs review in accordance with SRP or DSRS
- Technical reviewer verifies SSC - function classification, ITAAC, design & ITP requirements, and commitments and/or exemptions are acceptable. Review may credit:
 - Security, Fire Protection, Radioactive Waste Treatment, Process & Effluent Monitoring, Radiation Protection, Motor Operated Valve, Preservice & In-service Testing & Inspection, Environmental Qualification, and Reactor Vessel Material Surveillance programs for design verification aspects
 - ITP, for verifying the SSC testing meets the specified test requirements
 - Maintenance Rule program for maintaining and restoring systems to meet their design requirements during plant operation
 - Quality Assurance program with meeting 10 CFR 50, Appendix B
 - ITAAC as ensuring construction & installation per design control document (DCD)

Design Specific Review Standard

- DSRS incorporates current SRP sections or includes new review sections based on:
 - Technology differences
 - Risk information
 - Lessons learned from previous reviews
 - Interim staff guidance
- DSRS sections issued (August 2016)
- Realized need for more “detailed” review information to implement NUREG-0800 during development of DSRS

- Formed Working Group (April 2016)
- Considered current design information and **holistic review approach** to enhance DSRS review
- Attended information exchange sessions on current NuScale design (June 2016)

- Beyond NUREG-0800, Introduction Part 2...
 - Staff should also consider improvements to SRP/DSRS section reviews related to “non-framework” topics (e.g., programmatic, procedural, organizational, and non-SSC)
 - Technical advisors available for guidance

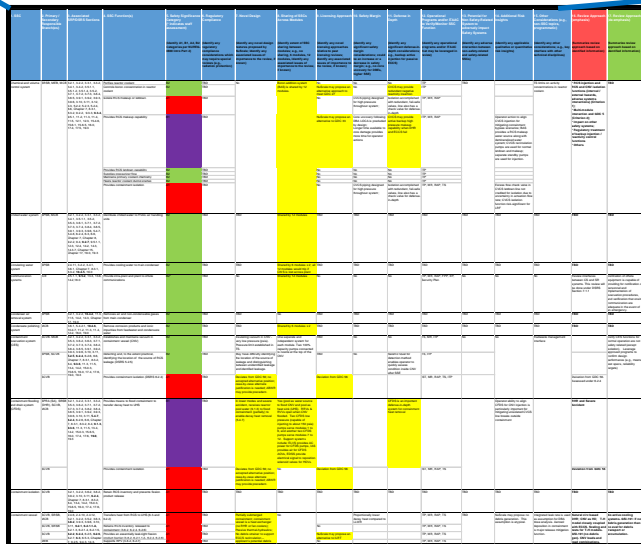
- Developed review guidance/tools:
 - Summary document on operational programs
 - SSC review tool
 - Framework for programmatic or non-SSC review
 - Safety evaluation report (SER) graded approach documentation
 - Internal SharePoint site for facilitating sharing of technical information

SSC Review Tool

Key Review Considerations

Safety-significance	Regulatory Compliance	Novel Design	Shared SSCs	Licensing Approach	
Safety margin	Defense-in-depth	Operational Programs	Non-safety SSCs impacting Safety functions	Additional Risk Insights	Other Considerations

SSC Review Tool



Output:

Scope and Depth of Review

- Provide supplemental approaches for implementation of NUREG-0800 Introduction - Part 2 and DSRS reviews
- Systematic thought process applicable to non-SSC and programmatic reviews

SSC Review Tool – Review Considerations

Safety-significance

- Identify A1, B1, A2, B2 categories (NUREG-0800, Introduction - Part 2)
- Applicant's safety classification is determined per 10 CFR 50.2, definition of safety-related SSCs (expected in DCD Chapter 3)
- Applicant's risk-significance is determined per reliability assurance program (expected in DCD Chapter 17)
 - combination of probabilistic, deterministic, and other methods of analysis to identify and quantify risk (e.g., PRA, severe accident evaluation, assessment of operating experience, seismic and expert panel deliberation)
- Final SSC categorization for DCD review to reflect staff review of the applicant's SSC categorization results per SRP Sections 3.2 and 17.4

