

# **Official Transcript of Proceedings**

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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
(ACRS)

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NuSCALE SUBCOMMITTEE

OPEN SESSION

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TUESDAY

MARCH 3, 2020

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ROCKVILLE, MARYLAND

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The Subcommittee met at the Nuclear  
Regulatory Commission, Two White Flint North, Room  
T2D10, 11545 Rockville Pike, at 3:05 p.m., Walter L.  
Kirchner, Chair, presiding.

COMMITTEE MEMBERS:

WALTER L. KIRCHNER, Chair

RONALD G. BALLINGER, Member

DENNIS BLEY, Member

CHARLES H. BROWN, JR., Member

VESNA B. DIMITRIJEVIC, Member

1 JOSE MARCH-LEUBA, Member  
2 DAVID PETTI, Member  
3 JOY L. REMPE, Member  
4 PETER RICCARDELLA, Member  
5 MATTHEW W. SUNSERI, Member

6

7 ACRS CONSULTANTS:

8 MICHAEL L. CORRADINI

9 STEPHEN SCHULTZ

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11 DESIGNATED FEDERAL OFFICIAL:

12 MIKE SNODDERLY

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

3:04 p.m.

CHAIR KIRCHNER: Okay, we're back in session. For members of the public, we are turning now to the staff for their presentation on NuScale design certification application, the PRA. And with that, I'll turn to you first, Tony.

MR. NAKANISHI: Well, good afternoon, my name is Tony Nakanishi, and I'm with the Division of Risk Assessment. I'm here with Maria Pohida, also with the Division of Risk Assessment.

So today we'd like to provide a briefing that focuses on PRA and its, we tried to structure our briefing to be responsive to some of the feedback that we received from the ACRS members relative to the PRA focus areas. So if we could go to the next -- oh, I guess I'll have to. Yeah, I'm driving also.

So what we thought might be useful is to start out with a bit of a discussion relative to the design PRA and its context in terms of the Part 52 regulatory framework in terms of its uses, limitations, and the staff review associated with the DC PRA. And then get into some of the topics that were identified by the members. And so that includes the ECCS model, the sensitivity and uncertainty

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1 analyses, and the reactor building crane operations.

2 So under the Part 52 process, consistent  
3 with Commission policy and direction, the primary  
4 focus of the PRA is to identify risk insights to  
5 inform the design, identify insights that could  
6 support things like the reliability assurance program  
7 that we were talking about, RTNSS, risk-significant  
8 human actions, things like that.

9 Obviously part of the PRA is to show that  
10 the new design is an improvement in terms of severe  
11 accident performance relative to the operating  
12 reactors. So from a quantitative standpoint, there's  
13 one use with respect to compliance or consistency with  
14 the Commission goals relative to CDF and LRF.

15 And I guess the emphasis that I, the  
16 emphasis here is that while we rely upon numbers that,  
17 you know, risk insights are really what we're trying  
18 to go after here at the DC stage. And our staff  
19 review of the PRA acceptability is really to support  
20 the PRA uses at the DC stage.

21 I also want to just highlight the  
22 progression of the PRA under Part 52. At the DC  
23 application stage and also at the COL application  
24 stage, there's a lot of unknowns that have to be  
25 addressed through assumptions. And over time, you

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1 know, there are regulatory provisions to ensure that  
2 the PRA improves and the level of detail, the scope of  
3 the PRA. And just overall capability of the PRA.

4 And that's, sometimes we refer to the fuel  
5 load PRA at, right before operations, and that's, you  
6 know, that'll be developed or updated by the COL  
7 holder. And then, but even at that stage, you know,  
8 the plant hasn't been operated. So you're still  
9 lacking in plant-specific operating experience.

10 You'll have procedures by that time, but  
11 certainly there's still a lot of unknowns that have to  
12 be addressed via assumptions. And any risk-informed  
13 decisions will require the evaluation of those  
14 assumptions for impact on any decisions.

15 And just to, in terms of the guidance at  
16 the DC stage, we have a PRA acceptability regulatory  
17 guide that we apply primarily in the operating  
18 reactors space. Obviously, plant is in the design  
19 phase and there's no, there's many things that are  
20 unavailable.

21 And so Reg Guide 1.200 can't be applied  
22 directly, and so we do have a interim staff guide  
23 instead that sort of provides guidance to staff in  
24 terms of how we review the PRA for DC and COL  
25 applications.

1           So just to provide a summary in terms of  
2           the DC PRA for NuScale, we want to mention that the  
3           PRA acceptability is to be commensurate with its  
4           intended use. And the primary findings that we're  
5           making at this stage is relative to ensuring the  
6           Commission objectives relative to PRA use in design  
7           are satisfied.

8           I want to clarify that findings are not  
9           made on specific numerical results. We found that PRA  
10          acceptability is sufficient to support PRA uses in the  
11          design certification. And, you know, as a previous  
12          slide tried to highlight, there's established  
13          regulatory frameworks that will ensure that PRA will  
14          reflect an as-built and as-operated condition for  
15          operational phases.

16          And we also want to highlight that we  
17          applied a focus review approach for the Chapter 19  
18          review, and we, you know, we focused on the  
19          information needed to reach the safety findings that  
20          we, that I mentioned.

21          So getting more specific into some of the  
22          topics that were raised, so for the ECCS model,  
23          there's certainly recognition that there's a lot of  
24          uncertainty in our view that, you know, there's  
25          obviously no operating experience. And you took a



1 look at the model, I guess, at the closed session.  
2 But we believe that for the purposes that we indicated  
3 earlier, that the model is sufficient.

4 And that, you know, there are assumptions  
5 that are used to model the ECCS with respect to the  
6 level of detail, completeness, and, you know, data.  
7 But we evaluated those assumptions for impact on the  
8 findings made at this stage and found them acceptable.

9 DR. SCHULTZ: Tony, when you say you  
10 evaluated those, could you describe basically how you  
11 did that, what's your approach.

12 MR. NAKANISHI: Sure, so yeah, it's a  
13 really a good segue to the next slide, which is, you  
14 know, sensitivity and uncertainty analyses. So the  
15 applicant provided some sensitivity studies addressing  
16 things like common cause failure, of human failure,  
17 operator action.

18 And we sort of applied the common cause  
19 failure sensitivity study as sort of a surrogate for,  
20 you know, evaluating the impact of less reliable ECCS  
21 system. And you know, the applicant showed that they  
22 still, the design is still, you know, consistent with  
23 the Commission goals and things like that.

24 MEMBER DIMITRIJEVIC: That's one of my  
25 main issues.

1 MR. NAKANISHI: Okay.

2 MEMBER DIMITRIJEVIC: This sensitivity  
3 uncertainty only supported conclusion that they meet  
4 safety goal. No any other. Am I right?

5 MR. NAKANISHI: So there's, so in terms of  
6 the CCF, the common cause failure sensitivity  
7 analysis, so the applicant --

8 MEMBER DIMITRIJEVIC: Let me add that all  
9 of these, they just show you that you're always  
10 meeting safety goals. But you never evaluate the  
11 implication on the input would be the up to human  
12 factors to anything. You just say, oh, we make safety  
13 goal so we are fine.

