



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

January 28, 2019

MEMORANDUM TO: ACRS Members

FROM: Michael Snodderly, Senior Staff Engineer **/RA/**
 Christopher Brown, Senior Staff Engineer **/RA/**
 Technical Support Branch
 Advisory Committee on Reactor Safeguards

SUBJECT: CERTIFICATION OF THE MINUTES OF THE ACRS
 NUSCALE SUBCOMMITTEE MEETING DECEMBER 18,
 2018, IN ROCKVILLE, MARYLAND

The minutes for the subject meeting were certified on January 24, 2019. Along with the transcripts and presentation materials, this is the official record of the proceedings of that meeting. A copy of the certified minutes is attached.

Attachment: As stated

cc with Attachment: A. Veil
 M. Banks



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

MEMORANDUM TO: Michael Snodderly, Senior Staff Engineer
Technical Support Branch, ACRS

Christopher Brown, Senior Staff Engineer
Technical Support Branch, ACRS

FROM: Michael Corradini, Chairman
NuScale Subcommittee

SUBJECT: CERTIFICATION OF THE MINUTES OF THE ACRS NUSCALE
SUBCOMMITTEE MEETING ON DECEMBER 18, 2018, IN
ROCKVILLE, MARYLAND

I hereby certify, to the best of my knowledge and belief, that the minutes of the subject meeting on December 18, 2018, are an accurate record of the proceedings for that meeting.

/RA/

January 24, 2019

Michael Corradini, Chairman
NuScale Subcommittee

Dated

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
NUSCALE SUBCOMMITTEE MEETING

December 18, 2018

ROCKVILLE, MD

Open

The ACRS NuScale Subcommittee held a meeting on December 18, 2018, in 1C3 & 1C5, 11601 Landsdown Street, Rockville, MD. The meeting convened at 1:00 p.m. and adjourned at 4:59 p.m.

No written comments were received from members of the public.

ATTENDEES

ACRS Members/Staff

Ron Ballinger, Member	Gordon Skillman, Member
Charlie Brown, Member	Mike Corradini, Chairman
Vesna Dimitrijevic, Member	Pete Riccardella, Co-Chairman, Chapter 2 (Site)
Matthew Sunseri, Member	Harold Ray, Co-Chairman, Chapter 17 (QA)
Dennis Bley (via phone), Member	Jose March-Leuba, Member
Margaret Chu (via phone), Member	Joy Rempe, Member

Michael Snodderly, Designated Federal Official 1
Christopher Brown, Designated Federal Official 2

NRC Staff

Omid Tabatabai-Yazdi, et.al.

NuScale

Tom Berman
Paul Infanger, et.al.

SUMMARY

The NuScale Subcommittee members was briefed on the NuScale application and SER with open items for Chapter 17 (QA and RAP) and Chapter 2 (Site Characteristics).

The reliability assurance program has two stages. The first stage, referred to as the D-RAP, occurs before initial fuel load. An applicant for DC is responsible for establishing the scope, purpose, objective, and essential elements of an effective reliability assurance program and implementing those portions of the D-RAP that apply to DC. A COL applicant is responsible for augmenting and completing the remainder of the D-RAP to include any site-specific design information. The second stage comprises the reliability assurance activities conducted during the operations phase of the plant's license. Reliability assurance activities during the operations phase are implemented through regulatory requirements for SSCs, including the maintenance rule program, quality assurance program, in-service inspection, in-service testing, and surveillance testing.

NuScale is designed using meteorological parameters that are representative of a reasonable number of potential plant site locations in the United States. NuScale design does not rely upon an external water supply for the ultimate heat sink or safety-related makeup water. This design reduces the influence local hydrologic features have on plant safety. NuScale is designed using geologic, seismologic, and geotechnical engineering parameters that are representative of a reasonable number of potential plant site locations in the United States.

SIGNIFICANT ISSUES	
Issue	Reference Pages in Transcript
1. Co-Chairman Ray provided an overview of a few items to be covered by NuScale during the briefing to the Subcommittee regarding the QA program. In particular, the QA program description and design verification. See transcript for discussion and issues raised by Co-Chairman Ray.	7 - 10
2. Presentation by NuScale on their QA program. TR-1010-859-NP-A, "Quality Assurance Program Description for the NuScale Power Plant," Rev. 3. NuScale indicated that there is a COL item indicating that the NuScale QAPD topical report provides enough information that is needed for design certification. The template includes some portions that will be applicable later, but the applicant is responsible for everything after the design certification phase. The report is not a stand-alone document for the applicants. NuScale discussed how the QAPD will carry them forward into working with the COL applicant when we they get to the site-specific stage. Co-Chairman Ray had a number of follow-up questions and concerns relating to construction and operation. See transcript for discussion of issues raised by Co-Chairman Ray.	12 - 18
3. Presentation by NuScale on D-RAP process and how it complies with NUREG-0800. Discussion included the process that documents and controls the D-RAP including the expert panel. Engineering change control process determines if an expert panel is needed. Expert panel consists of Design Engineering, Operations, PRA, and Safety Analysis. Engineering Change Control process determines if expert panel review is required. Member Corradini asked whether updates will occur in the PRA and how the COL applicant will handle/evaluate the changes. Co-Chairman Ray asked follow-up questions about activities that will continue up-to plant startup. See transcript for responses to these issues raised about the D-RAP program continuing into COL space.	19 - 29
4. Discussion by several Members and NuScale on ODIs. In particular, how are ODIs closed out, visibility of the concern, and assessing the status. NuScale indicated that ODIs are unverified assumptions. This topic is discussed further during the staff's briefing. See transcript for discussion.	29 – 33 37 46 - 55
5. Presentation by NuScale of risk significance determinations, events and initiators. D-RAP PRA candidates were also discussed; i.e., system and components. Member Skillman asked about how operating experience of components and the screening process. See transcript for discussion, questions and responses.	33-45 73

6. Co-Chairman Ray provided a brief overview regarding the SER for chapter 17; i.e., ODIs that are not closed, findings in the NRC inspection report relating to ODIs. See transcript for overview.	53-55
7. Presentation of staff's review which included discussion of two regulatory audits conducted in 2017 and 2018. Also, discussion on the quality assurance implementation inspection in 2017. See transcript for discussion.	56-60
8. Presentation by staff on the regulatory basis, topical report review, and QA implementation inspection. Questions by Co-Chairman Ray and Members Corradini and Skillman concerning the tracking ODIs and ODIs not being made into ITAACs. Discussion on what does sufficiently closed mean. See transcript for staff's response to these concerns and Co-Chairman Ray's guidance to staff for the February Full Committee concerning this topic.	60-72
9. Presentation by staff on the RAP review. Discussion on the expert panel and risk-significant SSCs. Member Corradini had questions as it related to SECY 18-0093, "Recommended Change to Verification of the Design Reliability Assurance Program." See transcript for discussion.	72-79
10. Subcommittee comments on NuScale and staff's Chapter 17 presentations. See transcript for comments.	79-87
11. Presentation by NuScale on conceptual site layout and site design parameters. COL items were discussed. The COL applicant will demonstrate that the site is acceptable for each potential accident or provide site-specific design alternatives. Members Skillman and March-Leuba raised COL item 2.2-1 - description of nearby facilities for potential accidents for discussion. See transcript for discussion/question(s) and NuScale response(s).	88-94
12. Presentation by NuScale on maximum precipitation, snow load, tornado missile load, dispersion factors and exceedance values. Member Skillman raised a question concerning exclusion of specific portions of U.S. territories. See transcript for discussion/question and NuScale response.	94-99
13. Presentation by NuScale on hydrology. In particular, flood and groundwater elevation. See transcript for discussion/questions and NuScale response.	99
14. Presentation by NuScale on geology, seismology. Design uses geologic, seismologic, and geotechnical engineering parameters representative of a reasonable number of potential plant site locations. No potential for liquefaction or slope failure is assumed. Member March-Leuba asked about the accident source term topical report and the methodology to develop the accident source terms, as well as on the methodology to determine the EAB and LPZ X/Qs. See transcript for discussion/questions and NuScale response.	99-110
15. Presentation by staff on their review of geography and demography. Also, discussion on the review of nearby industrial, transportation and military facilities. See transcript for additional discussion on this subject matter.	111-116
16. Presentation by staff on their review of the meteorology section of the application. In particular, postulated site parameters, maximum precipitation, wind speed dry- and wet-bulb temperatures were	116-129

discussed. A few clarification questions were asked by members. See transcript.	
17. Presentation by staff on their review of short-term atmospheric dispersion site parameters for accident releases and routine releases. Question by member Corradini on the meteorological data collected at six plant sites. See transcript for discussion, question, and response,	130-135
18. Staff's presentation on the evaluation on the applicant's site parameters for hydrologic engineering. In particular, flood protection requirements were discussed. Geotechnical engineering of the plant was also discussed. In particular, horizontal seismic design response spectra and total settlement.	135-149 Slide 37
19. Member comments; in particular, the February 2019 ACRS Full Committee meeting some. How ODIs will be closed out. Note - no public comments.	149-162

Official Transcript of Proceedings
NUCLEAR REGULATORY COMMISSION

Title: NuScale Subcommittee Meeting

Docket Number: N/A

Location: Rockville, MD

Date: 12-18-18

Work Order No.: NRC-0002

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

+ + + + +

NuSCALE SUBCOMMITTEE

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TUESDAY

DECEMBER 18, 2018

+ + + + +

ROCKVILLE, MARYLAND

+ + + + +

The Subcommittee met at the Nuclear Regulatory Commission, Three White Flint North, Room 1C3 & 1C5, 11601 Landsdown Street, at 1:00 p.m., Harold B. Ray and Peter Riccardella, Co-Chairmen, presiding.

COMMITTEE MEMBERS:

HAROLD B. RAY, Co-Chairman

PETER RICCARDELLA, Co-Chairman

MICHAEL L. CORRADINI, Member

RONALD G. BALLINGER, Member

DENNIS C. BLEY, Member*

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CHARLES H. BROWN, JR., Member
MARGARET SZE-TAI Y. CHU, Member*
WALTER KIRCHNER, Member
JOSE MARCH-LEUBA, Member
JOY L. REMPE, Member
GORDON R. SKILLMAN, Member
MATTHEW W. SUNSERI, Member

DESIGNATED FEDERAL OFFICIAL:

MIKE SNODDERLY

*Present via telephone

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T-A-B-L-E O-F C-O-N-T-E-N-T-S

Opening Remarks, Harold Ray, ACRS.. 4

Overview of Chapter 17, "Quality Assurance. . . . 11
and Reliability Assurance," NuScale Design
Certification Application

Chapter 17, "Quality Assurance and. 14
Reliability Assurance," Safety
Evaluation With Open Items

Overview of Chapter 2, "Site Characteristics. . . 88
and Site Parameters," NuScale Design
Certification Application

Chapter 2, "Site Characteristics and Site.. . . . 91
Parameters," Safety Evaluation With
Open Items (Open Session)

Discussion. 149

Adjourn.. 162

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

1:02 p.m.

CO-CHAIR RAY: The meeting will now come to order. This is a meeting of the Advisory Committee on Reactor Safeguards, NuScale Subcommittee. I'm Harold Ray and I'll serve as co-chairman for today's Subcommittee meeting along with Pete Riccardella.

Members in attendance are Members Rempe, Kirchner, Corradini, Riccardella, Skillman, Sunseri, March-Leuba, Ballinger, and Brown. Members Dennis Bley and Margaret Chu are participating via teleconference as we just heard. Mike Snodderly is the designated federal official for the meeting.

The Subcommittee will review the status evaluation of Chapter 2, Site Characteristics and Site Parameters, and Chapter 17, Quality Assurance and Reliability Assurance of NuScale Design Certification Application. Today we have members of the NRC staff and NuScale to brief the Subcommittee.

The ACRS was established by statute and is governed by the Federal Advisory Committee Act, FACA. That means the Committee can only speak through its published letter reports. We hold meetings to gather information to support our deliberations.

The parties who wish to provide comments

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1 can contact our office requesting time after the
2 meeting announcement is published in the Federal
3 Register. That said, we set aside 10 minutes for
4 comments from members of the public attending or
5 listening to our meetings. Written comments are also
6 welcomed.

7 The ACRS section of the U.S. NRC public
8 website provides our charter by-laws, letter reports,
9 and full transcripts of all full and subcommittee
10 meetings including slides presented there. We may
11 close the meeting after the open portion to discuss
12 proprietary material and presenters can defer
13 questions that should not be answered in the public
14 session to that time.

15 No written statement or request for making
16 an oral statement to the Subcommittee has been
17 received from the public concerning this meeting. A
18 transcript of the meeting is being kept and will be
19 made available. Therefore, we request that
20 participants in this meeting use the microphones
21 located throughout the meeting room -- actually,
22 behind me here, I believe.

23 When addressing the Subcommittee
24 participants should first identify themselves and
25 speak with sufficient clarity and volume so that they

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1 can be readily heard.

2 We have a bridge line established to the
3 public to listen to the meeting. To minimize
4 disturbance the public line will be kept in a listen
5 only mode. To avoid disturbance I request that
6 attendees in the room put their electronic devices
7 like cell phones in the off or noise-free mode.

8 To accommodate the availability of
9 interested members, we will begin with Chapter 17.
10 And, of course, as always, any member can participate
11 at any time, but Mike Corradini will take the lead on
12 Reliability Assurance Program matters and I will do so
13 on the rest of the chapter overall.

14 Because we have to share the half-day
15 meeting with discussion of Chapter 2, which will be
16 led by Pete Riccardella, as I mentioned, and we have
17 members who need to get off to the airport this
18 evening, I'll begin both the discussion of Chapter 2
19 with NuScale and with the staff by stating a couple of
20 items that I believe deserve focused responses and I
21 hope can receive them.

22 As always, our aim is to resolve questions
23 at Subcommittee if at all possible.

24 Does staff management have any comments?
25 Sometimes the staff will offer a comment at this point

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1 but, hearing none, we'll proceed.

2 Okay. NuScale is at the table on the
3 opposite here so let me do as I said I would and give
4 you a couple of items that I hope we can address
5 during the limited time we have.

6 Regarding the Quality Assurance Program
7 Revision 3 of the NuScale Topical Report has been
8 found acceptable as documented in the final Safety
9 Evaluation issued September 22, 2016. This revision
10 is referenced in Section 17.5 of the final Safety
11 Analysis Report and it is identified there as
12 nonproprietary.

13 Section 2.3.1 of the Topical Report is
14 entitled "Design Verification" and it includes the
15 statement that, "NuScale normally completes design
16 verification activities before the design outputs are
17 used by other organizations for design work and before
18 they're used to support other activities such as
19 procurement or testing.

20 Procedures are established that require
21 identification and control of any portion of the
22 design where verification has not been completed.
23 When such timing cannot be achieved, the design
24 verification is completed before relying on the item
25 to perform its intended design or safety function."

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1 One of the items of interest to us is the
2 procedures referred to in this statement. In its
3 letter dated July 24, 2017, NRC reported the results
4 of an initial inspection which included design
5 control.

6 It included substantial discussion related
7 to the implementation of the procedure for open design
8 item management. We will refer to open design items
9 as ODIs. At the time of the inspection a year-and-a-
10 half ago, there were over 1,500 ODIs.

11 The inspection report includes a statement
12 that neither the design control process, nor the ODI
13 procedure, have a requirement to establish a date or
14 event, such as DCH submittal, to close the ODI. It
15 indicates that NuScale stated only that they would
16 need to be closed "prior to the affected systems,
17 structures, or components being considered operable."
18 And that ODIs do not need to be closed prior to DCA
19 submittal.

20 Personally, I've been involved as an
21 applicant in three separate Part 50 construction
22 permit applications each for a new plant design. One
23 of them was a HTGR. I completely understand the
24 necessity to accept and track unverified design
25 assumptions at that stage in the process.

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1 So my first question is about how you're
2 implementing the requirement in Section 2.3.1 of your
3 Topical Report to ensure that design verification is
4 completed before relying on the item to perform its
5 intended design or safety function in this somewhat
6 different process involving the initial stage of
7 design certification.

8 I believe the second question I would like
9 to ask up front just involves the wording that I find
10 confusing concerning applicability of the QA program.

11 Section 17.5 of the NuScale FSAR states
12 that the QA program description for the standard
13 design is provided in the Topical Report and that "a
14 COL applicant that references the NuScale power plant
15 design certification will describe the Quality
16 Assurance Program applicable to site-specific design
17 activities and to the construction and operation
18 phases." That's a clear and consistent statement
19 concerning the respective responsibilities of NuScale
20 and a COL applicant.

