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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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NUSCALE SUBCOMMITTEE

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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 you  
16 engineering judgment on a plant that's never been  
17 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 A1s and B1s, 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 I  
3 like this process of what I say.

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 at  
22 capability, validity and reliability during  
23 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 write 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. There are I would guess a dozen or  
14 less that are ones that industry has, in all  
15 candor, honed to a very, very sharp level knowing  
16 how important that they are. And even though this  
17 a different geometric design and somewhat a  
18 different thermal hydraulic design, this is a  
19 design that still has an abundance of radionuclides  
20 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 the  
21 flower diagram. Do you want to work with people,  
22 things or data? And you write the stuff down and  
23 you figure out where your career is going to go.  
24 Same kind of thing. It's just to think through  
25 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 dry 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 Nuclear 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 Empower 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                      CHAIRMAN CORRADINI:   So long story  
19           short, I think we felt that three and four were  
20           just not practical.   We thought one wasn't good  
21           enough and we felt -- the working group felt that  
22           two was the best way to go.

23                      MR.   CARUSO:       So I figured you might end  
24           up there.   So repeat for me what two is.

25                      CHAIRMAN CORRADINI:   Two is --

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1 MR. CARUSO: Some numbers, just in case  
2 I don't get it.

3 CHAIRMAN CORRADINI: What is the  
4 traditional risk number for a single module and  
5 then a new risk metric for multi module but is not  
6 three.

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 damage  
20 frequency of multiple cords.

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 MR. CARUSO: And that was too.

5 CHAIRMAN CORRADINI: And that was too.  
6 So we 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 criteria  
9 are and we're not -- we have concerns about  
10 establishing some new quantitative criteria for  
11 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 MR. CARUSO: And do what?

17 CHAIRMAN CORRADINI: 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 MR. CARUSO: This was more of a  
23 conversation with management?

24 CHAIRMAN CORRADINI: 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 may sure you're as complete as possible. Sub-  
22 bullet two says once you're complete make sure all  
23 interactions are minimal. Is that really what I'm  
24 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 do  
5 about that. But I thought I would another thought  
6 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 nodule 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, what  
23 we really area concerned about is this close  
24 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.)

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**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

- 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

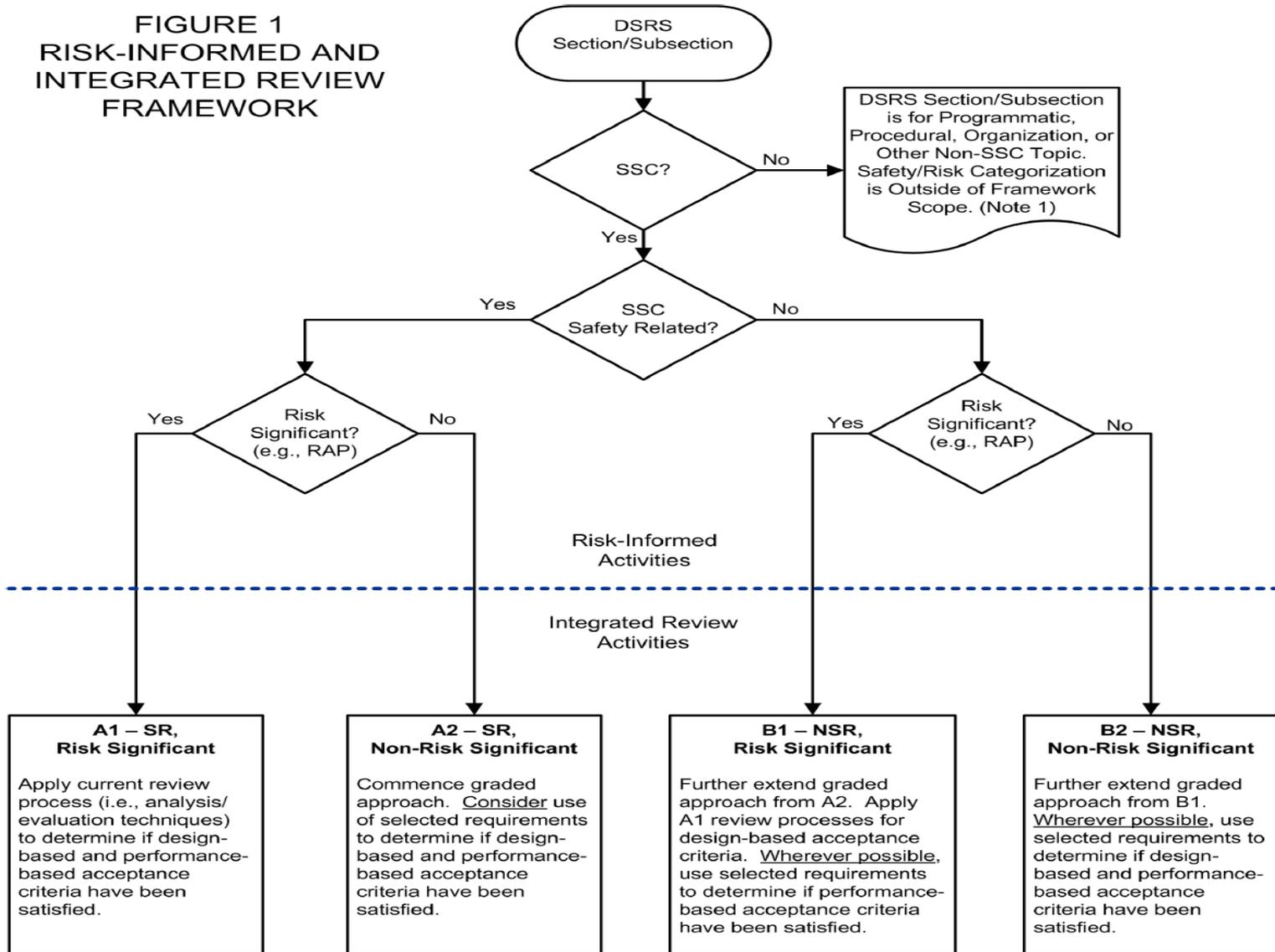
# Background

- 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

Program Requirements	Acceptance Criteria Attribute		
	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)