14 MR. NAKANISHI: So the DRAP process we --  
15 so I guess I'll first of all mention I wasn't the  
16 reviewer that looked at the DRAP process. But I  
17 believe we, it was a kind of a integrated look at the  
18 design. So certainly the risk significance, yeah,  
19 methodology is one aspect.

20 MEMBER DIMITRIJEVIC: I didn't want to put  
21 you on the spot because you did not do it, and nobody  
22 does it. So it's all right. If you did it, it would  
23 be revolutionary thing. But you specifically say in  
24 SER, that's a not true statement, you specifically say  
25 the sensitivity uncertainty were used to evaluate

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1 insight. They're only used to evaluate safety goal,  
2 not the insight.

3 So that statement is not true, and if you  
4 did not do it, nobody did it during the, you know, EPR  
5 review. Nobody's, this is advanced step to say, oh,  
6 okay, if you change this how does this imply insight.

7 So therefore I will note clearly, you can  
8 say the uncertainty and sensitivities are done to  
9 support the design meets safety goal, that's perfectly  
10 true and it's perfectly fine. But don't say they use  
11 that to support all other regulatory findings.  
12 Because they're not really used, they're just done,  
13 they illustrate that we meet safety goal for all these  
14 cases, but nobody looks at the implications, you know.

15 Like for example, the ECCS valves are not  
16 as reliable, obviously you really want to have a  
17 charging, and you know, containment and things because  
18 that's your only other level of defense. So that's  
19 what I was trying to say with the sensitivity  
20 uncertainty.

21 MR. NAKANISHI: Right, I think there could  
22 have been a more explicit --

23 MEMBER DIMITRIJEVIC: This is what you say  
24 in SER. You say that we can't appropriately consider  
25 uncertainty sensitivity a traditional relation

1 regulation defense in depth, blah, blah, blah, blah,  
2 to, in addition to risk insight to determine it is  
3 significant for DRAP, as discussed in Section 1744.  
4 That's not a true statement. If you can prove me,  
5 show me how uncertainty sensitivities are used there,  
6 I will be impressed.

7 MR. NAKANISHI: Yeah, I would say the  
8 focus was more on the, you know, the qualitative  
9 aspects, like the defense in depth and --

10 MEMBER DIMITRIJEVIC: But there is no  
11 defense in depth they also face, because you're only  
12 defending on ECCS valves, your next defense is that is  
13 charging, I mean, you know. So it's not, definitely  
14 not defense in depth.

15 MR. NAKANISHI: Well, right, so defense in  
16 depth meaning sort of the design, considering the  
17 design itself. I think there was some discussion  
18 earlier about, you know, the level of redundancy with  
19 respect to CVCS.

20 And you know, also the fact that it's a,  
21 you know, it's in a protected, you know, aircraft  
22 impact-proof reactor building. We think, you know,  
23 putting it on the DRAP may or may not necessarily add  
24 so much. It's already, you know, it's a normally  
25 operating system.

1           So I think things like that, we looked at  
2           it, you know, more of a, in holistic manner. We sort  
3           of went back and forth with the applicant regarding  
4           expert panel process. I think expert panel process is  
5           very important.

6           MEMBER DIMITRIJEVIC: That's true.

7           MR. NAKANISHI: I think the numbers, like  
8           I said, you know, you could sort of play around with  
9           the assumptions and, you know, get where you want.

10          MEMBER DIMITRIJEVIC: But, and I don't  
11          think you need to do anything more, don't get me  
12          wrong. I'm just saying it should be stated truthfully  
13          here and say when the PRA is completed in this spaces,  
14          you know, then that this insight should be evaluated  
15          because sensitivity, the sensitivity only addresses  
16          your safety goal.

17          MR. NAKANISHI: Right, so we'll look at  
18          that and consider rewording.

19          MEMBER DIMITRIJEVIC: That was my main  
20          concern, whenever I brought uncertainty sensitivity.  
21          Not just safety goal.

22          MR. NAKANISHI: Right, understood.

23          DR. SCHULTZ: Tony, just to amplify that,  
24          on the slide 3 in your last bullet, for the DC PRA  
25          uses, you have a number of things in the last bullet

1 that could be done. And the question is were they  
2 done for the passive design here.

3 MR. NAKANISHI: So they have been. So  
4 RTNSS evaluation has been done. From a probabilistic  
5 standpoint it's what we call the focus scope -- focus  
6 PRA where you assume that the non-safety systems are  
7 unavailable and you evaluate the CDF and LRF. The  
8 applicant evaluated that process and determined and we  
9 accepted that there's no written SSCs.

10 ITAAC is, you know, per our guidance it's  
11 supposed to be a risk-informed process. And so we  
12 tried to incorporate risk insights, I believe the  
13 crane, ITAAC on crane.

14 MS. POHIDA: The review of the crane  
15 resulted in additional ITAACs.

16 DR. SCHULTZ: In particular, yes.

17 MS. POHIDA: Thank you.

18 DR. SCHULTZ: And we'll talk about that  
19 later.

20 MR. NAKANISHI: And we talked about RAP,  
21 and tech spec I think it's a little, you know, there's  
22 this, I think it's primarily deterministic in terms of  
23 how we, you know, 5036 is written, so.

24 DR. SCHULTZ: There's some of that done  
25 but not --

1 MR. NAKANISHI: Right.

2 DR. SCHULTZ: Not a lot now.

3 MR. NAKANISHI: Right. And --

4 DR. SCHULTZ: Same with the COL action.

5 MR. NAKANISHI: COL action items,  
6 certainly.

7 DR. SCHULTZ: Well, the action items are  
8 there, so right.

9 MR. NAKANISHI: And then the interface  
10 requirements is really more relative to the specific  
11 site, site-specific features, how the design  
12 interfaces with like the ultimate heat sink and things  
13 like -- for NuScale it's a little different because  
14 their ultimate heat sink is, you know, within the  
15 design.

16 DR. SCHULTZ: Good, I appreciate the extra  
17 information. Thank you.

18 MEMBER DIMITRIJEVIC: I have additional  
19 questions. I found that in SER, but I thought I saw  
20 in slide, but I cannot. You said that you think that  
21 the applicant adequately addressed multi-module risk.  
22 That's within SER, I thought it was in some slide,  
23 but. How is multi-module risk defined, how does staff  
24 define multi-module risk?

25 MR. NAKANISHI: So the staff guidance for

1 multi-module risk is not quantitative. Like, the SRP  
2 19 doesn't require the applicant to do a quantitative  
3 multi-module risk analysis. Really, the, what we were  
4 looking for and what we reviewed was did the applicant  
5 do a systematic analysis of multi-module scenarios and  
6 did they identify, you know, potential risk-  
7 significant issues associated with that.

8 And I believe the crane --

9 MS. POHIDA: We can discuss this with the  
10 crane, but there is no requirement for an applicant to  
11 quantify multi-module risk. The requirement is to  
12 look for potential system interactions. And that's  
13 what the applicant has done, and those are described  
14 in Chapter 19.

15 MEMBER DIMITRIJEVIC: Okay, because see  
16 they calculate multi-module risk in Chapter 19 as a  
17 risk to fail two modules, more than one module, right?  
18 Is that how you define multi-module risk?