21 However, a seemingly different description
22 appears elsewhere including on the NuScale slide 4 to
23 be presented shortly, and in the staff SER Section
24 17.5.1 where it says that, "The QA program description
25 submitted by NuScale addresses the design QA

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1 activities in support of design certification. The
2 NuScale QA program description does not address
3 construction and design through activities that occur
4 once construction begins."

5 I don't read this the same as in the FSAR,
6 especially given that the design activities are
7 expected to continue after design certification and
8 before approval of a future COLA. I think it's just
9 a wording problem that needs to be -- I need to be
10 clarified on at least.

11 With that, those two items, Mike, is there
12 anything you want to say about reliability assurance
13 at this time?

14 MEMBER CORRADINI: No. I think we'll wait
15 and get them when we get the 17.4.

16 CO-CHAIR RAY: As we go if we don't go by
17 the numbers.

18 Okay. With that, I will call on Paul
19 Infanger of NCO to begin today's presentations.

20 MR. INFANGER: My name is Paul Infanger.
21 I am license and project manager at NuScale. I've
22 been doing licensing for about 35 years, 25 years in
23 the operating fleet. I was licensing manager at
24 Crystal River and Turkey Point. Later I was licensing
25 manager in Part 52 space for the EPR with UniStar.

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1 I've been with NuScale for about three-and-a-half
2 years. I went to Iowa State University and have a
3 masters in nuclear engineering.

4 CO-CHAIR RAY: Paul your microphone is on,
5 isn't it? You have a strong enough voice that I can't
6 tell.

7 MR. INFANGER: Okay. Yeah, I'm on.

8 I'm going to be presenting the Quality
9 Assurance portion of the Chapter 17 presentation. The
10 D-RAP portion will be with my cohort here Mr. Patrick
11 Conley.

12 Patrick, why don't you give a little
13 background on yourself.

14 MR. CONLEY: Yes. My name is Patrick
15 Conley. I'm the programs engineer for NuScale Power.
16 I've been with the company about two-and-a-half years.
17 Before NuScale I was at the Vogtle construction
18 project on 3 and 4 where I was in quality assurance
19 with ITAAC procedures as well. I left that to come to
20 NuScale for an opportunity to do some design.

21 Prior to that I received my degree from
22 Auburn University in --

23 MEMBER BLEY: Excuse me. Could you talk
24 into the microphone a little better? I can't hear
25 online.

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1 MR. CONLEY: Is that better?

2 MEMBER BLEY: Yes.

3 MR. CONLEY: Prior to that I was in the
4 Nuclear Navy as a machinist mate and that's how I got
5 my interest in nuclear power.

6 MR. INFANGER: Thank you, Patrick.

7 Moving on to slide 2, just an overview of
8 Chapter 17 which includes the Quality Assurance
9 Program and Design Reliability Assurance Program, D-
10 RAP.

11 The Quality Assurance Program is
12 established in accordance with 10 CFR 50 Appendix B,
13 and ASME NQA-1-2008 with the 2009 addenda which is
14 endorsed by Req. Guide 1.28.

15 Consistent with the guidance in the NUREGS
16 and also we use the NEI template for the QAPD, Quality
17 Assurance Program Description. It consist of our
18 Topical Report which is approved and has a dash A, and
19 the Quality Management Plan which identifies
20 requirements fully implemented in the requirements now
21 within the scope of design phase but may be
22 implemented in the future. We have implementing
23 procedures as listed in the Quality Management Plan.

24 Chapter 17 is divided up into six
25 subsections, the first five in the QAP. The first

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1 three sections pretty much just point to 17.5 which
2 has a brief description that we follow the Topical
3 Report for the Quality Assurance Program and has the
4 COL items for the applicants to provide information
5 during the construction and operation phases. The
6 QAPD for NuScale is just for the design certification
7 phase.

8 CO-CHAIR RAY: Okay. You're not going to
9 go beyond that without answering my question, are you?

10 MR. INFANGER: Okay.

11 CO-CHAIR RAY: Because that's certainly
12 not what the Topical Report said. It says it deals
13 with essentially everything except site-specific
14 design activities, but it doesn't end when the design
15 certification is issued. Anyway, I'm repeating
16 myself. Go ahead.

17 MR. INFANGER: The COL item indicates that
18 the NuScale QAPD provides in the Topical Report what
19 we believe is needed for design certification. The
20 template includes some portions that will be
21 applicable later, but the applicant is responsible for
22 everything after the design certification phase. It's
23 not itself -- it's not a stand-alone document for the
24 applicants.

25 I'm going to go back to -- can I tie in

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1 back to the folks back at NuScale to see if I can get
2 some additional collaboration on that?

3 CO-CHAIR RAY: Absolutely. I just want to
4 be really clear as to what the heck the question is
5 that we're talking about here. I'm trying to find the
6 words here. Go ahead. I'll come back to this in a
7 second.

8 MR. INFANGER: NuScale, come up, Carolyn
9 or someone in the QA organization who can fill in more
10 details.

11 MS. MONACO: Yeah, good afternoon. This
12 is Carolyn Monaco, the Director of Quality here at
13 NuScale. I'm in the Corvallis offices.

14 Responding to the structure of the QAPD,
15 the activities that NuScale will do are QAPD will
16 carry us forward into working with the applicant when
17 we get to site-specific stages.

18 Our program will cover our design
19 activities as we go forward as well. Should the
20 applicant want to designate additional activities to
21 us, then we'll obviously work with them as appropriate
22 as we go forward.

23 CO-CHAIR RAY: Well, the way I interpret
24 what you just said is consistent with what the FSAR
25 states and the Topical Report states which is that the

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1 QA program description for the standard design forget
2 about design certification.

3 The QA program for the standard design is
4 provided in the Topical Report. That's what it says
5 plainly. It doesn't say that the standard design will
6 transition to some other QA program at some indefinite
7 time after the design certification is approved or
8 issued. That's what is said elsewhere and that's what
9 continues to be confusing.

10 A COL applicant it says in the FSAR,
11 Section 17.5, "References a NuScale power plant
12 applicable to site-specific design activities and to
13 construction and operation." That is absolutely fine.
14 No problem. The issue is does the QA program that
15 we're talking about here today only apply to design
16 certification and not thereafter?

17 MS. MONACO: I think the difference or the
18 language may be that our program could be used and
19 carried forward into site design and certain
20 construction aspects, but the applicant could also
21 choose to use a different program, their own program.

22 CO-CHAIR RAY: That's right, but I'm
23 asking what NuScale is going to use for its design
24 activities after certification. That's what is clear
25 in the FSAR but not at all clear in these other

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1 citations I've given you.

2 It sounds like the QA program that we're
3 talking about today only applies to design
4 certification and it will be something imposed by a
5 future customer, COL applicant, on you for work on the
6 certified design after it's issued, and there's a lot
7 of work to be done as we all know.

8 Whereas, what you say in the FSAR is, "No,
9 this QA program is for the certified design full
10 stop." Not for site-specific activities. That's
11 clearly the COL applicant. And also the construction
12 and operation. That's the COL application just like
13 the FSAR says.

14 Well, listen I don't want to take up more
15 time now. I guess the question is clear but the
16 answer is not. We can always take note of it and seek
17 further clarification later.

18 MEMBER SKILLMAN: I want to weigh in on
19 this because I've got the same comment. Let me read
20 text from the SER, Section 17.0. This is exactly what
21 Harold pointed to. Actually, this in the SER. "The
22 NuScale QAPD Topical Report covers the activities
23 associated with the certification of the NuScale power
24 plant."

25 The next sentence is where I want to raise

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1 the question. "The QAPD is based on the applicable
2 portions of Appendix B." I'll stop there. Which
3 portions of Appendix B are not applicable?

4 CO-CHAIR RAY: Okay. I think we've posed
5 the question clearly enough and I don't want to get
6 into a bog-down debate. We're asking for a clear
7 answer and we'll just have to move on.

8 MEMBER SKILLMAN: That's good. Thanks.

9 CO-CHAIR RAY: Please go ahead, Paul.

10 MR. INFANGER: There's a number of COL
11 items in Chapter 17. They describe the Reliability
12 Assurance Program to be conducted during operations.
13 The site-specific SSCs in the RAP identify QA controls
14 for the RAP. They describe the QAP applicable to
15 site-specific construction and operation. The last
16 one in 17.6 is just a COL items that the application
17 has to have a maintenance rule program in conformance
18 with 10 CFR 50.65.

19 CO-CHAIR RAY: The wording, by the way,
20 for the RAP QA is different than what we just debated
21 here about the Appendix B and in QA 1 applicable
22 requirements. The QA program controls for the
23 Reliability Assurance Program are as stated here,
24 "during site-specific design procurement instruction,
25 but they are specified as opposed to being left at the

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1 COL holder."

2 It just seems strange why the Reliability
3 Insurance Program and the Appendix B ASME Section 3 of
4 the program are treated differently in this regard.

5 MEMBER BLEY: It sounds like somebody is
6 not muted. It's really noisy on the line.

7 CO-CHAIR RAY: It sounds like what,
8 Dennis?

9 MEMBER CORRADINI: Somebody has to mute
10 their line, please, because we are hearing background
11 noise.

12 CO-CHAIR RAY: Thank you. I don't mean to
13 bug you, Paul. I just want to get the record
14 straight. Please proceed.

15 MR. INFANGER: Okay. We had three RAIs on
16 Chapter 17. All of them are resolved and closed. The
17 topics are listed there. One was on the CVCS, one on
18 the expert panel, and one on the backup power
19 supplies.

20 MEMBER CORRADINI: We are going to come
21 back to the first for these, right? Is that correct?
22 Is Patrick going to come back and talk about the
23 expert panel CVCS later?

24 MR. INFANGER: We can talk about D-RAP and
25 include the expert panel.

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1 With that I'm going to introduce again
2 Patrick for the D-RAP process.

3 MR. CONLEY: Thank you, Paul.

4 Can everyone hear me okay? Okay. So our
5 D-RAP process was modeled after complies with NUREG
6 800 Section 17.4. We do have a process that documents
7 and controls that process of D-RAP including the
8 expert panel.

9 All of the SCCs, of course, were looked at
10 for cauterization. The initial determination was
11 declared by the subject matter expert and system
12 engineer. Then it was confirmed through deliberation
13 with the expert panel which makes the final decision.

14 Our expert panel did consist of a diverse
15 group of personnel including design engineering,
16 operations, PRA, and safety analysis. We also had a
17 licensing member but they were a non-mandatory member.
18 They could vote but it wasn't required for a quorum.

19 MEMBER CORRADINI: So these are internal
20 to NuScale or these are external people?

21 MR. CONLEY: These are internal to
22 NuScale.

23 MEMBER CORRADINI: Internal?

24 MR. CONLEY: Yes, sir.

25 MEMBER CORRADINI: Okay.

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1 MR. CONLEY: Next slide, please.

2 Our PRA report is based upon the Topical
3 Report we submitted. You can see the number there,
4 the risk significance determination process, Rev. 0.
5 As far as classification, we always assumed that a
6 component was classified as risk significant unless
7 PRA told us otherwise. We didn't start at the bottom
8 and work out way up. We started at the top and worked
9 our way down.

10 The engineering change control process
11 determines if an expert panel is needed. We allow the
12 engineering change control process to change the
13 design and then, as part of that process, the expert
14 panel will be determined if it's needed for further
15 classification.

16 Next slide, please. If you look at
17 17.4.3.3 it states that the process for evaluating
18 SSCs for regulatory treatment. It's described in
19 19.3. We had no RTNSS criterion met and, therefore,
20 we had no RTNSS SSCs in the design.

21 MEMBER CORRADINI: Let me ask a question
22 since one of our experts is on the line, but I'm sure
23 he's going to jump in. If the PRA identifies by your
24 risk-significant measures that something is not
25 meeting the criterion, but later component reliability

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1 testing of a particular component changes such that it
2 might, does this all occur prior in the DCD portion of
3 the analysis, or is this a COL item that the applicant
4 has to deal with in terms of --

5 MR. CONLEY: As far as updates to the PRA?

6 MEMBER CORRADINI: Yes. In terms of if
7 there's an update to the PRA that something's
8 reliability estimate after testing is different. It
9 rises. Is it up to the COL applicant to deal with the
10 change in what's in the D-RAP and then it falls into
11 the old RAP? That's what I didn't understand.

12 MR. CONLEY: We do have COL items in
13 Chapter 17 and there are other COL items in 19 that
14 deal with the site-specific portion. As far as the
15 follow-up PRA prior to that, if there's information
16 that is gained.

17 Sarah, can you speak, please to the
18 process of update as needed? I know we frequently
19 look at updates, but I'm not sure of that process
20 entirely.

21 MS. BRISTOL: Yeah, this is Sarah Bristol.
22 In a PRA update if a candidate rose to the level of
23 potential risk significance, the candidate would be
24 then brought to the D-RAP board for consideration
25 either during the DCA phase or, as you mentioned,

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1 there is a COL item to go back and look at those
2 candidates again at the COL stage.

3 MEMBER CORRADINI: So is that -- so I
4 guess I don't understand the process. Let me take an
5 example. Let's say one of the RRV valves assume
6 probability of failure or reliability is some value
7 and after testing it rises. Then that changes the
8 analysis that something falls into a RTNSS. Whose
9 responsibility is that to identify it and track it?
10 Is it the COL applicant? Is it NuScale as the holder
11 of the DCD? I'm not clear.

12 MR. GREENWOOD: This is Dustin Greenwood
13 at NuScale.

14 MEMBER CORRADINI: Can you guys speak
15 louder? Can you guys get closer to the mic?

16 MR. GREENWOOD: This is Dustin Greenwood
17 at NuScale. Sorry about that. At any phase during
18 the COLA or the DCA this identified through testing,
19 then it would be through our engineering change
20 control process and gets filtered through the D-RAP.

21 In general, the entire process goes
22 through the Operational Reliability Assurance Program
23 after procurement of a specific item. So to determine
24 the maintenance in the M rule requirements, this
25 entire process will be done again with the site-

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1 specific PRA and all of the actual design components.

2 So our process and our change control
3 process would capture something if we identified it
4 during this phase but, in general, to ensure that it
5 happened, this whole program is done again during the
6 construction phase and needs to be verified prior to
7 going into operation.

8 MEMBER CORRADINI: Okay. Thank you.

9 CO-CHAIR RAY: Excuse me for just a
10 second. Let me just ask one question because it's
11 pertinent to Appendix B also.

12 When we say we're talking about a holder
13 of an approved combined operating license, right, it's
14 not just somebody who has applied for a combined
15 license and work is ongoing. Not site work but
16 there's other work ongoing. We're not talking about
17 the COLA holder at that time. It's only after the
18 COLA is approved that their status is what you just
19 said. Is that correct?

20 MR. GREENWOOD: This is Dustin. I'm not
21 sure if that question was directed at me.

22 CO-CHAIR RAY: To NuScale generally.

23 MEMBER CORRADINI: It's addressed to
24 NuScale so whoever can answer.

25 MR. CONLEY: If I understand your

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1 question, is there a transition from one process to
2 the other?

3 CO-CHAIR RAY: Well, I'm more worried
4 about the gap than the transition. In other words,
5 having been through AP1000, as an example, a real-life
6 thing that went into construction, the idea that on
7 the day that the COLA is approved, suddenly things
8 change and prior to that time they were as they were
9 back to the beginning of time is not something we're
10 familiar with in real experience.

11 What we're familiar with is the design
12 certification holder retains responsibility under the
13 programs described in the design certification, even
14 though it's been approved three years ago, to do what
15 they are doing in accordance with that program.
16 That's the way I read your FSAR, by the way.

17 MR. CONLEY: Yes.

18 CO-CHAIR RAY: But it's all the other
19 discussion that has got us terribly confused because
20 it sounds like once the design certification is
21 issued, we go into a space that isn't defined until
22 the COLA is approved at which time then the COLA
23 becomes effective for the things that are taking place
24 then whether it's the D-RAP or whatever else it may
25 be. I'm sure that's not what you intend but it's what

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1 you can read in this is what I'm saying.

2 MR. CONLEY: I understand how you view it
3 and I appreciate your comment. It is not our intent.

4 MEMBER CORRADINI: So help us. What is
5 the bridge? Because my next question is going to be
6 in the SE, the draft SE that we have in front of us,
7 there's an open item about that there's nothing from
8 D-RAP in ITAAC.

9 My thought was before I read this that the
10 logical thing is thou shall go and do this as an ITAAC
11 item to make sure the D-RAP is rechecked before fuel
12 up, for example. But it's not there so that leaves
13 me, again, a bridge.