- 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)

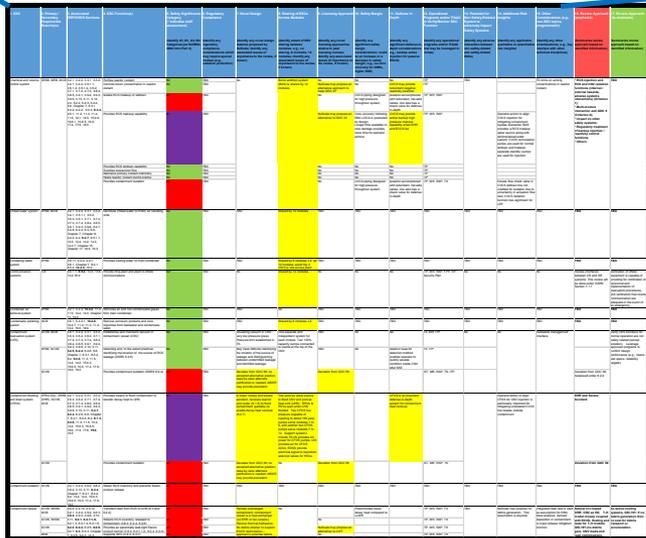
- Beyond NUREG-0800, Introduction Part 2...
  - Staff should also consider improvements to SRP/DSRS section reviews related to “non-framework” topics (e.g., programmatic, procedural, organizational, and non-SSC)
  - Technical advisors available for guidance

- 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

## 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



The screenshot shows a complex spreadsheet with multiple columns and rows. The cells are color-coded: red, yellow, green, and purple. The columns represent different review considerations, and the rows represent individual SSCs. The tool is used to track and document the review process for each SSC.



## 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

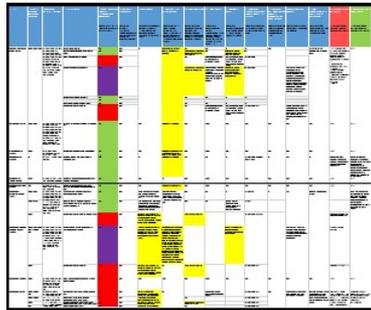
## **Other considerations**

- 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

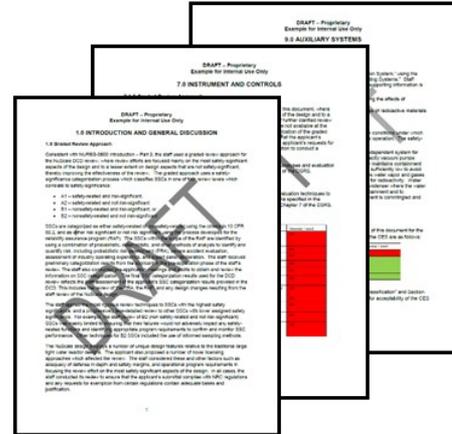
SSC Review Tool



The table displays a grid of review criteria (rows) and systems (columns). Each cell contains a colored box representing the review approach: red for 'Not Reviewed', yellow for 'Limited Review', and green for 'Full Review'. The systems listed include Instrumentation and Controls, Auxiliary Systems, and others.



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

## 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

<b>Review Topic</b>	<b>Procedures Specific to Passive Designs</b>	<b>Treatment of High Winds</b>
<b>Review Procedure</b>	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.
<b>Level of Emphasis</b>	Normal (i.e., thorough)	Reduced (non-refueling) Normal (refueling)
<b>Basis</b>	New novel design; Risk insights from audit	Defense-in-depth (non-refueling) New novel design (refueling)
<b>Review Activities</b>	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
<b>Acceptance Criteria</b>	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"><li>• Design reliability</li><li>• Expected frequency of events</li><li>• Effects of failure</li></ul>
Shared safety-related systems	Loss of safety functions	<ul style="list-style-type: none"><li>• Hazards analysis</li><li>• Protection of safety equipment</li></ul>
Identical SSCs in multiple modules	Traditional common mode failure	<ul style="list-style-type: none"><li>• PRA</li></ul>
Proximity dependencies	Events propagating from one module to others	<ul style="list-style-type: none"><li>• Hazards analysis</li><li>• Separation</li><li>• Isolation</li></ul>
Human dependencies	Operator response to simultaneous events; Actions on the wrong Module	<ul style="list-style-type: none"><li>• Accident types</li><li>• Operator staffing</li></ul>
Organizational dependencies	Common mode failure	<ul style="list-style-type: none"><li>• Operational Programs</li></ul>

# Acronyms

ACRS	Advisory Committee on Reactor Safeguards
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