19 MR. NAKANISHI: So the applicant decided  
20 to quantify the multi-module risk. Our finding is  
21 really of a, based on a qualitative assessment.  
22 Correct me if I'm wrong.

23 MEMBER DIMITRIJEVIC: Because there is a  
24 different aspect of this. Multi-module risk would be  
25 more than one module failing, or it could be increased



1 risk because you have multiple modules on the same  
2 side.

3 MR. NAKANISHI: It's the former, former.

4 MEMBER DIMITRIJEVIC: For --

5 MR. NAKANISHI: Simultaneous core damage  
6 events.

7 MEMBER DIMITRIJEVIC: So why wouldn't you  
8 look in increase the reason, or the presence of multi-  
9 module where we can start moving one module, heating  
10 that, as you know, have explosion of hydrogen above  
11 all of them. You know, whenever one event happens,  
12 affect all modules. Why was not staff interested that  
13 type of multi-module?

14 MR. NAKANISHI: So no, that is the, that's  
15 the multi-module --

16 MEMBER DIMITRIJEVIC: Because you said the  
17 former, which was more than one module failing, but.

18 MR. NAKANISHI: Yeah, maybe I  
19 misunderstood you, so --

20 MEMBER DIMITRIJEVIC: That's what they  
21 quantify in the Chapter 19, just the common cause  
22 within different systems and things like that.

23 MR. NAKANISHI: Right.

24 MEMBER DIMITRIJEVIC: But there is not  
25 any, like nobody even look in the, nobody even discuss

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1 the, for example, operator will have to do multiple --  
2 but multiple modules in the same time because they're  
3 exposed to the same external event and things like  
4 that. And even there is a section, don't we have a  
5 multi-module?

6 Joy, I think you were in charge when they  
7 only identify common systems but not never common risk  
8 contributions, right?

9 MEMBER REMPE: You're talking about in  
10 Chapter 19?

11 MEMBER DIMITRIJEVIC: No, I'm talking  
12 about --

13 MEMBER REMPE: In 20, Chapter 20.

14 MEMBER DIMITRIJEVIC: So that's why I sort  
15 of think that maybe there is some missed opportunity  
16 here to talk about the some risk impact from presence  
17 of multi-modules on the same site.

18 MS. POHIDA: May I provide a  
19 clarification? Regarding, and if I misspeak I'll  
20 defer to NuScale on this one, but in multi-module risk  
21 for full power conditions, multi-module risk was  
22 quantified by the use of module adjustment factors.

23 MEMBER DIMITRIJEVIC: Right.

24 MS. POHIDA: To look at the potential  
25 commonalities of operator actions and shared systems.

1 So that was done for full power. Multi-module risk in  
2 terms of a drop a module impacting another module,  
3 that is evaluated in DC Section 19.1.7, and that was  
4 done qualitatively.

5 In terms of multi-module risk regarding  
6 external events, as I recall, that was also done, you  
7 know, qualitatively, Chapter 19.

8 MEMBER DIMITRIJEVIC: This is where I have  
9 to say I disagree. What is done in Chapter 19 is  
10 calculate frequency or core damage frequency of  
11 failing two modules.

12 MS. POHIDA: Yes.

13 MEMBER DIMITRIJEVIC: This wasn't done is  
14 calculating crease of core damage frequency for single  
15 module due to presence of other modules. And that's  
16 what I would define as one aspect to multi-module.

17 MS. POHIDA: That's one aspect of several.

18 MEMBER DIMITRIJEVIC: Because let's say I  
19 agree that we are only we're looking in one module and  
20 that's what we are worried. But that module has  
21 increase in risk because of setup of these multiple  
22 modules. Because the operators could be, you know,  
23 distracted with a million or doing different things  
24 because eventually we move each of those modules  
25 around each other. They have some common spatial

1 things.

2 So I think that this was a failed  
3 opportunity to identify this type of increase in  
4 multi-module risk. That's in my opinion.

5 MEMBER REMPE: But just to clarify, it is  
6 in Chapter 19, but remember, I had to recuse myself.  
7 So I think we need to look at Steve.

8 MEMBER DIMITRIJEVIC: What was the, when  
9 you were addressing all these common system, that was  
10 some chapter you --

11 MS. POHIDA: Chapter 20.

12 MEMBER REMPE: But that was mitigation of  
13 beyond design-basis events. But there is, as Marie,  
14 said a multi-module risk in Chapter 19.

15 MEMBER DIMITRIJEVIC: But that's a  
16 different, that's what I know am I discussing. But  
17 what was the chapter where they say this is new bad  
18 concern or how about they connect the modules?

19 PARTICIPANT: System interactions.

20 MEMBER DIMITRIJEVIC: System interaction.

21 MEMBER REMPE: That was where we were  
22 talking about buildup, and that was back in Chapter 9.  
23 But that wasn't like a risk assessment, it was just  
24 how they would build up. I just was confused a bit on  
25 where you're going.

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1 MEMBER DIMITRIJEVIC: I'm not talking  
2 about risk assessment because it wasn't in that  
3 chapter but I thought it should be.

4 MEMBER REMPE: Okay.

5 MEMBER DIMITRIJEVIC: That was what,  
6 whatever chapter that was. All right, did you  
7 understand my point?

8 MR. NAKANISHI: I think so, yes.

9 MEMBER DIMITRIJEVIC: All right.

10 MS. POHIDA: Thank you.

11 MR. NAKANISHI: So I think I'm going to  
12 turn it over to Marie at this point to talk about the  
13 crane operations.

14 MS. POHIDA: Yeah, as I presented in the  
15 phase 3 ACRS discussion, the calculated drop  
16 probability is dominated by operator errors. You  
17 know, overspeed, over-raise, over-travel. And  
18 failures of instrumentation that's, interlocks or  
19 switches to provide a safety stop. And that was based  
20 on the reactor building crane PRA, which we understand  
21 that reactor building crane design is evolving.

22 During that period since our last  
23 briefing, key assumptions was added for the low power  
24 and shutdown PRA in DC table 19.1-71 to state that  
25 movement of the reactor building crane is modeled as

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1 being operator controlled. And you know,  
2 administrative controls will ensure that reactor  
3 building safety features, those limit switches and  
4 interlocks to prevent undesired movement, are  
5 functional during module movement.

6 We do have a COL action item, 19.1-8,  
7 where the validity of these reactor building crane  
8 assumptions and the crane data will be confirmed by  
9 the COL applicant.

10 MEMBER BLEY: Before you leave that--

11 MS. POHIDA: Sure.

12 MEMBER BLEY: NuScale and you said, and  
13 you folks agreed, as I recall, I don't remember if  
14 it's in the SER or somewhere else, that their crane  
15 vendor would do an analysis of human-related failures  
16 of the crane. And I would assume then the COL  
17 applicant would present that and you folks would  
18 review it. Is that your understanding?

19 MS. POHIDA: My understanding, if there  
20 are changes that impact the crane data or the crane  
21 assumptions in the DCA, that we would keep format --

22 MEMBER BLEY: They don't even have a crane  
23 now.

24 MS. POHIDA: I beg your pardon?

25 MEMBER BLEY: They don't have a crane yet.

1 They're laying out a specification, and you agreed  
2 that was a reasonable way to do it in Chapter 18. And  
3 then their vendor will, is being tasked with doing the  
4 human reliability analysis to support the crane. And  
5 I would assume that makes its way back to the PRA  
6 eventually in the COL stage. And you look like this  
7 is news.