14 MR. CONLEY: So the process is up to the
15 DCA you're still responsible. Through the DCA and
16 through the continuing design NuScale is still
17 responsible.

18 The process will be once we get into
19 certain things like you talk about testing and
20 procurement, some of that will have to be deliberated
21 in a contractual commercial space. Do you want to do
22 this? Are you going to procure these proponent and
23 take care of that testing or not?

24 For the things that NuScale will be
25 responsible for, we will make sure that the D-RAP

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1 process continues for that piece. There's a line of
2 demarcation once you get into the COLA space that
3 there's some deliberations with the applicants that we
4 can continue this process for you.

5 We will model it for you. That's what the
6 COL items are intended to cover is that transition and
7 the setup of the program and making sure that the
8 reliability of the components is still considered and
9 updated.

10 CO-CHAIR RAY: Well, we just need to make
11 that really clear. Specifically, like I say, the FSAR
12 reads fine. It says things that are site specific are
13 fine, or construction, or operation. That all fits
14 the COLA. It's things that are related to the
15 certified design completion that has got us worried.

16 MR. CONLEY: I understand. Because we
17 were silent on it, you're unsure if it was going to
18 continue.

19 CO-CHAIR RAY: That's right.

20 MR. CONLEY: Okay. I appreciate the
21 comment.

22 MEMBER CORRADINI: Or who owns it. The
23 design will be done by the DCD. Therefore --

24 MR. CONLEY: Correct. So it's our intent
25 to keep the D-RAP program up through the process.

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1 CO-CHAIR RAY: I'm was sure it was.
2 That's why I said it was something that I thought was
3 just a lack of clarity or some confusion. But it does
4 need to be explicit and clear because I think you'll
5 hear a similar discussion with our staff when they
6 come up in which it was even less clear.

7 MR. CONLEY: I understand.

8 CO-CHAIR RAY: So we need to be -- I'm
9 talking about an earlier discussion we had. We need
10 to be crisp about this point that we're trying to make
11 which is the certification is based on a program that
12 continues on for the applicable -- for the certified
13 design and we're going to talk, I hope, here in a
14 little bit about open item verification and closure.

15 That's an activity that will go on until
16 the plant is ready to start up as it's described here,
17 and so we don't want it to be handed off for the
18 certified design itself, to somebody else, and wait
19 until the COLA is approved before we have a program
20 that we can oversee. I think you understand.

21 MR. BERGMAN: Tom Bergman, Vice President,
22 Regulatory Affairs. Just to be clear, our programs
23 continue, but the agency's approval is of what is in
24 the certification. The process, I mean, the ideal
25 process is the COL fully incorporates the DCD by

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1 reference with no changes. There would be no change
2 if that were the case in the COLA. Only the site-
3 specific portions would be addressed.

4 In reality, we know from past experience
5 there will be departures from the certified design.
6 To the extent those change the design, we address it
7 at that time. And it's clear that all those design
8 changes will have to have been done under our QA
9 program, our D-RAP program, and the COLA will then
10 justify the program that they're using for their
11 application, which will be some combination of ours
12 and theirs.

13 The programs don't stop, and that's clear
14 through -- they could stop, right? I doubt ABWR, or
15 I shouldn't use that one because that one is licensed,
16 CE System 80+ is still maintaining a QA program and a
17 D-RAP over their certified design, right? But we
18 expect to move into COL space, and so those programs
19 will continue indefinitely.

20 CO-CHAIRMAN RAY: Well, I just ask that
21 you be really clear regarding what the staff can and
22 cannot do. We'll discuss that with them and give them
23 our best advice. But the fact is that your work will
24 continue after the design is certified and it needs to
25 be covered by a program that we can provide oversight

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1 to and that has the necessary controls.

2 MR. BERGMAN: We agree, but that's
3 separate from the certification in my view.

4 CO-CHAIRMAN RAY: Not in my view, but we
5 can agree to disagree on that. Since you're in the
6 position that you are, did you want to speak to the
7 issue of the coverage of the open design item closure
8 under the purview of this program while you're --

9 MR. BERGMAN: It's covered by procedures
10 under our QA program.

11 CO-CHAIRMAN RAY: I've got the number. I
12 know the procedure. What I'm not certain about is if
13 you had anything more to say about it because what we
14 know about it it's not clear that it's being -- it
15 will continue to be implemented in accordance with
16 your QA program, correct?

17 MR. BERGMAN: Yes.

18 CO-CHAIRMAN RAY: Do we need to take all
19 of the open ODIs at the time of design certification
20 and make an ITAAC out of each one?

21 MR. BERGMAN: Oh, no.

22 CO-CHAIRMAN RAY: No, we don't. Of
23 course. And, therefore, afterwards, you need, there
24 needs to be some relationship between the agency and
25 what you're doing to close those items that allows us

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1 to be satisfied that, yes, they're all getting closed
2 and tracked and they're not being disregarded. Would
3 you agree with that?

4 MR. BERGMAN: Yes, and that's, I think,
5 addressed by the regulations.

6 CO-CHAIRMAN RAY: Well, if we're back to
7 the regulations, then that's fine. But we're trying
8 to get it into the program that we're looking at now,
9 and that's what -- I agree -- pardon me -- that it's
10 covered by the regulations, but what we want to be is
11 covered by this. Excuse me. I ate an apple, and it's
12 the apple that's got me.

13 Anyway, sorry. So thank you for
14 responding.

15 MR. BERGMAN: Yes, they'll be brought to
16 closure under a controlled process as late as
17 construction.

18 CO-CHAIRMAN RAY: Well, do remember that
19 we've been through this. I chaired the AP1000
20 subcommittee. I've done this for years, and I realize
21 we may be in a different circumstance now for
22 certainly reasons, and I just want to know what the
23 differences are.

24 MR. BERGMAN: The differences in what?

25 CO-CHAIRMAN RAY: With regard to the

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1 application of the QA program to work that continues
2 after the design certification.

3 MR. BERGMAN: So the QA program, I mean
4 the design continues to evolve even during the
5 certification. And all that work and work subsequent
6 to certification continues under our own QA program,
7 some of which will involve closure of open design
8 items. I'm sure you've all seen that we're doing a
9 power uprate. The power uprate isn't part of the
10 design certification, but the power uprate, of course,
11 would be done under the QA program. So that's
12 standard practice.

13 A COL who then, that would be a good
14 example of a departure. If a COL came in and added
15 the power uprate, all that design would be departures
16 from the certified design and that would all be done
17 under the QA program. And if it impacted the D-RAP
18 results, that would have to be reflected in the COL at
19 that time, as well. But the program never stops. All
20 the programs keep going.

21 CO-CHAIRMAN RAY: Well, that's fine. And
22 you've made that clear enough, I think. It satisfies
23 me, at least. We just, we'll see if everybody else
24 agrees that that's what you're required to do
25 following design certification.

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1 MR. CONLEY: If I could, I'd like to add
2 a comment about your -- maybe there's a difference in
3 the term ODI, open design item. ODIs are unverified
4 assumptions. So they're in the design, we just have
5 to verify them. So I just want to make sure everybody
6 was clear --

7 CO-CHAIRMAN RAY: Yes, it's not required
8 testing. I understand that.

9 MR. CONLEY: Okay.

10 CO-CHAIRMAN RAY: But the point is you got
11 a good system, as far as I can see, to track them,
12 identify them, and so on. Our concern includes what
13 visibility the agency has to the status of all of
14 those.

15 MR. CONLEY: I understand.

16 CO-CHAIRMAN RAY: Because a certified
17 design is different than a construction permit, as we
18 all know. And, therefore, what we're interested in is
19 how do we assess the status of the ODIs at the time of
20 certification and then ensure that they're closed in
21 time for operability requirements to be met. And
22 that's, you referred to the fact that there are
23 procedures in the Section 17.5, but it's the
24 procedures used with respect to ODIs that we wanted to
25 pursue here. And we may have some more questions on

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1 that before you're done, but, please, I've held you up
2 long enough now.

3 MR. CONLEY: Okay. That's fine. If you
4 have specific questions, we'll do our best to answer
5 them.

6 MEMBER BLEY: I think I remember that I
7 had a question earlier. This is Dennis Bley. I
8 wanted to ask you about the D-RAP board expert panel.
9 The idea of expert panels in this sort of area, on the
10 one hand they're looking to see at things pointed out
11 in the PRA. It may not be as risk significant as the
12 CDF. And, two, if there are things that aren't
13 modeled in the PRA that the experts think would be
14 important to safety at the plant, maybe because
15 they're needed to keep the operators' understanding of
16 the situation clear enough that what we model in the
17 human reliability analysis still holds up.

18 Two questions for you. Can you give me
19 any examples of where your D-RAP board either found
20 something that was in the PRA that they thought wasn't
21 really a risk issue and maybe the PRA was revised
22 because of it? And, two, were any areas where the
23 panel brought up issues that are not modeled in the
24 PRA that they think could have been important?

25 MR. CONLEY: So if I understood, you had

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1 two questions. The first one was is there something
2 through operating experience that may have caused us
3 to go back and want to revise the PRA and make
4 something that was not risk significant become risk
5 significant? Is that your first question?

6 MEMBER BLEY: That was pointed out by one
7 of your panelists, yes.

8 MR. CONLEY: Okay. We will not, the PRA
9 is the PRA. We don't update it, and I'll let Sarah
10 speak to that. We do deliberate at the board, at the
11 panel, and there are items, speaking to your second
12 question, where we have brought something in and it
13 wasn't risk significant and we deliberated whether it
14 needed to be evaluated or elevated to risk
15 significant.

16 Off the top of my head, I can't speak
17 specifically to any one example. I'm sure we can find
18 some for you that may fit in that or Dustin may have
19 one.

20 Sarah, can you please speak to the other
21 question about going back to revised PRA based on
22 operating experience?

23 MS. BRISTOL: Yes. And this is Sarah
24 Bristol. We did not, we looked at OE throughout
25 developing the PRA for different aspects, but there

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1 was no specific OE related to NuScale that was
2 incorporated, that needed to be incorporated in the
3 PRA update that indicated risk significance was more
4 significant. You know, we used the generic
5 reliability data that was, you know, based on industry
6 OE and put that into our model.

7 MEMBER BLEY: That wasn't quite what I was
8 asking. I expected that. My issue was, my question
9 was the experts in your panel might know things beyond
10 what's in the public operating experience that leads
11 them to Ray's questions about things that are in the
12 PRA and are they appropriate. I was asking did they
13 find anything like that and, if they did, rather than
14 just adding them to the risk or deleting them from the
15 risk, I would think they'd want to have incorporated
16 them in their PRA.

17 MR. GREENWOOD: This is Dustin Greenwood.
18 And I think that's a great question. We took a little
19 bit different strategy, and one of the items I think
20 is important to point out, and I appreciate that you
21 asked the question, the expert panel oftentimes
22 identified items and the PRA identified items that
23 would have screened as risk significant through the D-
24 RAP process. But instead of adding them to the list
25 of the D-RAP process using the risk-informed design

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1 process, we challenged ourselves to put redundancy or
2 add some design feature that removed it from the risk
3 significance. So instead of identifying as risk
4 significant, we found a design solution. Typically,
5 it was using redundancy or other method of doing it to
6 remove it from the risk significance.

7 So I hope that kind of answers your
8 question, but we --

9 MEMBER BLEY: Yes, that's a more helpful
10 answer. Thanks.

11 MR. GREENWOOD: Okay. Thank you.

12 MR. CONLEY: Okay. Any further discussion
13 on that? If not, we'll move forward. Okay. The next
14 slide, please.

15 What you see here is a figure from the DCA
16 submittal in Chapter 17.4, and this basically outlines
17 the D-RAP process. What I wanted to point out on this
18 slide are a few things here, and it kind of goes back
19 to your question about the program and process itself.
20 We have the safety analysis. We have the results. We
21 look at RTNSS during this process. We also look at
22 other considerations, like Fukushima, other operating
23 experience, what we've learned through our own
24 experiences working with the design. And those will
25 be inputs for the classification that the system

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1 expert will use to make his initial or her initial
2 determination.

3 Now, once that goes to the expert panel,
4 you'll see here in the lower left, the expert panel,
5 again, uses their own experiences, PRA results and
6 assumptions. We also, as Dustin mentioned, we have a
7 defense-in-depth approach and then system interactions
8 again with RTNSS.

9 So all those things were considered at the
10 expert panel. And then, through the discussion, it
11 was either determined to be risk significant or not
12 and then, from there, it was categorized.

13 And, again, going back to the process, our
14 engineering change control process, any design change
15 or a change to a calc has to go through that process
16 and it gets evaluated for impacts. So ODI's updates
17 impacts the PRA. All those things were considered
18 through our processes.

19 Next slide, please. So for the risk-
20 significance determination, this is from the, this
21 table is in the topical. You can see the component
22 system-level CDF and LRF values and then what we call
23 the basic event contributor greater than 20 percent or
24 equal to.

25 There were four key limitations in the

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1 topical report. This is applicable to NuScale. And
2 the second one is that the risk-informed applications
3 include risk-significant SSCs with other concepts, and
4 what that means is that we have, we consider the risk
5 insights along with deterministic approaches and
6 defense-in-depth concepts. And, therefore, we're
7 implementing a risk-informed, rather than a risk-based
8 approach.

9 The technically-adequate PRA addresses all
10 hazards and all modes and the thresholds for low CDF,
11 you can see there 10 to the minus 7 per year. NuScale
12 meets all these conditions, as documented in the
13 topical report.

14 Next slide, please. What you see before
15 you is a list of the PRA candidates that came out
16 through our evaluations. They're listed by system and
17 components. ECCS, MPS, module protection system, the
18 ultimate heat sink, those are the systems that were
19 candidates based on their functions.

20 Components below, ECCS vent valves and re-
21 circ valves, decay heat removal, actuation valves. I
22 won't read all these for time, but you can get the
23 gist of the idea that containment isolation valves,
24 CVCS, CIVs, and the combustion turbine generator.

25 Next slide. So for other events and

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1 initiators that were considered through the Fussel-
2 Vesely, the reactor building crane, the LOCA inside
3 and outside of containment, LOCA, loss of cooling
4 accident, loss of off-site power, and internal fires
5 and floods. We also looked at human actions with the
6 20-percent threshold, as well. And the chemical
7 control volume system actuation and the containment
8 flooding drain system were those that were analyzed
9 for that.

10 MEMBER CORRADINI: Let me make sure I
11 understand. So eventually you're going to get to the
12 bottom line that neither of these two systems appear,
13 but the human actions to initiate them do appear?

14 MR. CONLEY: The CVCS specifically was one
15 --

16 MEMBER CORRADINI: And the containment
17 flood and drain system.

18 MR. CONLEY: Yes. I'll speak to the CVCs
19 one for sure, and then I'll come back to your other
20 question.

21 MEMBER CORRADINI: All right. Thank you.

22 MR. CONLEY: So if you look at one of the
23 previous slides, I don't know the slide number, but it
24 was one of the three RAI questions specifically
25 questioning the risk significance of the CVCS. We

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1 responded to the RAI and we determined and basically
2 specified that, from a system component function, it
3 was not considered through the D-RAP as risk
4 significant. It was considered through the important
5 human actions. It's covered under that program.

6 MEMBER CORRADINI: So this will appear in
7 Chapter 18 discussion? I don't think I understand
8 that.

9 MR. CONLEY: I believe that's correct.
10 Sarah, can you confirm that it's in Chapter 18?

11 MEMBER CORRADINI: Because I'd like Dr.
12 Bley to pay attention to that.

13 MR. GREENWOOD: Yes, those actions are
14 covered in Chapter 18 under the important human
15 action.

16 MEMBER CORRADINI: So let me say it
17 another way. I've got these systems. These systems,
18 in some sense, are complementary. They overlap in
19 function to provide appropriate actuation of boration
20 or connection to the containment to the pool for an
21 ultimate heat sink. But they're not risk significant,
22 but the human actions to initiate them are.

23 MS. BRISTOL: That's correct.

24 MEMBER CORRADINI: Okay, all right. And
25 that's not covered here in the D-RAP. That's covered

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1 in Chapter 18 relative to operator actions/human
2 reliability?