SSC Review Tool – Review Considerations

Regulatory Compliance

- Adequate review will always be conducted for reasonable assurance of compliance with applicable regulations

Novel Design

- Identify any novel design features proposed by NuScale and associated issues of importance to review, if known (e.g., passive safety design features)

Sharing of SSCs across modules

- Identify extent of SSC sharing between modules and associated issues of importance to review, if known (e.g., multi-module trip)

Licensing approach

- Identify any unique licensing approaches and associated issues of importance to review, if known (e.g., GDC 33, GDC 17)

SSC Review Tool – Review Considerations

Safety margin

- Identify any significant safety margin considerations

Defense-in-Depth

- Identify any significant defense-in-depth considerations (e.g., active injection back up for passive emergency core cooling system)

SSC Review Tool – Review Considerations

Operational programs / ITAAC

- Identify any operational programs and/or ITAAC that may be leveraged for review (e.g., technical specifications, maintenance rule, initial test program)

Non-safety related system interaction with safety function

- Identify any adverse interaction between non-safety-related and safety-related SSCs

Additional risk insights

- Identify any applicable qualitative or quantitative risk insights, including key PRA assumptions

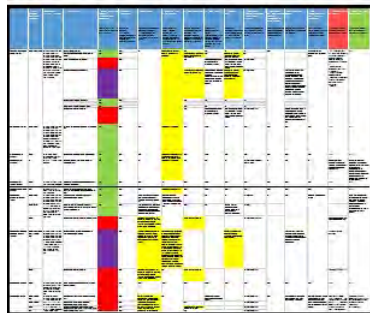
Other considerations

- Identify any other considerations (e.g., key interface with other technical disciplines)

Scope and Depth of Review

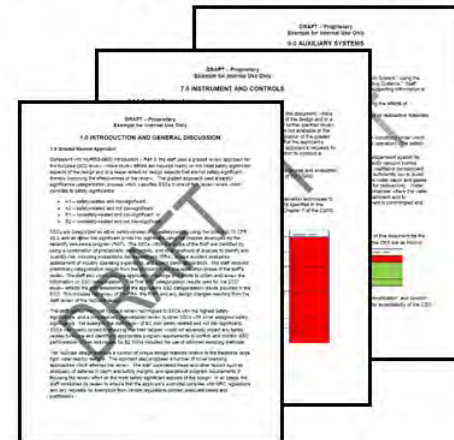
- Apply applicable review considerations to SSC design information and SRP/DSRS review procedures
- Develop graded review approach that will be an input to safety evaluation report

SSC Review Tool



Scope and
Depth of
Review

SER Documentation Approach



Chapter 1 of SER to discuss generic approach which may be referenced by individual technical evaluations

- Graded approach consistent with NUREG-0800 Introduction – Part 2
- Review efforts focused mainly on the most safety-significant aspects of the design and to a lesser extent on design aspects that are not safety-significant
- SSCs categorization based on safety classification and reliability assurance program.
- DCD review based on staff accepted SSC categorization results (i.e., feedback loop)
- Integrated review considerations (e.g., novel designs, safety margins, defense-in-depth)

Draft language available on internal SharePoint site

Containment evacuation system (CES)

- One separate and independent system for each power module
- Maintains low vacuum pressure in containment vessel (CNV) during operation
- Remove and transfer water vapor and gases from the CNV; monitor water vapor and gases for radioactivity
- Provide RCS leak rate detection function
- Two 100% capacity vacuum pumps connected to a nozzle at the top of the CNV
- Vapor condenser and sample vessel
- Discharge connected to liquid and gaseous radioactive waste systems