8 MS. POHIDA: No, my -- I apologize. My  
9 understanding is is that we would be looking at that  
10 at COL stage.

11 MEMBER BLEY: Okay, that's fine.

12 MS. POHIDA: Thank you.

13 CHAIR KIRCHNER: Just an observation,  
14 Dennis and Vesna, and I think, and Joy, this rises to  
15 the level it's on of note.

16 PARTICIPANT: Yeah, it's already flagged.

17 CHAIR KIRCHNER: Yeah, we flagged it  
18 before, and I think this is one of the items that  
19 should find its way into our final letter on this.  
20 Thank you.

21 MEMBER DIMITRIJEVIC: But I just want to  
22 note that everybody that has that in mind, this core  
23 damage frequency through the cane is not part of core  
24 damage frequency consider safety goal. Because it  
25 cannot result in release.

1           So therefore it's irrelevant, it just  
2 hangs there like -- they decided that this, when new  
3 report core damage frequency and large release  
4 frequency, this core damage frequency is not included.  
5 And it's not used in importance measure, it's a  
6 separate chapter. Because it doesn't lead to  
7 releases. Because if they drop the module then, you  
8 know, they made the argument that there's not going to  
9 be releases from the pool.

10           MS. POHIDA: May I make a clarification on  
11 that?

12           MEMBER DIMITRIJEVIC: Sure.

13           MS. POHIDA: Okay. In the module drop  
14 analysis in the SER, we do do a comparison of  
15 NuScale's module drop probability and the resultant  
16 CDF against the Commission goals. And what we also  
17 used was a drop probability from the EPRI report on  
18 spent fuel casks, which was on the order of 5E minus  
19 6. And what we recognize is that the use of either  
20 drop probability yields a core damage frequency that  
21 meets the Commission goals, okay.

22           And as we say in the SER, if we drop a  
23 single module, it does not result in a large release.  
24 So we do do a comparison of the drop probability and  
25 resultant CDF against the Commission CDF goal. Does



1       that help?

2                   MEMBER DIMITRIJEVIC: Yeah, I know you do  
3       that, but it's not part of the, you know, any risk  
4       insights because it just fends for itself with large  
5       number of existing things, so. I'm not sure,  
6       actually, how to treat that, it's the first time I saw  
7       something like this happening, so.

8                   MS. POHIDA: Well, the risk significance  
9       of the reactor building crane, and it's actually on  
10      this slide, the risk significance of the crane is  
11      inclusion of DRAP. That was used to initiate a deeper  
12      look into ITAACs and see, you know, what additional  
13      ITAACs could be performed to give a little bit more,  
14      for lack of a better term, infrastructure to the drop  
15      probability that was assumed in the PRA. And that was  
16      done.

17                   Does that help? Okay. All right, getting  
18      back to bullet number one, in DC table Chapter 9.1.5-  
19      1, that does document the max speeds and lists heights  
20      for the reactor building crane. The reactor building  
21      crane is to be constructed single failure proof  
22      consistent with operating plants. I forgot the NUREG  
23      number and the supplemented by guidance in NOG-1.

24                   The applicant, the COL applicant will  
25      describe the process for handling and the receipt of

1 heavy loads, including the nuclear power module per a  
2 COL action item, 19.1-5. Since phase 3, the reactor  
3 building is included within the scope of the human  
4 factors process during COL, according to the human  
5 factors designing implementation plan.

6 And as I stated earlier, the risk  
7 significance of the reactor building crane did result  
8 in additional ITAACs. And that's for, you know, rated  
9 low tests of the module lifting fixture and the module  
10 lifting adapter. And inspection of the, you know, as-  
11 built welds for the module lifting adapter and the  
12 module -- module-lifting fixture, excuse me, and the  
13 module-lifting adapter.

14 And as I stated previously, a postulated  
15 single module drop does not result in a large release.

16 So this concludes my presentation. I'll  
17 be happy to address any questions.

18 CHAIR KIRCHNER: Did you go beyond that,  
19 Marie and the staff, did you look at the build-out of  
20 the plant and any, are there any limitations on  
21 operating other modules while you're building out?  
22 You know, the nominal concept of operations has the,  
23 I believe it's unfueled, the nuclear power module  
24 comes in on a special trolley, it's positioned, if  
25 it's fueled, it's moving.

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1           Are there any limitations on operations of  
2           any other modules that are pre-existing or installed  
3           while those operations are ongoing?

4           MS. POHIDA: That, those conditions were  
5           not evaluated in 19. I'm questioning whether they  
6           were addressed in Chapter 9, but I'm not the proper  
7           reviewer for that.

8           CHAIR KIRCHNER: I don't think so, nor is  
9           20, to my knowledge.

10          MS. POHIDA: Yeah, that was not addressed.

11          CHAIR KIRCHNER: This is one of the rather  
12          unique features of this plant. And does that set of  
13          operations introduce risk significance to how the  
14          plant is built out?

15          MS. POHIDA: What was discussed in Chapter  
16          19 was the postulated drop of a module being removed  
17          -- being moved for refueling on top of another, on an  
18          operating module. Whether it strikes the top and  
19          could result in breaks of CVCS piping, or if it's  
20          struck, you know, it hits the module at the bottom, at  
21          the pedestal, that is described in Chapter 19.

22          MEMBER REMPE: So what Vesna's mentioning  
23          is slowly coming back to me, that there are, and I'm  
24          having trouble remembering what chapter --

25          MEMBER DIMITRIJEVIC: Chapter 21, it was

1 actually.

2 MEMBER REMPE: Yeah, okay, there is a  
3 chapter that has some requirements about when they  
4 even start building, how many modules have to be  
5 supported by how many systems. I've not seen any  
6 assessment of when they're bringing in another module,  
7 but they do have some requirements. I just, you were  
8 puzzling me when you brought it up because I hadn't  
9 thought about it for a while.

10 MEMBER DIMITRIJEVIC: Twenty-one is called  
11 multi-module consideration. But it is very bare, this  
12 only identifies systems which are common for all the  
13 modules and nothing else. There is not any other  
14 multi-module consideration there. It is a pity, it  
15 could be fantastic and very informative section.

16 CHAIR KIRCHNER: Yeah. For example,  
17 although each module will have its own CVCS system,  
18 there's common supply of boron addition as one example  
19 of potential multi-module --

20 MEMBER REMPE: And so they do consider  
21 that one, as I recall, and it helped me remember. But  
22 isn't it like one boron addition a system for six or  
23 something like that. And so I would assume the risk  
24 assessment would have done like a one out of six or  
25 something or other.

1           It would have considered that. Because  
2           again, even though you had two for 12, you would have  
3           been thinking about those kind of relationships as a  
4           way to kind of think about this right now and what  
5           you're required to do. Does that make sense, what I'm  
6           trying to say?

7           MS. POHIDA: Yes, I understand. I would  
8           have to go back and look at the full power, you know,  
9           multi-module risk assessment that was done and see how  
10          those module adjustment factors, in other words the  
11          impacts, the conditional impacts in the other modules  
12          was done. But I would have to go back and look at  
13          that. I can take that back, though.