3 MR. GREENWOOD: That's right.

4 MEMBER CORRADINI: Okay, all right.

5 MEMBER BLEY: And we'll be doing Chapter
6 18 with you in about a month.

7 MEMBER CORRADINI: Exactly.

8 MEMBER BLEY: Mid-January.

9 MEMBER CORRADINI: So we won't forget.

10 MEMBER BLEY: It's close enough we'll
11 remember that one.

12 MR. CONLEY: Did that answer your question
13 for now? Okay, thank you. Okay.

14 Moving on to the results of the process.
15 Again, this is a dynamic process, so there could be
16 changes forthcoming as the design evolves. Table
17 17.4-1 in the FSAR shows you the systems. It also, if
18 you look the table up itself, will show you some of
19 the components. So the containment system, steam
20 generator system, reactor core, reactor coolant
21 system, CRDS, decay heat removal, ECCS, ultimate heat
22 sink, MPS, and neutron monitoring, and then there's
23 some non-modulate-related systems that are structures.
24 The crane and the building and the control building
25 were also considered risk significant.

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1 MEMBER KIRCHNER: May I make an
2 observation? So you screened out the two systems on
3 the preceding, the CVCS system and the containment
4 flooding drain system. They're risk significant
5 because of human actions, so it strikes me, as a
6 former designer designing advanced reactors, you don't
7 want to be in this position. You want to design for
8 that not to be the case, which suggests that they
9 should be in your risk-significant list and be
10 designed accordingly to prevent inadvertent operation
11 because you're relying then on administrative
12 operational controls rather than design to take them
13 out of the risk-significant category, and that just
14 seems counterintuitive to me for what we expect of an
15 advanced reactor design and that needs to be caveated
16 that's one member's opinion.

17 MR. CONLEY: Thank you for that. And if
18 I understood your comment, you believe we should have
19 designed that out using other things other than
20 administrative controls so we weren't relying upon
21 just the controls themselves. Okay.

22 MEMBER SKILLMAN: I want to join Walt and
23 I want to re-ask Dr. Bley's question. His question
24 was are there any systems or structures or components
25 that operating experience suggested should be in and

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1 that you screened out, and I'm wondering if CVCS was
2 one of those systems. And I ask that as a guy who
3 responded to a loss of coolant accident on a PWR whose
4 ECCS system was disabled.

5 MR. CONLEY: So the question was if there
6 were any operating experience components considered
7 that screened out, was that your comment?

8 MEMBER SKILLMAN: Specifically, was CVCS
9 screened out?

10 MR. CONLEY: CVCS was not risk
11 significant; that's correct. There are multiple ways
12 to add moderator and also to add coolant to the RCS,
13 and, once the containment is isolated, that's where we
14 drew the line as far as getting into the human
15 actions. But it was screened out as not risk
16 significant.

17 MEMBER SKILLMAN: I understand it was
18 screened out. The question, I think, that Dr. Bley
19 asked was was there any system that operating
20 experience would have suggested should be in your list
21 that was screened out and was CVCS among those that
22 was screened out?

23 MR. CONLEY: I'll have to take that as a
24 question and respond back, unless Dustin can speak to
25 that specifically. I don't know the complete list.

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1 We had, like, a hundred systems, and I can't recall
2 each one. Dustin, can you speak to a place where we
3 had operator experience that we screened it out?

4 MR. GREENWOOD: Where we screened the
5 system out of the risk-significant discussion based on
6 operator experience?

7 MR. CONLEY: I believe that was the
8 question.

9 MR. GREENWOOD: We did not. We did not.

10 MEMBER CORRADINI: No, just the opposite.
11 I think Member Skillman's question was it was his
12 impression that CVCS, based on operating experience,
13 would be screened in, not screened out. That's what
14 I think he was trying to get at.

15 MEMBER SKILLMAN: That's what I was trying
16 to get at.

17 MR. GREENWOOD: That's the way I
18 understood the question also, and the answer is no.
19 We didn't bring any in and identify them as risk
20 significant and we did have extensive discussions
21 about CVCS, but the idea that we had to un-isolate
22 containment to initiate CVCS as a core makeup was the
23 topic of the discussion. So that was discussed more
24 clearly in the RAI when we asked why CVCS wasn't a
25 risk significant because there are competing scenarios

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1 that we discussed in the expert panel is all I'll talk
2 about in this, to just quickly answer the question.

3 MEMBER BLEY: This is Dennis Bley. I'd go
4 back to what Walt asked, and I'd suggest that, while
5 I don't disagree with what he said, is these folks
6 have broken what they're looking at in the hardware
7 and into the human participation with the hardware.
8 When we get to Chapter 18 and however they dealt with
9 this, depending on how risk significant the operator
10 action was, you know, sometimes that leads to a
11 hardware change to make it less likely. But I would
12 hope that's where we would see that, and I think we
13 ought to return to this in January when we look at
14 Chapter 18.

15 MEMBER CORRADINI: Okay. Why don't we
16 move on?

17 MR. CONLEY: Okay. I believe that was our
18 final slide for the presentation on Chapter 17. Thank
19 you for your time.

20 CO-CHAIRMAN RAY: Okay. Well, we're now
21 one hour in. We've got the staff to go, and we've got
22 another whole chapter to do. I do want you, however,
23 please speak more fully. I believe I've acknowledged
24 that the ODI management system is a visible system.
25 It's been checked. The inspection that was performed

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1 so far identified some shortcomings. It identified,
2 for example, that there's no clear restraint on a
3 design product based on underlying ODIs. Presumably,
4 you get at them by coming from the ODI list, not by
5 looking at the final design document, whatever it is.
6 But they can be tracked. I understand that.

7 What I'm asking you to speak to or
8 someone, if you can, please, is how they are actually
9 managed and if you, I'm not trying to get hung up on
10 specific findings in the inspection because it was an
11 initial inspection. There will be a follow-up
12 inspection. I'm not wanting to get over dramatic
13 about the issues that were raised.

14 The thing that is of concern is it wasn't
15 clear to me that these ODIs went beyond just a list
16 that existed, such that the products themselves
17 identified that this is an assumption, not a verified
18 item. And I'm trying to get you to talk a little bit
19 about how you gained confidence that we're going to
20 get all these things closed by the time they need to
21 be and we're not going to have stuff manufactured that
22 has problems with it because we didn't close an ODI in
23 time and things like that.

24 None of that is in the topical report. It
25 just says a procedure exists. I've looked at the

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1 procedure. I understand it. But can you talk some
2 more about how ODIs get managed so that you can give
3 us assurance? I'll be asking the staff. They talked
4 about in the inspection report being sufficient
5 closure to have, enough closure to have sufficient
6 confidence to make the reasonableness finding in the
7 design certification issuance. I don't know how they
8 go to do that, but I just want to know how you guys
9 see yourselves managing this large number of ODIs that
10 existed at least a year and a half ago.

11 MR. CONLEY: Okay. I'll take an attempt
12 to answer your question. So I'll agree with you we
13 didn't specify all that level of detail in the
14 submittal or in the topical. Basically, we have a
15 procedure, as we mentioned earlier, that governs open
16 design issues or open design items. That is
17 dovetailed with our engineering change control
18 process, so there's many mechanisms that work together
19 to ensure that we attach the appropriate level of
20 identification that something needs to be changed and
21 the way we do that is through what's called ensuring
22 change order, an ECO.

23 What will happen is when a document needs
24 to be revised or changed it goes through the
25 engineering change control board process. It gets

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1 analyzed for impacts through systems for the license.
2 And as part of that, we will do an impact analysis to
3 see where that change might be filtered through the
4 design.

5 Once we identify those documents that are
6 impacted, those ECOs are posted against those
7 documents, so they're there attached to it so we see
8 them visibly that there's an outstanding item here
9 that needs to be resolved or incorporated.

10 Now, as far as the ODI process itself,
11 that's part of the change process. We have an
12 administrator who keeps the list, but when we go
13 through to do, let's say we're going to close or
14 resolve an open design item, that means I've got to go
15 touch this document for revision, we'll generate an
16 engineering change request which kicks off that
17 process that identified, gives it the visibility. We
18 see where it goes. The appropriate ECOs go out and
19 get attached to the documents that won't necessarily
20 be updated at that moment, but they are attached to
21 show that the change is there.

22 Also, if we have the open design items
23 added through a design or a calculation that's
24 updated, if we have an unverified assumption, again,
25 that will be identified through that process, ECOs

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1 will be updated, and it will be part of that change
2 control process.

3 So there are many things that work
4 together through that, but it all hinges on the
5 administration of the engineering change control
6 process and that interacts with the ODI process
7 itself. The number of items that you're specifically
8 speaking about, as things get resolved those get
9 worked off and those numbers, we do have a track on
10 those numbers. We know what they are, what
11 outstanding items we have, what the source documents
12 are, what the implementing document is. So we know
13 exactly where they are, how many we have, and the
14 process that controls them.

15 So I hope that gives you a little more
16 insight of how we handle that.

17 CO-CHAIRMAN RAY: Well, honestly, I
18 inferred most of what you said from what I have seen.
19 It just seems like a backlog that carries with it
20 uncertainty. And from where I sit now, it's a backlog
21 that needs visibility as one approaches. Really, it
22 doesn't concern me about at the issuance of the design
23 certification, provided there's an answer to the
24 question about reasonable assurance. But the real
25 problem is how the backlog avoids becoming a

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1 significant problem.

2 You're probably aware that AP1000, before
3 construction started, went through something called
4 Amendment 6, and it had been issued previously but
5 there was an enormous amount of the same sort of
6 thing. And it was difficult, extremely difficult, to
7 identify what it was that needed to be done to get it
8 put into ITAAC and so on. Just a very big job. And,
9 yet, that was something that had at least gone through
10 the stages, almost like getting an OL after getting a
11 CP because of how it evolved.

12 I appreciate you got to have a customer
13 before you do a lot of this work. That's absolutely
14 clear. Having been a customer, I know that that's the
15 case. And so what I'm concerned about is, once that
16 happens, how these things gain the necessary
17 visibility and get done in time because we've been
18 through it before and it wasn't a very comfortable
19 process.

20 But you said all I think you can
21 reasonably say. It's something that you have given
22 visibility to. You do have a write-up in the topical
23 on design verification. It would be good if you
24 revised that thing to say a bit more on this subject
25 if you revise it for some other reason because the

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1 implication is that it's infrequent, whereas the
2 reality is it's going to be much more infrequent that
3 these things exist throughout the design.

4 Okay. Well, with that, if there's nothing
5 more for you folks to say, we better --

6 MEMBER SKILLMAN: May I please ask a
7 question?

8 CO-CHAIRMAN RAY: Yes, of course.

9 MEMBER SKILLMAN: Patrick, what you
10 described is, by and large, a work management program,
11 how items are identified, how they're sifted, how they
12 are identified for work. What, to me, is the
13 complicated part of this riddle is you're dealing with
14 Tier 1 and Tier 2 information. And when you're in
15 Tier 1 information, you're into a license amendment.
16 When you're in Tier 2 information, you can pretty much
17 do whatever you want, do a 5059, screen it out, and
18 say I'm going to go.

19 And so compounding the issue of the number
20 of items that Harold pointed to, it seems to me that
21 you have the added burden of how are you going to
22 handle what might be unforeseen and emergent changes
23 that bump into Tier 1 information? And that can stop
24 the whole show because you've got to come back to this
25 office for, at the minimum, discussion.

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1 Can you briefly state how you're
2 envisioning handling the difference between changes
3 that might emerge on Tier 1 information?

4 MR. CONLEY: Yes, I can't personally speak
5 to that. I don't know if, Dustin, if you can speak to
6 that since it's related to ITAAC and Tier 1, I'd
7 appreciate that. If not, we'll just have to get back
8 to you on that.

9 CO-CHAIRMAN RAY: But before he responds,
10 let me just say we've been through it, so I think I
11 know the answer. It is what Dick said it was. I
12 think we're more expressing a concern and a desire for
13 visibility, something that we can hang our hat on.

14 MR. CONLEY: Your concern is very
15 warranted. We understand, and it is something that
16 bothers us, as well, and we have had lessons-learned
17 meetings and it --

18 CO-CHAIRMAN RAY: If you want to have
19 somebody speak to it further but keep it short.

20 MR. CONLEY: Go ahead, Dustin, if you have
21 something to offer.

22 MR. GREENWOOD: Yes, this is Dustin
23 Greenwood. Sorry. Thanks, Patrick. This is Dustin
24 Greenwood, and I will keep it short because I know we
25 all recognize that as a concern. In general, we tried

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1 to ensure that we pointed to Tier 2 wherever possible
2 in anything that was required in Tier 1 just to make
3 sure that if a design process went through and changed
4 it in the Tier 2 material, rather than specifically
5 pointing it out in Tier 1 and requiring an LAR to
6 resolve it, we just pointed back to the Tier 2
7 information so that that change would reflect.

8 But, yes, it's a long process ahead of us,
9 and I appreciate the foresight and caution.

10 CO-CHAIRMAN RAY: Thank you. Anything
11 else? All right. We will not take a break at this
12 time. We will ask you to trade places with the staff
13 and we'll try and wrap up Chapter 17. Again, it
14 sounds like someone needs to mute their phone.

15 Do you guys got enough chairs? Okay. If
16 I may, let me again, as I did with NuScale, express,
17 for the purposes of all the members here, as well as
18 the staff, stuff that I'll be looking for and hoping
19 that you'll respond to as part of the presentation
20 you're about to make.

21 2017 inspection report forwarding letter
22 includes a statement that, "As part of the DCA review,
23 NRC technical staff audits and additional inspections
24 of quality activities will be performed to ensure that
25 open design items are sufficiently closed to enable

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1 the NRC to make its 52.54 finding." And as I said to
2 NuScale, I've been through this several times at the
3 CP stage under Part 50. But then we were followed by
4 the OL stage.

5 Here, I don't know if the intent is to
6 incorporate all ODIs that aren't closed into ITAAC.
7 I'm sure it's not. But how do we deal with this open
8 item issue? We went through it in AP1000, and it
9 wasn't very pleasant, or it was difficult. Let's put
10 it that way.

11 Last year's NRC inspection, which I
12 referred to, included a number of findings that would
13 seem to make visibility to incomplete design
14 verification difficult. We've heard from NuScale
15 about that now, but the ODIs themselves are enumerated
16 and presumably can be tracked to closure through to
17 when operability is required, but there were errors
18 and omissions cited in the inspection and I'm sure
19 those will be followed up when the subsequent
20 inspection or inspections are done.

21 Also, in that inspection report, it was
22 stated that "ODIs may exist in supporting documents'
23 references to calculations and that the NRC inspection
24 team did not find examples of ODI placeholders in the
25 body of the documents reviewed," and that's what I

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1 meant by the question in which I ask how do you find
2 the ODIs that are outstanding? You've got a list of
3 them, but you have to go look for where they are and
4 what tier of design documents. They aren't reflected,
5 according to the inspection anyway, as a placeholder
6 in the design document.

7 They've committed to tracking all of the
8 open design items properly and ensure closure before
9 operability. However, we're interested in how the NRC
10 will be able to verify that the management, ODI
11 management has completed this process, most of which
12 will take place after the design certification occurs.
13 And I guess none of us see it as part of the COL QA
14 program, but then you may see it differently. So
15 please proceed.

16 MR. TABATABAI: Good afternoon, everyone.
17 Thanks for giving us an opportunity to present the
18 staff's review up to this point of Phase 2 of the
19 review. This is a briefing of Chapter 17, which
20 consists of two major parts: quality assurance and
21 reliability assurance program.

22 With me today, and we apologize for not
23 having name tags, but to my right Alissa --

24 MEMBER CORRADINI: You guys look familiar
25 to us.

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1 MR. TABATABAI: Yes. Alissa Neuhausen.
2 She will be presenting reliability assurance program
3 for the staff. Andrea Keim. She will be presenting
4 quality assurance. And we have Ian Jung, as well, who
5 will be helping us with the reliability assurance
6 program.

7 I will go through some background
8 information to just get the discussions started. I
9 just wanted to recognize the staff who have reviewed
10 this chapter. Since we presented risk significance
11 determination topical report, Mark Caruso was our main
12 reviewer and he has since retired. Alissa is going to
13 talk about that if there's anything to discuss. For
14 project management, Greg Cranston is our lead project
15 manager for NuScale. And I'm Omid Tabatabai. I'm a
16 senior project manager and responsible for Chapter 17.

17 Just an overview of the staff's review.
18 We received Revision 0 of DCA back in December 2016,
19 Revision 1 in March 2018, and recently we received
20 Revision 2 of the DCA in late October. I just want to
21 make sure that you know that the review is based on
22 Revision 1 of the application.

23 We issued two RAIs containing three
24 questions to NuScale related to Chapter 17, and they
25 were all related to reliability assurance program.

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1 And all of the questions have been responded to and
2 they have been resolved.

3 For reliability assurance program, we
4 conducted two regulatory audits in 2017 and 2018. And
5 for quality assurance program, we, as you mentioned,
6 in June of 2017, we had a quality assurance
7 implementation inspection. And we have a follow-up
8 inspection that we are going to plan to conduct again.