Review Considerations from SSC Tool to help identify scope and depth of review

- Safety significance – B2 (establish and maintain containment vacuum), B2 (RCS leakage detection), A1 (containment isolation)
- Regulatory compliance – GDC 2, GDC 60
- Novel design – none of significance
- Shared SSCs – no sharing between modules
- Licensing approach – standard
- Safety margin – not important
- Defense-in-depth – not important
- **Operational program – maintenance rule, technical specification, initial test program**
- Non-safety SSCs impacting Safety functions – none
- Additional risk insights – none
- Other considerations – radioactive waste, radiation protection interface

SER Documentation Approach (Technical Evaluation Example)

Chapter 9 example (CES)

SSC	SSC Function	Safety Significance
Containment Evacuation System (CES)	Provides containment isolation	A1
	Establishes and maintains vacuum in containment vessel during normal operation by removing water vapor and gases from containment using vacuum pumps	B2
	Provides RCS leakage rate detection function	B2

- A1 function (isolation) – staff finding to be documented in separate review (DSRS 6.2.4), address GDC 2
- **B2 function (evacuation) – controls provided by maintenance rule and technical specifications, together with initial test program, provide sufficient assurance of acceptable capability, reliability, and availability of the CES function to maintain containment vacuum**
- B2 function (RCS leakage rate) – staff finding to be documented in separate review (DSRS 5.2.5)
- address review interface with SRP/DSRS Sections 11 and 12 related to radioactive waste management (e.g., GDC 60)

Draft language available on internal SharePoint site

Planning Tool for Programmatic or Non-SSC Reviews

- Framework for planning scope and depth of programmatic or non-SSC reviews
- Some programmatic or non-SSC reviews
 - radiation protection program
 - PRA (Chapter 19); safety analysis (Chapter 15)
 - steam generator program
 - reliability assurance program
- Assess the importance of each review procedure in DSRS or SRP by considering the extent of its contribution to making a finding of reasonable assurance for the design under review
- Considerations in the SSC review tool may be applicable in reviews that relate to specific SSCs or safety functions
- Identify key review activities
- Identify key acceptance criteria

Example Use of Non-SSC Planning Tool

Review Topic	Procedures Specific to Passive Designs	Treatment of High Winds
Review Procedure	Identify all key T-H parameters that could affect the reliability of a passive system	..verifies that the methodology is consistent with the state-of-the art and that the assumptions are reasonable for estimating the CDF.
Level of Emphasis	Normal (i.e., thorough)	Reduced (non-refueling) Normal (refueling)
Basis	New novel design; Risk insights from audit	Defense-in-depth (non-refueling) New novel design (refueling)
Review Activities	Compare results with parameters treated in other passive designs and pertinent results of recent research in international community	Confirm that safety systems are protected from beyond DBE effects of high winds Examine how loss of electric power can affect use of crane during refueling operations
Acceptance Criteria	Set of T-H parameters is complete	High winds not expected to be a significant contributor Design features adequate to protect against high winds

- Complete review tools and draft safety evaluation documentation
- Technical reviewer orientation session (August 2016)
- Readiness assessment (September 2016)

Challenges/Benefits

- Challenges using a graded approach:
 - Approach review differently, without compromising safety
 - Implementation
- Benefits of using a graded approach:
 - Holistic review
 - Increased effectiveness

Acronyms

ACRS	Advisory Committee on Reactor Safeguards
ADAMS	Agencywide Documents Access and Management System
CDF	Core damage frequency
CES	Containment evacuation system
CNV	Containment vessel
DBE	Design basis event
DCD	Design control document
DSRS	Design Specific Review Standard
GDC	General Design Criterion
iPWR	Integral pressurized water reactor
ITAAC	Inspections, tests, analyses and acceptance criteria
NSR	Non-safety-related
PRA	Probabilistic risk assessment

Acronyms (cont.)