14          CHAIR KIRCHNER: The reason I bring it up  
15          is because I, from looking at like Chapter 21, it  
16          looks like it's really deferred to the COL to develop  
17          a conduct of operations plan for build-out. And hence  
18          a risk assessment, and a in-depth look at where  
19          they're reliant -- they are, as I mentioned just one  
20          example, the CVCS, there's one system for each module.

21          That sounds good, but they do share a  
22          common heating system, a common foreign injection  
23          system, and so on. So one starts to think, well, we  
24          got something operating and we're bringing something  
25          else in. What's the implications of that?

1 MS. POHIDA: We can take that back as an  
2 item to look at.

3 MEMBER REMPE: Yeah, I think we actually  
4 documented that concern in our letter. It's been  
5 awhile.

6 CHAIR KIRCHNER: I think so, because  
7 Chapter 21 is rather thin.

8 MS. POHIDA: It is very.

9 MEMBER DIMITRIJEVIC: And a factor is very  
10 simple, the system is common, they will just fail it  
11 for both modules. So the factors will not help if  
12 with this concern is.

13 MS. POHIDA: With this type of, this new,  
14 this consideration of the build-up of the modules as  
15 they're being brought online.

16 MEMBER DIMITRIJEVIC: Or be the common  
17 challenges were also not addressed in this, you know,  
18 two different modules. And the same operator's action  
19 affecting human. Probably not big deal, but it's  
20 very, it should be somewhere, you know. Now it's too  
21 late, but things.

22 DR. CORRADINI: Just to remind people,  
23 this was the June meeting letter, and it's a common  
24 letter between 19 and 21 where we did not have any  
25 specific recommendations for multi-module design

1 considerations. Most of it was --

2 MEMBER DIMITRIJEVIC: There was a common  
3 letter. Why would they be common --

4 DR. CORRADINI: It was the same letter,  
5 June.

6 MEMBER DIMITRIJEVIC: Oh, you mean in the  
7 same letter, but there is --

8 DR. CORRADINI: It's in the same letter.

9 MEMBER DIMITRIJEVIC: There was not --

10 DR. CORRADINI: But there was no  
11 recommendation specifically for multi-module design  
12 considerations, but there was a discussion in the  
13 discussion, most of what you've talked about is in the  
14 letter from June.

15 CHAIR KIRCHNER: I just brought it up  
16 because following on with Vesna's comments on -- you  
17 know, I think for the existing fleet, when they talk  
18 about multi-module, their concerns were much more  
19 limited. Here we have multi-modules within the same  
20 reactor building, different states of operation and so  
21 on.

22 Whereas most multi-module plants, even if  
23 they share control rooms adjacent or something, don't  
24 have the commonality of support systems that the  
25 NuScale design will have. Including the ultimate heat

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1 sink, etc.

2 MEMBER REMPE: I want to --

3 MEMBER BLEY: They don't, but this  
4 committee has a history of recommending that people  
5 consider site risk in its entirety.

6 MEMBER REMPE: On kind of a different  
7 topic, I'm thinking aloud here, and I think we have  
8 time for hypothetical, but we've commented throughout  
9 several meetings about the COL applicant will develop  
10 the procedures. And this table that documents  
11 assumptions would be a good place for the staff to  
12 evaluate those COL applicant procedures at some point  
13 in the future.

14 And perhaps, you know, it's a good  
15 repository of a lot of such assumptions to help.  
16 Because I think this, because of the newness of and  
17 the uniqueness of the design, that the procedures that  
18 are used are going to be more important than maybe if  
19 we just had an evolutionary LWR coming through.

20 And is that kind of the best place for  
21 looking at this? And like right now in the earlier  
22 discussions on other topics this week, we're going to  
23 be pointing to more things the COL applicant  
24 procedures need to consider.

25 And maybe they don't fall into Chapter 19,



1 but is there a better place other than to look at the  
2 whole SE, all these assumptions? It just, I know the  
3 applicant has said we've got a list of assumptions,  
4 but I thought it was always in Chapter 19 context.  
5 What are your thoughts about this? Because I think  
6 it's going to be a difficult situation in the future.

7 MR. NAKANISHI: So I personally, and I  
8 think from a staff standpoint, we agree. I think the  
9 Chapter 19 has a list of key assumptions that have to  
10 be reevaluated for, you know, future phases, you know,  
11 COL application and beyond. So and then the COL item  
12 that we have, there's a COL item specifically, you  
13 know, identified to go back and evaluate those  
14 assumptions.

15 So, and COL you know, action items are  
16 something that, yeah, COL applicant has to address.  
17 Whether, you know, they'll, there may be other  
18 justification for doing, you know, proposed  
19 approaches, but they certainly need to address those.  
20 And so that provides some assurance from the staff  
21 standpoint that, you know, issues, design or  
22 operational issues, procedural issues, may be  
23 addressed in the COL stage.

24 MEMBER DIMITRIJEVIC: And I want to action  
25 this very much, even this is not called COE applicant

1 the COL holder who will deal with the procedures.  
2 When I look at this PRA, this PRA was done as a most  
3 PWR PRA side. It concentrates on things which we  
4 know, not on the things which we don't know.

5 So the thing is what we notice here in our  
6 review, there are some things which don't show in  
7 other PWRs suddenly become a issue here, like this  
8 boron dilution, steam generators, maybe even this  
9 containment bypass. But that's maybe issue in others,  
10 I'm not sure.

11 So we are discovering through this review  
12 some things which we review of the PRA has a very  
13 small chance to discover because they're used to  
14 reviewing PWR, not the new design. So while we are  
15 reviewing this design, we are discovering very  
16 valuable things they should keep in mind. How to keep  
17 this documented, that's the question, so somebody will  
18 see it in the future, before the full load, which is  
19 the main thing.

20 MR. NAKANISHI: Right, I think we agree.  
21 And there's a lot of lesson learned potentially here  
22 for future even non-light-water reactor PRAs, you  
23 know. I think there's, you know, when you have to  
24 recover from a otherwise a safe, stable state, you  
25 know, that could get into some potential issues. So

1 I think the point's well taken. I think we probably  
2 need to align, you know, internally and --

3 MEMBER DIMITRIJEVIC: You know when the --  
4 brings, why didn't, why is this scenario not in the  
5 PRA? Well, I have never seen this in the PRA. It's  
6 a part of this design. So they haven't seen that in  
7 PRA, so they didn't even consider it, see. The people  
8 who will review it also didn't see that in the PRA, so  
9 they would not consider it. So that's a thing which  
10 we have to try to bridge somehow to keep this valuable  
11 information mean some.

12 DR. SCHULTZ: Leads to a followup  
13 question, Tony, and that, and Marie as well, is that  
14 does the staff have a good process to capture those  
15 things that you've learned from this experience, which  
16 is in fact somewhat different than what the staff has  
17 reviewed previously with LWRs?

18 It's certainly going to come up again,  
19 perhaps in more difficult evaluations with other  
20 designs, since this one is somewhat similar to light-  
21 water reactors.