9 We have two open items in Chapter 17, but
10 we don't have any confirmatory item. We will discuss
11 in more detail what those two open items are.

12 With that, that concludes my portion of
13 the presentation and I will turn the microphone to
14 Andrea to talk about quality assurance program.

15 MS. KEIM: Hi, good afternoon. My name is
16 Andrea Keim. I'm a reactor operations engineer at the
17 NRC. I've been with the agency for more than 20
18 years. I have a BE and an MS in material science and
19 engineering from Stevens Institute of Technology in
20 Hoboken, New Jersey. I work in the Quality Assurance
21 and Vendor Inspection Branch. The branch leads and
22 performs routine and reactive vendor inspections, and
23 we also conduct QA implementation inspections for new
24 reactors. We also perform QA reviews for Part 50 and
25 52 applicants, and we also review the initial test

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1 program.

2 Next slide. The main regulatory -- oh,
3 back one. The regulatory requirements are Appendix A
4 to Part 50, which gives us our general design
5 criteria, and quality assurance is number one. So
6 that means that licensees and applicants have to make
7 sure their structure systems and components important
8 to safety are designed, fabricated, erected, and
9 tested to quality standards commiserate with the
10 importance of the safety function they are to perform.

11 The second criteria here is Appendix B,
12 the second regulation is Appendix B to 10 CFR Part 50,
13 which provides our quality assurance criteria for
14 nuclear power plants and it lays out the 18 criteria
15 for quality assurance. 10 CFR 52.47 addresses the
16 contents of an application and, for a DC applicant,
17 must include a quality assurance program that
18 satisfies the applicable portions of 10 CFR Part 50.

19 Next slide. That's the one. So the way
20 we did this, the topical report was submitted and it
21 was separate from the design certification
22 application, and this was reviewed prior to getting
23 the application. The approval was prior. NuScale's
24 QR review was completed outside of the DC process.
25 The topical report was reviewed separately to ensure

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1 that the preliminary work on the application was done
2 in accordance with the requirements of Appendix B to
3 10 CFR Part 50.

4 The staff used the guidance of the NUREG-
5 800, Section 17.5, for quality assurance program
6 description for design certifications, early site
7 permits, and new licensee applicants as guidance for
8 the review.

9 Again, the applicant's QA topical report
10 was submitted in accordance, submittal was in
11 accordance with Reg Guide 1.28 Rev 4, which endorses
12 the ASME NQA-1 2008 edition through the NQA-1A 2009
13 addenda. The staff found this acceptable and that the
14 submittal met the requirements of Appendix B to 10 CFR
15 Part 50 and the staff's SER was dated September 22,
16 2016.

17 So then we go to the next one, and it
18 talks about our review for the design certification
19 application. And what we do with that is we verify
20 that they referenced the approved topical report. We
21 verified the COL application, and the staff identified
22 an open item where we're going to do an additional QA
23 implementation inspection.

24 And the last part of our review was the QA
25 implementation inspection that has already taken

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1 place. This occurred on June 5th through the 9th of
2 2017 at the NuScale office facility in Corvallis,
3 Oregon. The inspection followed Inspection Procedure
4 35017. There were no significant findings identified,
5 and the inspection report is publicly available.

6 Again, we plan to perform another QA
7 implementation inspection and it's being held in the
8 SER as an open item 17.5-1.

9 MR. TABATABAI: Okay. That concludes our
10 QA presentation. Any question?

11 MEMBER CORRADINI: So can I ask a
12 question?

13 CO-CHAIRMAN RAY: Please.

14 MEMBER CORRADINI: Okay. So I'm listening
15 to Harold and I want to make sure that it's clear. So
16 is it the staff's position that this is an issue
17 strictly for NuScale, as Dick calls it a work
18 management program for the ODIs, or is this something
19 that you're watching so that, once the DCD is done and
20 before the COL is issued, you're making sure that
21 these things are appropriately closed? Put another
22 way, why isn't this an ITAAC?

23 MS. KEIM: We've reviewed this as a
24 process, and, during the inspections, we evaluated how
25 they keep track of the ODIs and the process that

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1 they're using. But we're not following each and every
2 ODI --

3 MEMBER CORRADINI: No, I wasn't expecting
4 that.

5 MS. KEIM: But then there's the technical
6 staff that go and do audits for their calculations and
7 they have some documentation in their audit program
8 and through RAIs that also close the ODIs.

9 MEMBER CORRADINI: So if I've got it
10 right, you now are, you're satisfied that their
11 program to track and close the ODIs is appropriate,
12 but you don't see the need to essentially assure
13 closure of them before the COL is issued?

14 MS. KEIM: Not all of them, no.

15 MEMBER CORRADINI: Okay. Fine.

16 MEMBER SKILLMAN: Let me explain where I'm
17 going with this. I've got your SER at Chapter 17.0,
18 quality assurance. The statement is very clear. The
19 QA PD is based on the applicable portions of Appendix
20 B. Criterion III is design control. Criterion XVI,
21 16, is corrective action program.

22 Did you look at their Criterion III,
23 design control program, in a context of Harold Ray's
24 comments about the open items? Why are we asking the
25 question? Because this is a killer. Unless these

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1 pieces are knit together, the end product is going to
2 be a quagmire for everybody. It's going to be a
3 quagmire for NuScale, and it's going to be a real
4 rat's nest for the staff. And unless it's designed
5 properly on the front end, and it's not just work
6 management but it's the integration of the 18 points
7 of Appendix B, then we're probably all going to be
8 wishing that we had done something differently a
9 couple of years before. Now is the time to do it.

10 When this says applicable portions, I've
11 got to ask, what isn't applicable?

12 CO-CHAIRMAN RAY: Well, the inspection
13 report itself didn't refer to Criterion XVI, which
14 seemed a little odd to me, but maybe it's the right
15 thing to do in this context.

16 Do you know how the NRC will determine
17 that the open design items are sufficiently closed to
18 issue the design certification? That's what's stated
19 in the forwarding letter for the inspection report.

20 MS. KEIM: Some are being closed through
21 the audit process and through RAI --

22 CO-CHAIRMAN RAY: Well, they're not being
23 closed to the audit process. They're being recognized
24 as having been closed by NuScale through the audit
25 process; is that correct?

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1 MS. KEIM: Yes.

2 CO-CHAIRMAN RAY: Okay. But how do we, as
3 an agency, decide that they've closed enough of them
4 that we can issue the design certification?

5 MS. KEIM: Because they're following their
6 processes through the, if their assumption comes --
7 they had a process which they talked about where if
8 one of their assumptions comes out to be wrong then
9 they have to go through the whole design control
10 process to figure out how broad does this error --

11 CO-CHAIRMAN RAY: I'm asking how we
12 decide, we, the agency, decide that they're
13 sufficiently closed. That's what it says.

14 MS. KEIM: I'm not sure.

15 CO-CHAIRMAN RAY: I'm not either, and I've
16 been around here perhaps as long as you have. I have
17 never seen a statement like that before, and I'm
18 trying to understand what it means.

19 MEMBER CORRADINI: Are you looking for
20 other staff to help you? Someone was up, and they sat
21 down.

22 CO-CHAIRMAN RAY: All I can do is ask
23 who's in front of us here, but the question --

24 MS. KEIM: And that's in the cover letter
25 of the inspection report.

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1 CO-CHAIRMAN RAY: The forwarding letter of
2 the inspection report says what I just read you, that
3 they're sufficiently closed to -- as part of the DCA
4 review, NRC technical staff audits, which you referred
5 to, and additional inspections, plural, of quality
6 activities will be performed to ensure that open
7 design items are sufficiently closed, not that they're
8 being managed properly. Sufficiently closed is the
9 phrase.

10 MS. KEIM: Sufficiently closed is for the
11 ones that are of high significance that they're going
12 to be done through our RAI process and through the DCA
13 review.

14 CO-CHAIRMAN RAY: Let me suggest
15 something. Perhaps this is something which, at the
16 full committee meeting, you'd want to get a more well-
17 prepared answer for because I've never seen this kind
18 of statement made. I don't know how it's done. I can
19 imagine some things, but that's just all it is at this
20 point. But I'd rather the staff tell us this is how
21 we reached this conclusion that they're sufficiently
22 closed. And as I said to NuScale, nobody in their
23 right mind would expect them to all be closed or any
24 given number remain outstanding, but we don't know how
25 to ensure after the design certification is completed

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1 that they're closed. NuScale has told us they will be
2 closed in accordance with their program, which will
3 remain in effect contrary to how I read what the staff
4 has said about the applicability of the program, that
5 it only applies to the design certification.

6 But be that as it may, the concern that I
7 think is shared by Dick and others of us here is,
8 okay, this is a necessary situation, it's not
9 something that's a problem, so long as we understand
10 how the heck it gets resolved. And the only
11 mechanisms that we know about are the ones that we've
12 used so far, you know. The one Part 52 plant under
13 construction we went through this process, so if we're
14 going to do it differently here tell us how we do it.

15 MR. LEE: Good afternoon. My name is Sam
16 Lee. I'm the Chief of Licensing Branch 1 responsible
17 for project managing the NuScale DCA review. I think,
18 so I understand your point, Mr. Ray, and perhaps there
19 will be an opportunity where we can discuss what an
20 ODI is and what that consists of.

21 I think the question at hand is what
22 constitutes the scope of the staff's review? ODI,
23 open design item, is not an open item. I think it was
24 earlier somebody mentioned that it was referred to as
25 open item. Open item is really an unresolved issue or

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1 unresolved RAI, if you will, that is found through the
2 Phases 1 and 2 of the review, right? And at the end
3 of the Phase 2 --

4 CO-CHAIRMAN RAY: No, no, let me interrupt
5 you. I'm sorry to interrupt you, but I think it would
6 be best if you read NuScale's definition of ODI. They
7 call it a design assumption. It's not something
8 that's found, it's an assumption that allows them to
9 proceed with a design without verifying the
10 assumption, and it's perfectly fine. There's nothing
11 wrong with it. But it's not a finding, it is an
12 assumption that is made that allows the design to
13 proceed on the basis that you will later verify that
14 assumption in some manner. We had lots of them in the
15 Westinghouse AP1000. The ones that existed when the
16 Amendment 6 were issued were all put into ITAAC. It
17 was a dozen or so. This is a much bigger number.
18 We're wondering how it's going to be managed, which we
19 asked NuScale and we're asking you guys how it will be
20 overseen. But it's not a finding.

21 MR. LEE: So within the scope of the
22 design certification application review, the finding
23 that the staff will make would be related to the open
24 items coming out of Phase 2. We will not make a
25 finding on every ODI. If it happens that, as part of

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1 the staff's review, whether it's through the RAI
2 process or through the audit, that there is a
3 particular ODI that needs to be addressed within the
4 scope of the DCA, we will, as Andrea has said. But we
5 will, we do not plan to review and close or review of
6 how every open design item would be closed.

7 CO-CHAIRMAN RAY: And, of course, you
8 never heard me ask that. But I did ask how you would
9 decide that they were sufficiently closed to issue the
10 design certification. How is it done?

11 MR. LEE: I think that would be case
12 specific, depending on what the question at hand would
13 be.

14 CO-CHAIRMAN RAY: Will there be visibility
15 to it, as was done when we did the final amendment on
16 AP1000?

17 MR. LEE: The visibility would be through
18 the audit process or the RAI process.

19 CO-CHAIRMAN RAY: But not through the
20 process of recognizing what was outstanding, not yet
21 closed, at the time of the issuance of the design
22 certification?

23 MS. KAVANAGH: This is Kerri Kavanagh.
24 I'm the Chief of the Quality Assurance Vendor
25 Inspection Branch. NuScale does not supply the NRC

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1 with their list of ODIs. That is something that the
2 staff would come across during our inspection or
3 through the audits of specific design documents. So
4 the staff does not have first-hand knowledge of what
5 that list looks like unless we're on-site doing an
6 inspection or an audit of NuScale.

7 CO-CHAIRMAN RAY: How does sufficient
8 closure get determined then?

9 MS. KAVANAGH: We have to determine what
10 are reasonable assurances based on our regulatory
11 requirements, so the staff would make that for each
12 chapter that is reviewed.

13 MEMBER CORRADINI: Can I try something?
14 I keep on listening to you guys going back and forth,
15 and I wrote something down, but maybe this is not
16 accurate. But my interpretation of it is, based on
17 inspections and audits, the staff feels that they need
18 to find reasonable assurance that the ODIs can be
19 managed and closed. So by the audits, you look at
20 what they've closed one by one and you gain assurance
21 by essentially a fraction sampling of what they're
22 doing? That's what I'm struggling with. I think
23 that's what Harold is struggling with.

24 CO-CHAIRMAN RAY: Excuse me. And I'll let
25 you speak in just a second. I'm actually, the thing

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1 that I'm struggling with the most is a determination
2 that open items are sufficiently closed to enable a
3 reasonableness finding. I don't know what that means,
4 but that's precisely what I'm trying to ask.

5 MS. KAVANAGH: Right. So for a QA
6 implementation inspection, we don't do 100 percent.
7 It's a sampling basis. So depending on what it is
8 that we sample or who we have, which specialist we
9 have with us on our particular team, I mean, that's
10 the scope that we would be looking at and we'd have to
11 make an assumption on our part that that whole process
12 will be relayed to the rest of the program.

13 CO-CHAIRMAN RAY: Okay. I think we've
14 gone around and around enough. I'm using some of
15 Pete's time now. I appreciate you stepping up to
16 answer. I'll just say this is not something, at least
17 speaking for myself alone, understand sufficiently.
18 I understand what NuScale will do. That's not a
19 problem. And they're going to continue to do what
20 they do before and after the design certification is
21 issued, and before operability everything has got to
22 get closed.

23 The question I'm asking is how do we
24 decide that they've closed it enough to issue the
25 design certification? We'll follow that as we go

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1 forward, and that's about the best we can do right
2 now.

3 If you have something more to offer us,
4 plan to do so in February at the full committee
5 meeting, and we'll greatly appreciate it.

6 MR. LEE: This is Sam Lee. I'll just
7 restate what I've said. Staff will make a reasonable
8 assurance finding. If that reasonable assurance
9 finding needs a review of the ODI to reach that point,
10 we will do so. Otherwise, we will not.

11 CO-CHAIRMAN RAY: I see. Well, that's
12 fine. Glad to have it on the record. Appreciate it.
13 Okay. Anything more for the staff?

14 MR. JUNG: This is Ian Jung. I'm speaking
15 more from a Chapter 19 review. There are a set of
16 very significant assumptions made in developing PRA,
17 given the lack of design details or some of the
18 limitations associated with the design stage. So
19 those assumptions that are significant staff's review
20 has been focusing on. And not only those assumptions
21 are listed in FSAR and staff is also including those
22 significant assumptions to be carried forward to a COL
23 applicant, so there are tables, there are COL action
24 items for verifying those assumptions. So I just want
25 to mention that.

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1 I was a part of the training that was
2 offered to branch chiefs last year on ODI, and my
3 impression coming out -- I don't want to go into
4 detail, it was a closed meeting -- is that ODIs are,
5 in general, so far below the design certification
6 material that's needed for the reasonable assurance of
7 safety finding. However, the ODIs are ongoing
8 activity for NuScale. Any of those activities rises
9 to a level that's going to have an impact on design
10 certification, staff's finding on reasonable
11 assumptions finding, they have to either come back
12 with FSAR changes during design certification or carry
13 forward through the COL stage. That's what my --

14 CO-CHAIRMAN RAY: Yes, I agree with part
15 of what you said. But, of course, the ODIs don't have
16 to do with PRA. That's not an Appendix B design
17 verification issue.

18 MR. JUNG: There's a slight programmatic
19 difference, but assumptions in PRAs are --

20 CO-CHAIRMAN RAY: I'm sure that's right.
21 Absolutely. But I'm really just focused on the ODIs
22 that are related to Appendix B scope or --

23 MR. JUNG: I understand. I just want to
24 share my thoughts on much broader --

25 CO-CHAIRMAN RAY: And I appreciate the

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1 input on a difficult thing. I did convey this issue
2 to the staff a week ago or so, so I hope I'm hearing
3 what you had to say after thinking about it. But I
4 still don't understand what the mechanism is, although
5 I think it's better now than it was.

6 In any event, anything more for the staff?
7 We need to go around the members quickly and -- oh, I
8 beg your pardon. We stopped before we did reliability
9 assurance. I thought you hadn't asked many questions,
10 Mike. It was my effort to beat the clock here.
11 Please, go ahead.