RCS	Reactor coolant system
SER	Safety evaluation report
SR	Safety-related
SRM	Staff requirements memorandum
SRP	Standard Review Plan (i.e., NUREG-0800)
SSC	Structures, systems and components
T-H	Thermal-hydraulic



Staff Review Criteria for Multi-Module Risk Development and Results

Meeting of ACRS Subcommittee on NuScale

August 16, 2016

Mark Caruso, NRO

Background

- High degree of sharing of structures, systems and components among integral pressurized water reactor “reactor-units” observed during pre-application reviews
- Suggests potentially higher likelihood of accidents involving multiple reactors than in current designs
- Current regulatory framework not well suited for addressing multi-module risk
 - Commission’s safety goals are for single reactor
 - Level 3 multi-unit probabilistic risk assessments (PRAs) not required
 - Some issues recognized in current PRA Standard (ASME/ANS RA-Sa-2009)
 - multi-unit sites with shared systems must consider multi-unit initiators
 - multi-unit sites to include multi-unit fire and flood areas, if necessary
- Acceptance criteria needed for Chapter 19.0 reviews of pending applications for design certification (mPower, NuScale)

Action - Office of New Reactors (NRO)

- Multi-module Working Group formed to develop options for addressing the problem
- Membership from Office of New Reactors (Chair), Office of Nuclear Reactor Regulation and Office of Nuclear Regulatory Research
- Working Group developed 4 options and recommendation:
 1. Traditional risk metrics (CDF/LRF) for single module considering interactions between multiple modules
 2. Traditional risk metrics for a single module and a new metric for risk from multi-module accidents
 3. Quantitative Health Objectives for a nuclear power station
 4. New accident radiological release metric

NRO Action

- Working Group recommended Option 2
 - Qualitative rather than quantitative criteria developed in response to NRO management guidance
- White paper on draft criteria published June 2014 (ADAMS Accession No. ML14150A330)
- Public meeting held June 2014
- Draft criteria issued for public comment December 2014
- Qualitative criteria included in Standard Review Plan Chapter 19.0, Revision 3 issued December 2015

Review Procedure for Multi-module Risk

For small, modular integral pressurized water reactor designs, the staff reviews the results and description of the applicant's risk assessment for a single reactor module; and, if the applicant is seeking approval of an application for a plant containing multiple modules, the staff reviews the applicant's assessment of risk from accidents that could affect multiple modules to ensure appropriate treatment of important insights related to multi-module design and operation.

- The staff will verify that the applicant has:
 - Used a systematic process to identify accident sequences, including significant human errors, that lead to multiple module core damages or large releases and described them in the application
 - Selected alternative features, operational strategies, and design options to prevent these sequences from occurring and demonstrated that these accident sequences are not significant contributors to risk. These operational strategies should also provide reasonable assurance that there is sufficient ability to mitigate multiple core damages accidents.

Implementation of Criteria in NuScale Review

- Evaluate potential sources of multi-module risk
 - verify thoroughness of NuScale search for vulnerabilities
 - staff independent review
- Evaluate effectiveness of features incorporated to address multi-module risk

Considerations for Review of Multi-Module Issues

Consideration	Concerns	Review Focus
Shared non-safety related SSCs	Multi-module initiating events	<ul style="list-style-type: none"> • Design reliability • Expected frequency of events • Effects of failure
Shared safety-related systems	Loss of safety functions	<ul style="list-style-type: none"> • Hazards analysis • Protection of safety equipment
Identical SSCs in multiple modules	Traditional common mode failure	<ul style="list-style-type: none"> • PRA
Proximity dependencies	Events propagating from one module to others	<ul style="list-style-type: none"> • Hazards analysis • Separation • Isolation
Human dependencies	Operator response to simultaneous events; Actions on the wrong Module	<ul style="list-style-type: none"> • Accident types • Operator staffing
Organizational dependencies	Common mode failure	<ul style="list-style-type: none"> • Operational Programs

Acronyms

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ADAMS	Agency-wide Documents Access and Management System
ANS	American Nuclear Society
CDF	Core damage frequency
LRF	Large Release Frequency
NRO	Office of New Reactors
PRA	Probabilistic risk assessment