22 MR. NAKANISHI: Right, I agree. I think  
23 we have some, you know, internal communities of  
24 practice, if you will, for, you know, risk type of  
25 activities. I think this is something that's probably

1       worth sharing in that group. And --

2                   DR. SCHULTZ:       Yeah, I'd certainly  
3       recommend it.

4                   MS. POHIDA:   We appreciate the comment,  
5       because it's, when you go through a review, it's not  
6       what's in the PRA, it's not -- it's what's not in the  
7       PRA. And should it be in scope.

8                   MEMBER REMPE:   Dennis brought up an  
9       example with the sampling system from the hydrogen.  
10      And Jose's brought up an example with respect to  
11      situations where you might have some sort of increased  
12      instability. Where do we catch those?

13                          We can't tell the applicant to add it to  
14      table whatever. Do we just have to put it wherever?  
15      It would be nice if it were in a single location, you  
16      know, just to make it easier for the future. Thoughts  
17      on those ideas?

18                   MR. NAKANISHI:   So I think we need to go  
19      back, get back within, you know, kind of discuss among  
20      the staff and just kind of decide what we need to do,  
21      if anything, relative to, you know, from a licensing  
22      standpoint and documentation standpoint. I think we  
23      probably need to, you know, think about how to best do  
24      that.

25                   MEMBER REMPE:   Maybe our letter could

1 reflect that concern somehow.

2 CHAIR KIRCHNER: Tony, I don't have the  
3 hard copy view graphs in front of me. How many more  
4 view graphs have you?

5 MR. NAKANISHI: That's it.

6 CHAIR KIRCHNER: This is it. That's what  
7 I thought. Okay, so at this point then, members,  
8 further comments, questions?

9 MEMBER MARCH-LEUBA: Since my name was  
10 just in vain a couple of times, well, it was used --  
11 I'm glad to be useful. One concern I have is as we're  
12 going doing the design certification, we are making  
13 risk-informed decisions that are called risk-informed  
14 based on a admittedly incomplete PRA.

15 So when we have the before logging fuel  
16 PRA, which that will go through a very thorough review  
17 and it will have much more completeness, because by  
18 that time we'll know how the operating procedures  
19 work, we'll know how the stimulator is designed, we'll  
20 know who'll build the crane.

21 Yeah, so is there a step when we  
22 reconsider those risk-informed decisions that were  
23 appropriate? Or what would trigger that decision? Or  
24 is it already been decided and forget it?

25 MR. NAKANISHI: Right, so I think, you

1 know, we would go back to some of the points I was  
2 trying to make relative to how you use the PRA. I  
3 think we're sort of trying to make sure we don't -- we  
4 don't make risk-informed decisions that are not  
5 supported by the current PRA.

6 So whenever you make certain decisions, we  
7 would make sure that the PRA adequately supports it,  
8 and things like completeness issues and, you know,  
9 various assumptions will be evaluated for the impact  
10 on decisions. So I guess what I'm saying right, I  
11 think we have to be careful right now with the current  
12 PRA how we use it.

13 MEMBER MARCH-LEUBA: And for future plans  
14 that are going to make even higher claims for risk-  
15 informed, like get rid of containment because I don't  
16 need it, how do we -- I mean, something like that we  
17 will not miss. But how do we ensure that as we know  
18 more about the plant --

19 MR. NAKANISHI: So the non-light-water,  
20 yeah, the non-light-water reactor process has a lot  
21 more rigorous approach. You know, the licensing  
22 modernization project and, you know, the associated  
23 used of PRA. So I think that process has to sort of  
24 address that.

25 MEMBER MARCH-LEUBA: It's a kind of a

1 chicken and the egg in the sense that you used the PRA  
2 to define your design participants, which defined the  
3 PRA. And somebody has to step in there and decide --

4 MR. NAKANISHI: There will be, yeah, a lot  
5 more rigor in terms of review against the standard,  
6 the non-light-water reactor standard. You know, peer  
7 review requirements, you know, looking at  
8 uncertainties and assumptions. I think that'll be a  
9 lot more rigorous.

10 MEMBER MARCH-LEUBA: Thanks, Tony.

11 CHAIR KIRCHNER: Other comments?

12 MEMBER BROWN: I'm not sure. I'm kind of  
13 responding to an email that Joy sent me, and I think  
14 you brought it up a minute ago, but I didn't realize  
15 something when you brought it up. You were talking  
16 about the RPV riser level sensor, the issue on the  
17 sensors.

18 And you made, and it triggers SFAS  
19 functions. And so your last sentence said so it was  
20 always just one sensor. Did you mean one sensor per  
21 division, or one --

22 MEMBER REMPE: No, there's multiple ones.  
23 But the, what I was trying to say was the pressurizer  
24 sensor and the RPV riser, it's the same --

25 MEMBER BROWN: Well, it's containment

1 level high and RP level low --

2 MEMBER REMPE: Containment levels are  
3 different --

4 MEMBER BROWN: Are triggers for actuation  
5 of ECCS.

6 PARTICIPANT: No.

7 MEMBER BROWN: Well, that's what --

8 MEMBER REMPE: No, the containment-level  
9 one is a different one.

10 MEMBER BROWN: I understand that.

11 CHAIR KIRCHNER: The letter is probably  
12 out of date.

13 MEMBER BROWN: But the RPV riser level  
14 sensor --

15 MEMBER BLEY: And pressurizer level.

16 MEMBER BROWN: And pressurizer level,  
17 those both trigger, or one of them the sensors.

18 CHAIR KIRCHNER: No, no they change their  
19 --

20 MEMBER BROWN: It's the same sensor.

21 CHAIR KIRCHNER: It's the same sensor.  
22 It's a safety-grade sensor.

23 MEMBER BROWN: Yeah.

24 CHAIR KIRCHNER: Its functionality and the  
25 applicant's here and can correct me, is just for the



1 pressure riser. They're not doing the riser --

2 MEMBER BROWN: They're not doing the riser  
3 level anymore for ECCS.

4 CHAIR KIRCHNER: Level, the trigger. No.

5 MEMBER BROWN: It's only the containment  
6 level? Okay, I missed that, I wanted to clarify that.  
7 That's, but there are -- is the containment level, I  
8 didn't read far enough, is that one also a radar-  
9 based?

10 MEMBER MARCH-LEUBA: Yes.

11 MEMBER BROWN: Okay, so that runs into,  
12 it's not quite as bad as the, I don't think, I'm not  
13 sure. Well, you're not as bubbly on the containment  
14 level as you are on the pressurizer, I would think.

15 MEMBER REMPE: The pressurizer and the RPV  
16 --

17 MEMBER BROWN: No, you're overflowing now.  
18 So I mean, there's a, and you're cooling to the pool.  
19 So I mean, it's going to be a slightly different  
20 environment by the time it rises up some.

21 MEMBER REMPE: So at the beginning of this  
22 session, the applicant discussed a little bit about  
23 the various sensors, and I pointed out that tomorrow  
24 we're going to have Chapter 20 and we're going to talk  
25 about the changes made to Chapter 20.

1 But the staff is going to come and also  
2 talk about some of the questions raised about the RPV  
3 riser and the pressurizer water level sensor. So  
4 we'll have time to read over this Rev 2, and we can  
5 have any questions we want to have by tomorrow.