12 MS. NEUHAUSEN: I'll be presenting on
13 reliability -- okay. Good afternoon. My name is
14 Alissa Neuhausen again. I'll be covering Section 17.4
15 on the reliability assurance program. And for the
16 reliability assurance program, or RAP, staff's review
17 was performed in accordance with SRP 17.4 Revision 1.

18 The staff reviewed the program description
19 in implementation, programmatic controls, SSC
20 selection, expert panel member requirements, and the
21 list of D-RAP SSCs. The first stage of the
22 reliability assurance program is referred to as the D-
23 RAP, which encompasses those reliability assurance
24 activities that occur before initial fuel load, which
25 includes both the DC and COL phases.

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1 The second stage comprises the reliability
2 assurance activities conducted during the operations
3 phase. Of course, what I'm talking about today is the
4 DC phase.

5 The applicant's description includes
6 sufficient detail of the process used to identify what
7 is risk significant at the design phase. That way,
8 any design changes done to those SSCs can be
9 controlled and, as construction progresses,
10 appropriate QA controls are applied to those SSCs.

11 The programmatic controls, which ensure
12 the risk insights and key assumptions are consistent
13 with the plant design, adjust the appropriate
14 activities as outlined in the SRP. The selection
15 methodology for the risk-significant SSCs considered
16 probabilistic information that is that PRA information
17 as approved in the risk significance determination
18 topical report, deterministic evaluations including
19 defense-in-depth considerations, operating experience,
20 expert panel reviews, and severe accident analysis.
21 The applicant met the conditions and limitations
22 stipulated in the topical report for the described
23 methodology to be acceptable.

24 The staff reviewed the expert panel
25 membership requirements and found them consistent with

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1 the SRP. The staff confirmed that the expert panel
2 considered the appropriate inputs, in addition to the
3 probabilistic information, for the selection of risk-
4 significant SSCs. And the staff reviewed the final
5 list of D-RAP SSCs which are those required to perform
6 risk-significant system functions and verified the
7 process described in FSAR Figure 17.4-1.

8 So based on the review of the previously-
9 described information, the staff found that the D-RAP
10 list was developed in accordance with its RAP
11 methodology, that NuScale adequately implemented the
12 expert panel in developing the D-RAP list, and that
13 the D-RAP list is comprehensive. The three COL items
14 respectively for integrating RAP into operational
15 programs, QA controls during site-specific design
16 procurement, fabrication, construction, and pre-
17 operational testing activities, and the identification
18 of site-specific SSCs provide an appropriate level of
19 assurance that a COL applicant referencing the NuScale
20 design will implement an adequate reliability
21 assurance program.

22 And, lastly, the inclusion of the D-RAP
23 ITAAC is currently the only open item in Section 17.4.
24 SECY-18-0093 is currently with the Commission. Staff
25 has recommended that the Commission discontinue the

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1 use of the D-RAP ITAAC, and we're currently waiting
2 for a response.

3 MEMBER CORRADINI: So can we go to that
4 last thing, and can you explain to me -- my first
5 conclusion was, because I didn't read Section
6 17.4.4.8, was there ought to be an ITAAC about doing
7 a D-RAP before fuel load to check everything is
8 kosher. But this says you're going to the Commission
9 to say ITAACs aren't needed anymore. Why? Explain
10 the logic. Can you explain the logic for me?

11 MS. NEUHAUSEN: I can explain a little bit
12 of the logic. It is --

13 MEMBER CORRADINI: But you've got
14 lifelines here. You can get other people to --

15 MS. NEUHAUSEN: So it is lined out in the
16 SECY paper, and so the basis is that we've done it
17 before several times. Nothing significant was really
18 identified. And it's consistent with how the
19 Commission has acted for additional operational
20 programs, so the remainder of the operational
21 programs, the Commission said we don't need ITAAC as
22 long as it's sufficiently described in the DC. So we
23 would consider it to be sufficiently described in the
24 DC.

25 MEMBER CORRADINI: So let me try it a

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1 different way. So as long as it's sufficiently
2 described, so is it described somewhere in Chapter 17
3 that the D-RAP will be re-visited with the new PRA
4 values prior to fuel load so that it's very clear the
5 D-RAP will be checked? Because I couldn't find that.

6 MS. NEUHAUSEN: That is part of the
7 programmatic controls.

8 MEMBER CORRADINI: That's part of the
9 programmatic controls?

10 MS. NEUHAUSEN: Yes.

11 MEMBER BLEY: Did we get that SECY? I
12 don't remember seeing it.

13 MEMBER CORRADINI: Dennis, you have to
14 speak a bit louder. You're kind of fuzzy.

15 MEMBER BLEY: Did we get the SECY? I do
16 not remember seeing it.

17 MEMBER CORRADINI: I don't either. I was
18 going to ask for it eventually, but, no, I'm not aware
19 of this. This was new to me when I read the
20 paragraph.

21 MS. HAYES: So I'm Michelle Hayes. I'm
22 the Branch Chief for the PRA and Severe Accidents
23 Branch, and we wrote the SECY, as Alissa said, based
24 on the programmatic controls that it has to be
25 approved, it has to be submitted and described in the

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1 COL and then approved by staff.

2 I think what you're talking about, having
3 everything done before operation starts or fuel load
4 starts, that's the second phase of the RAP program and
5 that's part of that 17.3 COLA item, that is -- or 17.1
6 actually, maybe 17.4-1, where that the COLA applicant
7 is going to put something in place during operations
8 phase to take care of the reliability insurance
9 activities.

10 MEMBER CORRADINI: Well, I guess maybe
11 every time I get to talk about process I do it wrong,
12 so Harold looks at me with a funny face. What I'm
13 worried about is there's a gap. In other words, we
14 have the D-RAP now based on a list of things, based on
15 the PRA and expert panel, and now time marches along,
16 they build components, the RRV, the RVV. There's
17 assumptions about reliability of these things. The
18 reliability changes or is estimated to be different,
19 and some things may become risk significant and
20 warrant or vice versa. Where does it stand that
21 somebody is going to do another check on all of this
22 so that before fuel load this is checked and I have
23 another D-RAP?

24 MS. HAYES: So the PRA is required to be
25 updated before fuel load, and then that would be the

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1 part where they would go into their operational
2 programs. That would be fed into the operational
3 programs.

4 MEMBER CORRADINI: So it's only
5 operational. The D-RAP would not change. The D-RAP
6 is set once the DCD, once the certification is
7 approved?

8 MS. HAYES: No, the programmatic controls
9 for the D-RAP and what they're explaining with that
10 flow chart is every time you make a design change,
11 either the NuScale or the COLA applicant is going to
12 be maintaining that D-RAP list.

13 MEMBER CORRADINI: Okay. So let me, I
14 have to go by specific examples. So we build some
15 first-of-a-kind RVVs and RRVs and I test them and they
16 work well, but they don't work as well as assumed.
17 That will go into the design process, and that will
18 then be funneled in through the PRA and --

19 MS. HAYES: Yes, the PRA, a change in the
20 PRA feeds back into the D-RAP process.

21 MEMBER CORRADINI: Okay, okay, all right.
22 Thank you.

23 MR. JUNG: Yes, we will provide the SECY
24 paper, although it's in public website right now.

25 MR. TABATABAI: Okay. This concludes our

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1 presentation. Any other questions from the members?

2 CO-CHAIRMAN RAY: I'll go back to where I
3 was some time ago and ask if there are other
4 questions. We appreciate you being responsive, and,
5 as I said in the beginning, we've got to move on.
6 Yes, Pete?

7 CO-CHAIRMAN RICCARDELLA: This is so much
8 different than Chapter 2. I wonder if maybe you ought
9 to go around --

10 CO-CHAIRMAN RAY: I am going --

11 CO-CHAIRMAN RICCARDELLA: -- for
12 individual members' comments before we move on.

13 CO-CHAIRMAN RAY: Appreciate it, yes.
14 Absolutely. It is different in topic. That's what I
15 was starting to do a bit ago when I got reminded that
16 we still had reliability assurance to go. Thank you,
17 staff.

18 Okay. With that, let me do as you say.
19 I've got note-taking capability here. Let me ask,
20 starting with Walt, about any comments on Chapter 17.

21 MEMBER KIRCHNER: Just one observation.
22 I have been struggling with how to phrase a
23 constructive question out of this but mindful of
24 events to the southeast that had QA kind of issues.
25 This sufficiently closed on ODI, to what extent have

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1 you factored lessons, are there any lessons learned
2 from previous certified designs that are in
3 construction in the area of QA implementation and
4 design control? Sufficiently closed is sufficiently
5 vague that it leaves me pondering as to what your
6 process is to make that determination. Do you
7 actively engage subject matter experts from your
8 design disciplines, like Chapter 4, the people that
9 would review 4, 5, you know, some of the areas that
10 really are going to be important factors in making a
11 reasonable assurance determination? Has there been
12 any change to the NRC processes in terms of evaluating
13 quality assurance programs as a result of previous
14 activities with the certified design and to what
15 extent do you actively engage other subject matter
16 experts in this assessment of open design issues?

17 CO-CHAIRMAN RAY: So this is a question
18 you want us to take note of here, or did you, were you
19 directing that to the staff to have them respond?

20 MEMBER KIRCHNER: It was to the staff.
21 It's just something I'm pondering and perhaps --

22 CO-CHAIRMAN RAY: Yes, it's a tough
23 question to answer at this moment.

24 MEMBER KIRCHNER: Yes. And it was a
25 rambling question, I will admit that. But it does

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1 make me think hard about sufficiently closed.

2 CO-CHAIRMAN RAY: Yes.

3 MEMBER KIRCHNER: Maybe they can address
4 that --

5 CO-CHAIRMAN RAY: I'll take note of it.

6 MEMBER KIRCHNER: -- at the February
7 meeting.

8 CO-CHAIRMAN RAY: We'll try to see how it
9 fits in. Certainly, staff understood your question.
10 You know, the other side of it for me is I don't see
11 how we can expect the NuScale design at this point to
12 be further along than it is. This is really an agency
13 process issue, as I see it. I happened to be somewhat
14 involved when Part 52 was adopted. We're now applying
15 it in a different context, so I know that we're
16 struggling to find out how to get things done.

17 I will ask the staff a question I forgot
18 to ask. You don't object to us saying that NuScale
19 has affirmed that their QA program will apply beyond
20 the design certification, even though you can read
21 some of the stuff that's been written as indicating it
22 only applies up to design certification? You don't
23 mind us saying that it was clarified that it applies
24 beyond then, right?

25 MR. TABATABAI: I think that's what Tom

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1 mentioned during his -- maybe he wants to clarify.

2 CO-CHAIRMAN RAY: I heard him say that,
3 too. But I just want to be sure you don't mind us --

4 MR. BERGMAN: I want to distinguish
5 between what we do to be practical and what is
6 required by regulation. I'm not willing to make that
7 regulatory commitment here. If it's not required,
8 that doesn't mean we won't do it.

9 CO-CHAIRMAN RAY: Okay. Well, you won't
10 be surprised then if we happen to advise the
11 Commission that it should be required like anything
12 else in the design certification is required.

13 MR. BERGMAN: I can't object to that. I
14 can't object to that.

15 CO-CHAIRMAN RAY: Yes, okay. Mike?

16 MEMBER CORRADINI: I've asked enough. I
17 pass.

18 CO-CHAIRMAN RAY: Okay. We're not asking
19 more questions here. I'm trying to get note for the
20 record of member reflections on what we've been
21 through and --

22 MEMBER CORRADINI: Okay. So my reflection
23 is, I think my confusion about the ITAAC, I guess, is
24 resolved based on we're going to see the SECY in terms
25 of what that implies. In terms of the QA program,

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1 you've asked enough questions. I think I understand
2 what the staff is, how the staff would determine
3 reasonable assurance, so I think my questions have
4 been answered.

5 MR. SNODDERLY: This is Mike Snodderly.
6 Just to clarify, that SECY did not come before the
7 committee and is not expected to come before the
8 committee. Right, okay. Sorry. I thought you meant
9 . . .

10 CO-CHAIRMAN RICCARDELLA: I just sense
11 there's kind of a serious timing issue here, you know,
12 regarding the D-RAP and the PRA. We're not going to
13 have a final PRA until prior to fuel load, and, yet,
14 that final PRA, as Ian said, has got a lot of, the
15 current PRA has a lot of assumptions in it and those
16 assumptions have fed into some key decisions that if
17 that were to change just before fuel load, I mean, in
18 reality, what are you going to do about it? What if
19 the source term changes? I mean, there's assumptions
20 from the PRA that went into choosing the size of the
21 source term. There's assumptions in the PRA that went
22 into picking this site boundary limits and things of
23 that sort. If those were to change at the, you know,
24 at the very end like that, I can't imagine we'd do
25 anything other than some hand-waving.

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1 CO-CHAIRMAN RAY: Well, you guys are going
2 to talk PRA as a separate topic. This is --

3 CO-CHAIRMAN RICCARDELLA: We've had a
4 meeting on that a couple of months ago, and, you know,
5 I'm not critical of that. That seemed like it was
6 very well done. Our PRA experts thought it was well
7 done, but there still are a lot of inherent
8 assumptions.

9 CO-CHAIRMAN RAY: Okay. Thank you. Dick?

10 MEMBER SKILLMAN: No further comments.
11 Thank you.

12 CO-CHAIRMAN RAY: Matt?

13 MEMBER SUNSERI: I've been following along
14 the QA discussions. As you know, we had several
15 conversations out here, and I share many of the
16 members' questions about this. So I'll just not
17 answer because all my questions have been asked
18 already. Thanks.

19 CO-CHAIRMAN RAY: Okay. Jose?

20 MEMBER MARCH-LEUBA: I want to emphasize
21 what Pete said. I mean, he took the thought out of my
22 head. We are making a lot of decisions about the plan
23 based on an assumption on a PRA, and I would like from
24 the staff to make sure that they tell NuScale that
25 NuScale is doing that at their own risk. Don't expect

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1 us to hand-wave anything if you're wrong at the end of
2 the design, which is probably the most likely
3 scenario.

4 So the staff should make sure that if you
5 make an assumption and you are wrong, you are wrong.
6 You lose your money. Okay. So that should be very
7 clear.

8 CO-CHAIRMAN RAY: Thank you. Ron?

9 MEMBER BALLINGER: No further comment.

10 CO-CHAIRMAN RAY: And Charlie?

11 MEMBER BROWN: No further comment.

12 CO-CHAIRMAN RAY: Okay. So the reason we
13 do this last part here is more setting an agenda for
14 our discussions --

15 MEMBER BLEY: Dennis is still here.

16 CO-CHAIRMAN RAY: Yes, I know, Dennis.
17 And I was just, I had written your name at the top of
18 the list, and I wasn't going to forget it. But I just
19 wanted to say I appreciate your speaking up. But,
20 anyway, we're trying to set an agenda of items, and so
21 we'll turn to our expert on PRA, Dennis, and ask you
22 to finish us up.

23 MEMBER BLEY: I have just a couple of
24 things to mention. One is the issue Pete brought up
25 is important, and we've brought it up before in other

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1 design certs. What we've been told by other vendors,
2 designers, is that, although the PRA has to be in and
3 the operating has to be in place before fuel load,
4 they really expect to have all that in place two or
5 three years before that so that there's time to deal
6 with these issues. If that's not true, they're taking
7 a heck of a risk.

8 The other thing is I did take a quick
9 review of the SECY they brought up on the last slide.
10 This is just my own opinion. It's a reasonable
11 argument, I think, and it's backed up by other policy
12 decisions. So I'm not really concerned about that.
13 That's all.

14 CO-CHAIRMAN RAY: Thank you, Dennis.
15 Margaret, are you still with us?

16 MEMBER CHU: No comments.

17 CO-CHAIRMAN RAY: Any comments from anyone
18 else on the phone line? Or if there's anyone here in
19 the room, is there anyone who wants to make further
20 comment?

21 Okay. I'll say I've said perhaps too much
22 here today. My intent is to try to narrow the things
23 that are outstanding issues. One of them was
24 clarifying the applicability of the NuScale program.
25 I'm still mystified by the idea that we don't

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1 recognize that it's a part of the design
2 certification, just like everything else is; and,
3 therefore, it remains in effect as the design
4 certification occurs for the scope of the certified
5 design. That's what I read in some places and not in
6 others. So we'll perhaps want to clarify that.

7 We'll reflect on the issues of PRA, but I
8 really think the best place to discuss the timing
9 issues created by PRA is in the context of PRA, rather
10 than QA. And that will come up shortly. We'll see
11 where that goes.

12 And with that, I appreciate everyone's
13 time. We've taken --

14 MEMBER CORRADINI: We'll take a break.

15 CO-CHAIRMAN RAY: -- two hours. It's time
16 for a break, according to the boss.

17 MEMBER CORRADINI: Ten minutes.

18 CO-CHAIRMAN RAY: And then we'll shift
19 gears to Chapter 2.

20 MEMBER CORRADINI: All right. We'll be
21 back at 3:10 to take on Chapter 2.

22 (Whereupon, the above-entitled matter went
23 off the record at 2:59 p.m. and went back on the
24 record at 3:12 p.m.)

25 MEMBER CORRADINI: Okay, why don't we come

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1 back together? And we'll begin on Chapter 2. Paul,
2 are you going to take us through this?

3 MR. INFANGER: Yes, I'll start. I'm Paul
4 Infanger. Continuing from our presentation on Chapter
5 17, we'd just like to introduce J. J. Arthur from
6 Engineering.

7 MR. ARTHUR: Good afternoon. My name is
8 J. J. Arthur, Manager of Structures and Design
9 Analysis at NuScale. I've been at NuScale for just
10 over eight years. Prior to that was non-nuclear
11 experience working on refractory and reactive metals
12 industry, site mechanical engineering at Oregon State.

13 MR. INFANGER: All right, with that we'll
14 start with slide 2, which has the FSAR overview.

15 MR. ARTHUR: All right, so the purpose of
16 our presentation this afternoon is to present a
17 summary of Chapter 2 of the NuScale FSAR, which
18 provides assumed site characteristics and parameters
19 for the NuScale design. We will also summarize --
20 provide a summary of the RAIs received thus far in
21 this area, along with SER and confirmatory items,
22 which Paul will cover at the end.

23 Chapter 2 of the NuScale FSAR contains a
24 description of assumed site characteristics and
25 parameters that are intended to be representative of

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1 a reasonable number of potential site locations in the
2 United States. These parameters are provided in Table
3 2.0-1 and described in the following subsection of
4 Chapter 2: Section 2.1, Geography and Demography;
5 Section 2.2, Nearby Industrial, Transportation, and
6 Military Facilities; Section 2.3, Meteorology; Section
7 2.4, Hydrology; and finally, Section 2.5, Geology,
8 Seismology, and Geotechnical Engineering.

9 As you will note throughout the
10 presentation, the site parameters contained within
11 Chapter 2 are generally consistent with past applicant
12 precedents, as well as the 2014 edition of the EPRI
13 Utility Requirements Document.

14 This slide depicts the conceptual layout
15 of the NuScale power plant. Maybe some of you have
16 seen this. In the center is the reactor building,
17 where the 12 reactors are located. It's flanked by
18 two turbine buildings, six turbines in each building;
19 the control building, where the control room resides,
20 as well as the rad waste building.

21 A minimum analytical X/Q distance from the
22 nearest release point to the exclusionary boundary and
23 the coincident outer boundary of the low population
24 zone boundary is also shown on this slide as 400 feet
25 there at the bottom.

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1 MEMBER MARCH-LEUBA: Is this a conceptual
2 design or you are sure the LPZ will be equal to the
3 EAB?

4 MR. ARTHUR: This is the assumed minimum
5 distance, the 400.

6 MEMBER MARCH-LEUBA: The LPZ could be
7 larger than this?

8 MR. ARTHUR: Correct.

9 MEMBER CORRADINI: So okay, can I say it
10 another way? Since the major open item in this
11 chapter is the source term that would determine this,
12 this is a starting point which can change.

13 MR. ARTHUR: Correct.

14 MEMBER CORRADINI: Okay.

15 MR. ARTHUR: Just to reiterate again, the
16 site design parameters in Chapter 2 are site-specific.
17 Therefore, the parameters chosen are believed to be
18 representative of a reasonable number of potential
19 site locations in the U.S. and the COL applicant will
20 demonstrate that their site is either bounded by the
21 parameters provided or demonstrate the acceptability
22 of their site-specific values.

23 This is a reiteration of a couple slides
24 earlier, this 400 feet value to the EAB and LPZ. In
25 Section 2.1, the COLA applicant will describe their

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1 site-specific characteristics.

2 We do not -- sorry, was there a question?

3 Okay.

4 We do not postulate any hazards from
5 nearby industrial, transportation, or military
6 facilities. These are addressed by a COLA applicant,
7 if applicable.

8 MEMBER MARCH-LEUBA: Just for my
9 education, what if there is an airport close by, I
10 cannot site your plant?

11 MR. ARTHUR: I'm sorry. Can you repeat
12 the question?

13 MEMBER MARCH-LEUBA: What if there is an
14 airport close by? I cannot site your plant, or I have
15 to take an exception, or what?

16 MR. ARTHUR: Correct.

17 MEMBER MARCH-LEUBA: There are airports
18 near everywhere. I mean you cannot site your plant.

19 MR. ARTHUR: The applicant -- the COLA
20 applicant would be required to address that hazard.

21 MEMBER MARCH-LEUBA: Wouldn't it be more
22 wise to just assume a certain rate of flights,
23 minimum, because you are going to have? There are
24 airports every ten miles. That's my personal opinion.

25 MEMBER SKILLMAN: Let me ask this, please.

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1 Please back a slide.

2 I'm looking at your application for your
3 design cert and this is your security-related
4 information. And your COL item 2.2-1 is as follows:
5 A COL applicant that references the NuScale power
6 plant design certification will describe nearby
7 industrial, transportation, military facilities, just
8 like you have right there. The COL applicant will
9 demonstrate that the site is acceptable for each
10 potential accident or provide site-specific design
11 alternatives. I got that.

12 I see that over in the safety evaluation.
13 What I think you're really referring to is Part
14 100.20(b). And what this text is is different than
15 what is in your application.

16 Here is the text in 100.20(b): The nature
17 and proximity of manmade hazards, and then, in paren,
18 airports, dams, transportation routes, military and
19 chemical facilities must be evaluated to establish
20 site characteristics for use in determining whether a
21 plant design can accommodate commonly occurring
22 hazards and whether the risk of other hazards is very
23 low.

24 Here's my question: Why in your
25 application have you not included the words manmade?

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1 MR. INFANGER: Is anyone in the NuScale
2 office familiar with the use of the wording for
3 manmade hazards versus just general?

4 MEMBER CORRADINI: Also, there is some
5 background noise. If you are not going to make an
6 answer, can you please mute your phone line, please?
7 Thank you.

8 MR. PARKER: This is Josh Parker. I did
9 the structural analysis. I was involved with it in
10 the Chapter 2 work.

11 I don't think there was any intentional
12 reason for leaving out manmade, necessarily.

13 MEMBER SKILLMAN: The skeptic in me
14 suggests by wording this COL item the way you have,
15 you have avoided either accidentally or on purpose a
16 very major concern that we've dealt with on manmade
17 hazards. And it would seem to me that the remedy is
18 to make the wording in your COL item 2.2-1 the same as
19 the wording in 100.20. At least that would solve the
20 concern that I have.

21 MR. BERGMAN: So we'll take it -- we'll
22 look into that prior to the full committee but --
23 sorry. This is Tom Bergman with NuScale.

24 In our view, though, a COL item that is
25 just restating a requirement that applies regardless

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1 of the existence of the COL item doesn't need to be a
2 COL item but that hasn't been accepted by the staff
3 yet, that approach. Because the COL has to comply
4 with all regulations that comply with it, whether or
5 not there is a COL item that reminds them of that
6 requirement.

7 So we'll look into either making the
8 language consistent with or removing the COL item.

9 MEMBER SKILLMAN: Thank you.

10 Thank you, J. J., proceed please.

11 MR. ARTHUR: Section 2.3 for meteorology,
12 the maximum assumed precipitation rate, the roof snow
13 load, and the 100-year return three-second wind gusts
14 are shown here and all come from the 2014 edition of
15 the URD.

16 The design basis tornado parameters are
17 taken directly from Regulatory Guide 1.76 and are
18 representative of Geographical Region I, which
19 represent the most severe set of characteristics
20 provided by the Reg Guide.

21 MEMBER SKILLMAN: Let me ask this, and
22 this is more perhaps trivia but curiosity.

23 If excluded, the protectorates, Guam, the
24 Virgin Islands, the Northern Marianas, American Samoa,
25 and Puerto Rico. Why?

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1 MEMBER CORRADINI: Where was that
2 excluded, Dick? Did I miss it?

3 MEMBER SKILLMAN: Yes, in the text the
4 territories are excluded. And I'm just wondering why
5 aren't those an opportunity for NuScale.

6 MEMBER CORRADINI: He's going to pass.

7 MR. ARTHUR: I don't think those words are
8 in our FSAR. I think they are in the SER.

9 MEMBER SKILLMAN: I think you're right.
10 But why are they excluded anyways? But I would think
11 NuScale might have something to say about that and
12 I'll ask the staff.

13 MEMBER CORRADINI: But I mean just a point
14 of information, there was a bulletin but it wasn't out
15 of NuScale. It was out of NEI that NuScale is one of
16 those going into Puerto Rico now considering modules
17 there for reliable power.

18 MEMBER SKILLMAN: It sounds like a perfect
19 application. I was just wondering why it's excluded.
20 I guess it's in the SER. I figured NuScale might have
21 something to say about that.

22 MR. ARTHUR: Do you have anything to say
23 about that, Tom?

24 MR. BERGMAN: Okay so I'm not familiar
25 with the details but Chapter 2 is a representative

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1 range of sites. It doesn't preclude us from going
2 anywhere. It's just where the site we go to doesn't
3 meet the parameters in Chapter 2, they have to justify
4 the difference.

5 Why there is an exclusion of specific
6 portions of U.S. territories I can say but I wouldn't
7 see that as an impediment, even if it existed. We
8 would just have to justify why our design was
9 acceptable for Puerto Rico, even though the staff
10 didn't include it in their SER.

11 MEMBER SKILLMAN: Fair enough. Thank you.

12 MR. ARTHUR: The tornado missile spectra
13 are also taken from Reg Guide 1.76 with
14 characteristics associated with Region 1 as well.

15 Similarly, the design basis hurricane wind
16 speed and missile spectra are taken from Regulatory
17 Guide 1.221. And as with design basis tornado, the
18 most extreme characteristics were assumed for the
19 design.

20 For HVAC and cooling tower design, outdoor
21 air temperatures are categorized into three sets of
22 conditions: zero percent exceedance, which are shown
23 on this slide; and one and five percent exceedance
24 shown in the next slide.

25 Zero percent exceedance values were used

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1 for the design of the control room ventilation system
2 as recommended by the EPRI URD.

3 One percent exceedance values were used
4 for the design of the reactor building and radioactive
5 waste building HVAC systems, as well as the site
6 cooling and circulating water designs.

7 We'll note the typo in the slide. That
8 should be RXB in the first bullet.

9 Finally, the five percent exceedance
10 values shown were used for the design of the turbine
11 building HVAC systems.

12 Again, these temperatures were chosen by
13 NuScale for the categories in which systems are design
14 and in accordance with which parameters was EPRI
15 recommendations.

16 As noted earlier, the distance from the
17 nearest release point to the exclusionary boundary and
18 the outer boundary of the low population zone boundary
19 is 400 feet. Given this comparatively short distance,
20 NuScale applied the ARCON96 methodology based on
21 Regulatory Guide 1.194 in calculating atmospheric
22 dispersion factors. This methodology is still under
23 review in the accident source term topical report.

24 The top of this slide shows the accident
25 release atmospheric dispersion factors for the EAB/LPZ

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1 boundary and the bottom shows the accident release X/Q
2 values at the door to the main control room and the
3 technical support center, as well as the intake of the
4 HVAC system for the main control room.

5 CO-CHAIRMAN RICCARDELLA: Are these based
6 on that 400-foot boundary?

7 MR. ARTHUR: Correct.

8 CO-CHAIRMAN RICCARDELLA: But again, with
9 an assumed source term.

10 MR. ARTHUR: Right.

11 MEMBER CORRADINI: So let me ask it
12 different. Let me ask Pete's question a different
13 way. If the source term were different, the X/Q
14 values would not change. This is more based on
15 distance from the point of source.

16 MR. ARTHUR: Distance from the point of
17 source, assumptions about weather, release
18 notifications, and things like that.

19 MEMBER CORRADINI: These are nominal
20 assumptions.

21 MR. ARTHUR: Correct.

22 MEMBER CORRADINI: So this could change.
23 If the source term changes and you still want to meet
24 your limits, they could go further out, if necessary.

25 MR. ARTHUR: Right.

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1 MEMBER CORRADINI: Okay, thank you.

2 MR. ARTHUR: Routine release atmospheric
3 dispersion factors and the deposition factor at the
4 exclusionary boundary are shown here. And as was just
5 mentioned by you, the COL applicant will update these
6 factors consistent with their site meteorology.

7 For hydrology, we have specified the
8 maximum flood elevation and maximum groundwater
9 elevation consistent with previous applicants and the
10 EPRI URD at 1 foot and 2 feet below the baseline plan
11 elevation respectively. COL applicant will confirm
12 these and describe their site-specific hydrology.

13 For geology and seismology, the design
14 assumes parameters that are representative of a
15 reasonable number of plant sites in the United States.
16 Two design basis earthquakes are assumed with a
17 certified seismic design response spectra or CSDRS and
18 a high frequency version of that.

19 These spectra bound most of the central
20 and eastern United States and sites in less
21 seismically active portions of the western U.S.

22 The balance of the parameters shown in
23 this slide are consistent with past applicants and the
24 recommendations of the URD.

25 CO-CHAIRMAN RICCARDELLA: I assume these

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1 are based on the new updated central and eastern
2 United States seismology -- seismic risk report? I
3 forget the NUREG --

4 MR. ARTHUR: I'm going to phone a friend
5 here.

6 CO-CHAIRMAN RICCARDELLA: Pardon me?

7 MR. ARTHUR: Josh Parker, can you answer
8 that?

9 MR. PARKER: Yes, I mean our spectra was
10 developed initially in the 2010-2012 time frame and
11 they were consistent with the spectra available at the
12 time. The current spectra still bounds a number of
13 sites in the central and eastern United States --

14 CO-CHAIRMAN RICCARDELLA: Okay.

15 MR. PARKER: -- as well as the slide
16 indicates, the less seismically active areas of the
17 western United States.

18 CO-CHAIRMAN RICCARDELLA: Okay, thank you.

19 MR. ARTHUR: So we assume no potential for
20 liquefaction or slope failure. And the maximum
21 assumed settlement values are shown here: a total of
22 four inches, half an inch per 50-foot of building
23 length for tilt and a differential settlement of a
24 half inch.

25 MEMBER CORRADINI: There seems to be

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1 background noise in a kitchen. Could somebody please
2 mute their phones? Thank you.

3 CO-CHAIRMAN RICCARDELLA: Whoever is doing
4 your dishes, mute your phone.

5 MEMBER SKILLMAN: Let me ask this. On
6 slide 16, back a slide -- excuse me -- on this slide,
7 the tilt and total. Is there a unique discipline that
8 will be required on this site because the reactor
9 building is basically filled with water and there are,
10 at least the full build, 12 modules in that building?

11 This building is going to have a very
12 strong footprint, probably stronger than any we've
13 seen. Does that obligate something different in terms
14 of settlement and tilt?

15 MR. ARTHUR: I'd point that back to Josh
16 Parker as well.

17 MR. PARKER: Yes, I don't think it
18 obligates anything different. We still account for
19 the total mass. We still evaluate that on the generic
20 soil profile and evaluate the overall settlement. And
21 the COL applicant wants to do a similar analysis for
22 the site-specific conditions.

23 So while you are right, it is obviously
24 different and it has a lot of water in it, the process
25 for determining the overall settlement and tilt is

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1 still the same as it would be for any other applicant.

2 MEMBER SKILLMAN: Okay, just let me ask
3 one more question.

4 So you, not you personally, NuScale is
5 going to build one of these -- let's presume they
6 build one of these machines and they start with one
7 module and then a second. And there are ten vacant
8 spaces. And then they do the third and the fourth.

9 This is not different than loading a
10 supertanker and unless that loading is balanced, at
11 least in the supertanker, you can deflect and you can
12 destroy the haul unless you do it right. There is a
13 loading sequence, whether it is a bulk carrier or
14 particularly something that is carrying dry cargo
15 versus liquid cargo.

16 Is there a thought given to the settlement
17 that will occur because the loading beyond the water
18 footprint load is different because the module build
19 may be not symmetric?

20 MR. ARTHUR: I know we've done some
21 sensitivity studies in the seismic analysis for
22 different configurations of modules in the building.
23 I don't know if we specifically have addressed that
24 for settlement.