6 MEMBER BROWN: I'm going to read Rev 2  
7 tonight.

8 MEMBER REMPE: Only 70 pages, you can make  
9 it Charlie.

10 MEMBER BROWN: Yeah, right, in your  
11 dreams, Joy, okay.

12 MEMBER REMPE: But anyway, well, if you  
13 want to you can read through it and ask any questions.

14 MEMBER BROWN: I'll sit down and I'll stay  
15 up till four in the morning to do it.

16 CHAIR KIRCHNER: Okay, we're off the PRA,  
17 but yes, tomorrow we will hear more on sensors.

18 MEMBER BROWN: Yeah, that's fine.

19 CHAIR KIRCHNER: So last chance, any other  
20 comments of the staff, questions?

21 DR. SCHULTZ: Just one more on the --  
22 excuse me, just one more on the PRA side, just a  
23 follow-on here. We were talking about how you would  
24 capture things going forward for the advanced plants.  
25 And the other thing that you might want to try to

1 focus on is for this plant, which as we've seen from  
2 the presentations and so forth, the numbers associated  
3 with core melt frequency and large early release are  
4 very, very low.

5 And so, and yet we have in the licensing  
6 stage the COL activities, the COL PRA. And then four  
7 years later, the revised PRA. So how, the question is  
8 how do you keep appropriate attention and focus for  
9 those teams that are going to be working on those  
10 things many years hence?

11 And the influence of what they're going to  
12 have in terms of findings may be somewhat lower than  
13 what we've seen from, in other areas. Or they may  
14 need to be looking at things which are not typically  
15 looked at today, specifically human performance,  
16 errors of commission, and the importance of those  
17 influencing the safety of the facility. And how does  
18 that get captured and pushed by the regulator going  
19 forward, and by the licensee, of course?

20 MR. NAKANISHI: Right, I mean, that's a  
21 great question. I think it kind of comes down to  
22 ensuring sort of the bench strength, if you will, of  
23 the staff. I think, you know, when the staff will  
24 look at the PRA, that's typically when there's an  
25 application of that PRA for some use.

1           So it may be, you know, maintenance rule,  
2       for example, down the line that as part of an  
3       inspection for maintenance rule implementation there  
4       will be some staff engagement relative to the risk  
5       assessment.

6           DR. SCHULTZ:     Yeah, those are good  
7       questions.

8           MR. NAKANISHI: Right. And I would expect  
9       that there would be additional risk-informed  
10      applications, you know, for the NuScale design by the  
11      COLs. So each of those opportunities I think would  
12      provide a chance for the staff to engage.

13          MS. POHIDA: Yeah, I was going to add if  
14      the PRA is going to be used for a risk-informed  
15      application, then the staff would have to do a PRA  
16      acceptability review in context of that application.

17          DR. SCHULTZ: Thank you.

18          MS. POHIDA: You're welcome.

19          CHAIR KIRCHNER: Okay, we are in an open  
20      session, so therefore, I'm going to turn to the  
21      public.

22          MR. SNODDERLY: I'm sorry, well, before we  
23      do that, I just, I had some notes and I wanted to make  
24      sure, well first of all, what was the Committee's --  
25      the Subcommittee's expectations for a possible staff

1 presentation on PRA at the full committee on April 8?  
2 That's, well, so --

3 CHAIR KIRCHNER: Yeah, we're writing a  
4 letter.

5 MEMBER MARCH-LEUBA: If we are writing a  
6 letter, our process has been lately the staff will  
7 need to give us, for the public on the phone line or  
8 whoever wants to show up, a summary presentation of  
9 what we've done. And it has to be 20 minutes, I mean,  
10 high level and non-proprietary so that the public  
11 finds out what your position is. And then we're going  
12 to write a letter.

13 MEMBER DIMITRIJEVIC: Or you can just tell  
14 us what are the changes in the SERs since the last  
15 version.

16 MR. SNODDERLY: Well, I also had a note  
17 that they were also, they said that they were going to  
18 consider possible mechanisms for documenting some of  
19 the insights they've gained in part of the PRA.

20 MEMBER DIMITRIJEVIC: What's the status of  
21 this containment bypass, the day, on the 19.2?

22 CHAIR KIRCHNER: We're going to hear about  
23 that tomorrow. I was going to share our agenda for  
24 tomorrow before we close.

25 MR. SNODDERLY: And then the only other

1 note I had was that the staff said that they went back  
2 and forth with the applicant as far as the CVCS being  
3 included in a DRAP, but it ultimately they agreed that  
4 it did not meet the criteria from DRAP.

5 And then I had, Vesna said that you also  
6 agreed that it looked like it didn't meet the Fussell-  
7 Vesely imports measures of 20%, but it was close. You  
8 mentioned several sequences that were seven percent,  
9 four percent contributors for several sequences. But  
10 you didn't think it exceeded 20%. But you were  
11 surprised that the sensitivity analysis, it didn't  
12 exceed 20%.

13 MEMBER DIMITRIJEVIC: Yeah, I would like  
14 to know the Fussell-Vesely on that, yes.

15 MR. SNODDERLY: And I didn't hear anyone  
16 from the staff or NuScale say that they were going to  
17 come back do that critical --

18 MEMBER DIMITRIJEVIC: Only NuScale can  
19 give us that.

20 MR. SNODDERLY: Right, only NuScale can do  
21 that. So I'm just trying to get, so right now I leave  
22 it as an open item for NuScale to consider whether  
23 they're going to come back and answer that on April 8  
24 or not.

25 MEMBER DIMITRIJEVIC: They can send us

1 the, these are just two numbers we are asking,  
2 Fussell-Vesely on human action to start charging with  
3 the current model and with this change in ECCS failure  
4 rate. That's all.

5 DR. CORRADINI: Careful, we're crossing  
6 closed to open, so make sure what we're talking about.

7 MEMBER DIMITRIJEVIC: That's all right, it  
8 should be open, it's a PRA.

9 MR. SNODDERLY: Then --

10 MEMBER DIMITRIJEVIC: No, no, it's a PRA  
11 --

12 MR. SNODDERLY: The last thing I had was  
13 that how could operator action to initiate CVCS be an  
14 important action, but the CVCS system not be. And I  
15 didn't know if you wanted any followup by the staff or  
16 NuScale to respond to that further or, okay.

17 So that's all I had. With that I'll go.

18 CHAIR KIRCHNER: Thank you, Mike. Okay,  
19 so now I'll turn to the public, if there's any member  
20 of the public in the audience, if you would wish to  
21 make a comment, please come up to a microphone, state  
22 your name, and make your comment.

23 Seeing none, we'll wait for the bridge  
24 line to be opened to the public. Okay, if there's any  
25 member of the public listening in, if you wish to make

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1 a comment, please state your name and make your  
2 comment.

3 MR. LEWIS: Marvin I. Lewis. Can you hear  
4 me?

5 CHAIR KIRCHNER: Yes, Marv, go ahead.

6 MR. LEWIS: Thank you. I've been  
7 following these public meetings for an awful long  
8 time. I have even been following back to '79,  
9 wondering have you ever tried to get tags under  
10 control so they don't block the view of operators,  
11 which was the causation, supposedly, of Three Mile  
12 Island Number Two accident.

13 Also, as I go along I don't hear any  
14 really approaching looking at problems from day to  
15 day. I don't hear anybody looking at, just looking at  
16 the surface of anything to see if there's good  
17 workmanship. I don't hear, I don't hear an awful lot,  
18 and I'm done with it. Thank you very much for  
19 listening to my comment, bye.

20 CHAIR KIRCHNER: Thank you, Marv. Is  
21 there any other member of the public who wishes to  
22 make a comment?

23 MS. FIELDS: Yes, this is Sarah Fields.  
24 My first comment is the only prospective NuScale COL  
25 applicant is the Utah Associated Municipal Power



1 Systems, or UAMPS. UAMPS has no experience whatsoever  
2 in nuclear reactors. I'm sure they'll be getting some  
3 help, but in the end they will be the responsible  
4 party, and they do not have any nuclear reactor  
5 licensing, construction, operation, decommissioning  
6 experience.

7 My second comment is when the ACRS looks  
8 at the NuScale standard design approval application,  
9 which will be based this DCA, which is currently under  
10 review, the ACRS should take a hard look at the multi-  
11 module aspects of the design. From today's discussion  
12 it's clear that there may be aspects related to the  
13 multi-module construction operation that have not been  
14 addressed by NuScale and the NRC staff.

15 The ACRS should go back and bring up  
16 issues that have not been satisfactorily addressed in  
17 the DCA review, including PRA and other  
18 considerations. Thank you.

19 CHAIR KIRCHNER: Thank you. Is there any  
20 other member of the public who wishes to make a  
21 comment? Hearing none, we'll close the bridge line.  
22 And at this point, any comments, further comments from  
23 members, question?

24 So if not, I think tomorrow, I'm, I've  
25 talked with both the applicant and the staff. I think

1 we will probably finish in the morning, by lunchtime.  
2 So that's the plan going in. We'll keep some  
3 contingency, but that's my estimate at this point of  
4 the material to cover tomorrow. So we may have the  
5 afternoon free to do other work on committee business.

6 With that, we are recessed for the day.

7 (Whereupon, the above-entitled matter went  
8 off the record at 4:07 p.m.)  
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# **Probabilistic Risk Assessment**

## **NuScale Design Certification Application**

ACRS Subcommittee Meeting  
March 3, 2020

# Topics

- DC PRA uses and review
- ECCS model
- Sensitivity and uncertainty analyses
- Reactor building crane operations

## **DC PRA Uses**

- Identify and address potential design features and plant operational vulnerabilities
- For new design, reduce or eliminate significant risk contributors identified at operating plants
- Identify risk-informed safety insights based on systematic evaluations of the risk
- Determine how risk compares against Commission's goals of less than  $1 \times 10^{-4}$  per year for CDF and less than  $1 \times 10^{-6}$  per year for LRF
- Demonstrate whether design represents a reduction in risk compared to operating plants
- Use results and insights to support programs such as RTNSS, ITAAC, RAP, TS, COL action items, and interface requirements

# Availability of Information at Various Licensing Stages

Information Availability	<u>Licensing Stage</u>		
	DC Applications 52.47(27) COL Applications 52.79(46)	COL Holders 50.71(h)(1) “fuel load PRA”	COL Holders 50.71(h)(2) 1st four-year update
• Site-specific information	Unknown for DCs	Known	Known
• Layout, cable routing, equipment capacities	Not fully known	Known	Known
• Plant-specific operating guidance	None	Available	Available
• Plant operating experience	None	None	Available
• Trainers or operations staff with plant-specific experience	None	None	Available
• Walkdowns	Not possible	Possible	Possible
PRA acceptability guidance	<ul style="list-style-type: none"> <li>RG 1.200, as modified by DC/COL-ISG-028</li> </ul>	<ul style="list-style-type: none"> <li>RG 1.200</li> <li>Portions of DC/COL-ISG-028 are still relevant</li> </ul>	<ul style="list-style-type: none"> <li>RG 1.200</li> <li>DC/COL-ISG-028 not applicable</li> </ul>

# **NuScale DC PRA Review**

- PRA acceptability is to be commensurate with its intended use
- Staff findings are made to support Commission's objectives for use of PRA in design; findings are not made on specific numerical results
- PRA acceptability is sufficient to support PRA uses for design certification
- Established regulatory framework will ensure PRA reflects as-built, as-operated plant for operational phases
- Staff applied Enhanced Safety Focused Review Approach during its PRA review to focus on information needed to reach a safety finding

## **ECCS Model**

- Modeling is adequate for DC purposes
  - Model is sufficiently consistent with DC/COL-ISG-028 and SRP 19.0
- Assumptions are used to address issues associated with level of detail, completeness, and data
- System/component reliability data is uncertain due to unavailability of design-specific operating experiences
- Staff evaluated assumptions for impact on safety findings made for the DCA and found them acceptable



# **Sensitivity and Uncertainty Analyses**

- Sensitivity and uncertainty analyses have been performed to support regulatory findings
- NuScale identified important SSCs, operator actions, and risk insights to support programs such as DRAP and human factors engineering
- Focused PRA showed Commission goals met without credit for SSCs that are not safety-related
- Additional analyses are not expected to alter risk insights or inputs to operational programs expected at DC stage

# Reactor Building Crane Operations (1)

- Calculated drop probability dominated by:  
Operator errors (over speed, over raise, etc.)  
AND  
Failure of instrumentation (interlocks/switches) for safety stop
- Key Assumptions for the LPSD PRA added to DCA Table 19.1-71
  1. Movement of the RBC is modeled as being operator controlled
  2. Administrative controls will ensure that RBC safety features (e.g., limit switches, interlocks to prevent undesired movement) are functional during module movement
- Validity of RBC assumptions in DCA and crane data supporting the PRA will be confirmed by COL applicant per COL item 19.1-8

## **Reactor Building Crane Operations (2)**

- DCA Table 9.1.5-1 documents max. speeds and lift heights
- RBC is single failure proof, consistent with operating plants
- COL applicant will describe process for handling and receipt of critical loads including NuScale Power Modules per COL Item 9.1-5
- RBC is within scope of human factors process during COL per “Human Factors Engineering Design Implementation Plan” (Report RP-0914-8544)
- Risk significance of RBC resulted in additional ITAACs
  - Rated load test of module lifting fixture and module lifting adapter
  - Inspection of as-built module lifting fixture and module lifting adapter
- Postulated single module drop does not lead to a large release

# Abbreviations

- **ASME** – American Society of Mechanical Engineers
- **CDF** – core damage frequency
- **CIV** – containment isolation valve
- **COL** – combined license
- **CVCS** – chemical and volume control system
- **DC** – design certification
- **DCA** – design certification application
- **DHRS** – decay heat removal system
- **DRAP** – Design Reliability Assurance Program
- **ECCS** – emergency core cooling system
- **EPZ** – emergency planning zone
- **ITAAC** – Inspection, Test, Analysis, and Acceptance Criteria
- **ISG** – Interim Staff Guidance
- **LPSD** – low power and shutdown
- **LRF** – large release frequency
- **PRA** – probabilistic risk assessment
- **RAP** – Reliability Assurance Program
- **RBC** – reactor building crane
- **RG** – Regulatory Guide
- **RSV** – reactor safety valve
- **SER** – safety evaluation report
- **SRP** – standard review plan
- **TS** – Technical Specification