25 MR. PARKER: Yes, I was just going to

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1 mention that same thing.

2 In Chapter 3 we talk about that aspect
3 that you are referring to. And there is a COL item
4 for the site-specific vendor to confirm how modules
5 are going to be loaded into the plant and then perform
6 subsequent analyses to ensure adequacy of the design.

7 MEMBER SKILLMAN: Thank you.

8 CO-CHAIRMAN RICCARDELLA: You know I saw
9 a number in your report in terms of the required
10 static pounds per square foot of the capacity of the
11 soil. Is that significantly different than say a
12 standard PWR or BWR?

13 MR. PARKER: No, that's similar to other
14 designs. It's consistent with them.

15 CO-CHAIRMAN RICCARDELLA: Okay, thank you.

16 MEMBER KIRCHNER: Just for clarification,
17 it's consistent with what EPRI has estimated as needed
18 or it is consistent with your fully loaded 12-module
19 building and the resultant load that that provides?

20 MR. PARKER: Yes, maybe I misunderstood
21 the initial question. I thought the initial question
22 was on the available bearing capacity. And that
23 bearing capacity is consistent with past applicants'
24 assumed values. The load bearing command values is
25 based on analyses.

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1 CO-CHAIRMAN RICCARDELLA: And is that
2 significantly different than the bearing demand for a
3 standard P or BWR?

4 MR. PARKER: I couldn't speak to that off
5 the top of my head. I would have to look at past
6 applications.

7 CO-CHAIRMAN RICCARDELLA: Okay. I was
8 just trying to get to Dick's point about whether the
9 density is greater or less than a current design. But
10 maybe you could have an answer to that by a full
11 committee meeting.

12 MEMBER SKILLMAN: Yes, the requirement for
13 the soil-bearing capacity, the gentleman is right. I
14 agree with that.

15 I'm just thinking of a large building
16 filled with water and you add 12 several hundred-ton
17 modules to that and you do not do that symmetrically.
18 Do you crack the building?

19 You can break a supertanker. You can
20 break a bulk carrier. You can snap its backbone if
21 you don't do it right.

22 MR. ARTHUR: Yes, we'll look into that.

23 MEMBER SKILLMAN: Okay.

24 MR. INFANGER: We had a number of RAIs on
25 Chapter 2. As you can see, we've -- the majority of

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1 them are resolved closed, or the supplements have been
2 submitted and are under evaluation, and some of them
3 are in the confirmatory status.

4 We have one unresolved closed item. It
5 has to do with the release of radioactive of liquid
6 effluents in groundwater and we're proposing or in the
7 middle of discussions on how to resolve that issue.

8 MEMBER KIRCHNER: Just for clarification,
9 when you say accident release, now we're talking about
10 a single module, right, which is different from normal
11 effluence, where it would include all 12 modules,
12 right?

13 MR. INFANGER: I believe it's from the rad
14 waste building. So it would be common.

15 MEMBER KIRCHNER: Oh, from the rad waste
16 building. Okay.

17 MR. ARTHUR: Actually, no. It's from the
18 pool surge control tank that's outside the reactor
19 building.

20 MEMBER KIRCHNER: Oh.

21 MR. INFANGER: Thank you. That's a common
22 structure?

23 MR. ARTHUR: Yes.

24 MR. INFANGER: It's still common -- it's
25 a common structure.

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1 MEMBER CORRADINI: This is the open item.
2 I guess I misunderstood. This is not the same as the
3 unresolved closed.

4 What's such a thing as an unresolved
5 closed?

6 MR. INFANGER: That means we've had an
7 RAI, we've sent a response, and the response the staff
8 has said that they need additional information.

9 MEMBER CORRADINI: Oh, so they've come
10 back to you another time.

11 MR. INFANGER: Yes. We don't have a
12 written question yet. So we're in discussions.

13 MEMBER CORRADINI: Okay, thank you.

14 MR. INFANGER: There is one SER open item
15 is on the X/Q values for the EAB and LPZ. And that's
16 in the accident source term topical report which is
17 under review.

18 This is just one of the confirmatory
19 items. I believe there are 11 confirmatory items.
20 This slide has been deleted.

21 That concludes our presentation.

22 MEMBER MARCH-LEUBA: So the open items is
23 the method for calculating the LPZ.

24 MEMBER CORRADINI: The open items is the
25 source term that would be used in the calculation.

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1 MEMBER MARCH-LEUBA: Can you go to slide
2 18, acceptability of method for calculating accidents?

3 MR. INFANGER: Yes, it's the methodology
4 for calculating our X/Q. And a lot of it is using the
5 ARCON96 versus PAVAN. And it's the ARCON96 has been
6 used in the industry for control room doses. And
7 since our site boundary is essentially about the size
8 of most sites for control room dose, that code was
9 more applicable.

10 PAVAN is for much, much larger sites,
11 several miles.

12 MEMBER MARCH-LEUBA: But the calculation
13 keeps looking at the source term.

14 MEMBER CORRADINI: Yes, I guess maybe I'm
15 misreading the open item. I apologize. That could be
16 my mistake.

17 But I thought open item was to determine
18 the subject conditions limitations NuScale methodology
19 is acceptable for calculating accident offsite X/Qs.
20 This review is being tracked as an open item.

21 So I thought the methodology is dependent
22 upon the source term that is being used and I thought
23 that topical report was the alternative source term
24 you're proposing.

25 MR. ARTHUR: If would have Mark Shaver

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1 jump in here, I think the answer is that this
2 methodology is described in the accident source term
3 topical report but it does not depend on the source
4 term itself.

5 Mark, can you confirm that is true?

6 MR. SHAVER: This is Mark Shaver. I'm a
7 radiological engineer at NuScale.

8 J. J. is correct, the accident source term
9 topical report has the methodology to develop the
10 accident source terms, as well as Section on our
11 methodology to determine the EAB and LPZ X/Qs.

12 So the open item is that it's contingent
13 on the source term topical for the X/Q methodology.

14 MEMBER CORRADINI: Oh, okay. That's my
15 mistake then. I apologize.

16 MR. SHAVER: But methodologies are in it.

17 MEMBER CORRADINI: Okay, I misunderstood.
18 You were referencing the topical report. I thought it
19 was the source term itself but it's the methodology
20 because the presumption is it's close in.

21 Okay, thank you.

22 MR. SHAVER: Correct and the X/Q is not
23 dependent on the source term.

24 CO-CHAIRMAN RICCARDELLA: The source term
25 part of that has been accepted?

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1 MR. ARTHUR: Both are under review.

2 CO-CHAIRMAN RICCARDELLA: Okay.

3 MEMBER MARCH-LEUBA: And that's not an
4 open item or is under review on a different chapter?

5 MR. INFANGER: It's not an open item for
6 Chapter 2.

7 MR. SHAVER: Yes, that's Chapter 15.

8 MR. INFANGER: Oh, okay.

9 MEMBER CORRADINI: It's your favorite
10 chapter.

11 MEMBER MARCH-LEUBA: That one has
12 problems.

13 CO-CHAIRMAN RICCARDELLA: They're both
14 covered in that topical report, though.

15 MR. ARTHUR: Yes.

16 CO-CHAIRMAN RICCARDELLA: All right.

17 MEMBER MARCH-LEUBA: One final question.
18 We recently have been reviewing the early site permit
19 for Clinch River where they have one review as you
20 guys. Is the methodology similar to the one that TVA
21 used? I mean, have you at least coordinated with
22 them?

23 MR. INFANGER: I'm not familiar with what
24 TVA has submitted.

25 MEMBER MARCH-LEUBA: Because it's a

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1 completely independent operation.

2 MR. INFANGER: That's correct.

3 MEMBER CORRADINI: Just for the sake of
4 information remember for their sizing, they took a 800
5 megawatt thermal source term sized by four different
6 potential but it was at 800 megawatts thermal.

7 MEMBER MARCH-LEUBA: We're not talking
8 about source term here. We're talking about how to
9 propagate it to the boundary, which is what they did.

10 MEMBER CORRADINI: But that methodology is
11 similar.

12 MEMBER MARCH-LEUBA: I'm pretty sure it's
13 similar but they said they did not coordinate.

14 MR. INFANGER: Any other questions?

15 MR. SHAVER: This is Mark Shaver. That is
16 correct, we did not coordinate with TVA on our X/Qs.

17 MEMBER CORRADINI: Shall we move on? It
18 looks like the committee is silent. So, let's move
19 on.

20 Shall we get the staff up here?

21 MR. INFANGER: You guys are ready for the
22 staff?

23 MEMBER CORRADINI: There are a lot of
24 slides. So I assume there are a lot of staff.

25 MR. CHOWDHURY: Good afternoon. My name

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1 is Prosanta Chowdhury. I am with NOR, Office of New
2 Reactors, Division of Safety and Environmental
3 Assessment. The branch is LB1, Licensing Branch 1.
4 I have been with the NRC for about 14 years now, 10 of
5 which I have been working as the project manager in
6 NRO. My background is I have a master's degree in
7 electrical engineering and one in nuclear engineering.

8 And today we are presenting the staff
9 evaluation of NuScale design certification application
10 Chapter 2, Site Characteristics.

11 So the technical branches that are
12 represented here today are Radiation Protection and
13 Accident Consequences Branch, Hydrology and
14 Meteorology Branch, and Geosciences and Geotechnical
15 Engineering Branch. So under RPAC, Radiation
16 Protection and Accident Consequences Branch, Section
17 2.1, Geography and Demography, and Section 2.2, Nearby
18 Industrial, Transportation, and Military Facilities,
19 these two sections will be presented by that branch.
20 Hydrology and Meteorology Branch, we present Section
21 2.3, Meteorology and Section 2.4, Hydrology
22 Engineering. Geosciences and Geotechnical Engineering
23 Branch will present 2.4 -- 2.5, Geology, Seismology,
24 and Geothermal Engineering -- Geotechnical Engineering
25 actually.

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1 So the staff interactions with NuScale for
2 Section 2.3, which is meteorology requests for
3 additional information, ten questions were asked.
4 Four questions closed, six confirmatory action pending
5 EPSAR update and one open item.

6 So the review here that the staff
7 completed is based on Revision 1 of the application.
8 So we received Revision 2 of the application in
9 October. And the SE will be updated accordingly
10 later.

11 Section 2.4 has one question and that has
12 been closed, three confirmatory actions pending EPSAR
13 update.

14 Section 2.5 had three question; one
15 closed, two confirmatory action pending EPSAR update.

16 So today we have with us Rao Tammara. He
17 will be -- he is sitting next to me and he will be
18 presenting the staff evaluation on Sections 2.1 and
19 2.2. Next to him is Michael Mazaika. He will be
20 covering his evaluation of Sections 2.3.1 through
21 2.3.3. Jason White, next to Mike, will cover Sections
22 2.3.4 and 2.3.5. Yuan Cheng will cover Section 2.4.
23 And finally, Weijun Wang will cover Section 2.5.

24 So branch chiefs involved in this review
25 is Stephanie Devlin-Gill with Hydrology and

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1 Meteorological Section and she is present in the
2 audience.

3 Gerry Stirewalt is the Branch Chief of
4 RGS, which is Geology and Seismology branch. And Mike
5 Dudek, I don't believe he is in the audience, but he
6 is with RPAC.

7 And once again, I am Prosanta Chowdhury,
8 Project Manager.

9 With that, we are going to go into Section
10 2.1 and 2.2 and Rao Tammara will cover that.

11 MR. TAMMARA: Good afternoon. My name is
12 Rao Tammara. I have 45 years of experience, out of
13 this 22 with a consulting company doing the similar
14 work preparing the FSAR, EA, and the EIS sections for
15 utilities and government agencies. And for the past
16 18 years I am with the NRC doing FSAR and SSER
17 Chapters 2.1, 2.2 and also aircraft hazards, covering
18 the COLs and the ESP applications and design
19 certifications.

20 Next, this application I am the lead
21 reviewer for the Chapter 2 Site Characterizations
22 covering the Sections 2.1 and 2.2. Next slide, please
23 -- previous slide.

24 This Section 2.1 contains -- I mean
25 addresses the geography and demography. Section 2.2

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1 addresses the nearby industrial, transportation, and
2 the military facilities. Next slide, please.

3 Section 2.1, Geography and Demography
4 covers the areas addressing site location and the
5 description, exclusion area authority and control, and
6 population distribution. Since all this information
7 is site-specific, the DC will not have the information
8 to review; however, to see where the applicant
9 referencing the NuScale Power design is to provide
10 this site-specific information as a part of COL
11 information item 2.1-1 in the COL application.

12 Next slide, please.

13 Section 2.2 covering the nearby
14 industrial, transportation, and military facilities
15 will address the locations and the routes of all the
16 facilities within five miles of the site, descriptions
17 of the products, and manufacturing products, and also
18 evaluation of those facilities that may have a
19 potential on the proposed facility. Manmade hazards
20 these are all.

21 Since this is a design-specification or
22 design certification application, the site-specific
23 information is not addressed for this application.
24 Therefore, the applicant, COL applicant referencing
25 the NuScale Power design is to provide the site-

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1 specific information as a part of COL Information Item
2 2.2-1 in the COL application.

3 So, all the site-specific information will
4 be provided at the COL stage.

5 That is my presentation.

6 MEMBER SKILLMAN: I'd like to ask a
7 question here. And it is Section 2.2.1 and among your
8 safety evaluation at page 2-12, and here is the text.
9 And the reference for my question is this: The ACRS
10 is looking at the Clinch River site as a potential
11 location for a NuScale plant.

12 MR. TAMMARA: That is a potential, yes.

13 MEMBER SKILLMAN: Yes, okay. And it has
14 a neighbor that's called Oak Ridge National
15 Laboratory.

16 MR. TAMMARA: That's correct.

17 MEMBER SKILLMAN: So here's the COL item:
18 A COL applicant that refers the NuScale Power Plant
19 certification will describe nearby industrial,
20 transportation, and military facilities. The COL
21 applicant's information should describe the primary
22 function of each facility and the nature of the
23 hazards that it presents. This information for each
24 facility should include the facility's primary
25 function, major products, number of employees,

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1 materials regularly manufactured, stored, used, or
2 transported near the site and the hazards that could
3 result from accidents at each facility.

4 How is a COL applicant going to respond to
5 this if its neighbor is Oak Ridge National Laboratory?

6 MR. TAMMARA: It is the COL application.
7 If you take a look at the COL application the Clinch
8 River it has been assessed. I mean I assess it in the
9 sense the nearby facility has been addressed in the
10 Clinch River application.

11 MEMBER SKILLMAN: Okay, thank you.

12 MR. TAMMARA: Because it is not a design
13 basis but the facility is addressed. That is correct.

14 MR. CHOWDHURY: Anything else on 2.1 and
15 2.2, before we move on to 2.3?

16 MR. TAMMARA: I will turn it over to Mike
17 Mazaika to cover the site meteorology.

18 MR. MAZAIKA: Everybody hear okay? Okay.

19 Good afternoon, folks. My name is Mike
20 Mazaika. I'm one of several meteorologists in NRO and
21 have been on staff for just over ten years. Before
22 that, I spent 30 years in the engineering consulting
23 and air pollution research industries.

24 MEMBER MARCH-LEUBA: Mike, talk into the
25 microphone because there is people on the phone line.

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1 MR. MAZAIKA: Okay. Better?

2 Okay, before that I spent 30 years in the
3 engineering consulting and air pollution research
4 industry, including support for nuclear and fossil
5 projects. Next slide, please.

6 My presentation will cover the review of
7 2.3.1 through 2.3.3 of Revision 1 of the FSAR. My
8 colleague, Jason White will present the review of FSAR
9 Section 2.3.4 and 2.3.5

10 The last bullet on this slide which was
11 brought up earlier points out potential plant site
12 locations include all 50 states in the U.S., Alaska,
13 and Hawaii but that the DCA is silent on U.S.
14 Territories. That was brought up in an RAI question
15 for clarification.

16 Next slide, please.

17 This slides indicates that the applicant
18 postulated site parameters for various climatic
19 extremes, and for design basis accident, and routine
20 release atmospheric dispersion and deposition factors.
21 The staff performed its review in accordance with
22 applicable standard review plan sections, associated
23 regulatory guidance, and related data resources.

24 Finally, we note that eventual COL
25 applicants will need to compare their site

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1 characteristics to the site parameter values
2 postulated for the NuScale design. Next slide,
3 please.

4 This slide covers site parameters related
5 to extreme rainfall. The postulated site parameters,
6 which you've seen before, are related are 19.4 inches
7 per hour and 6.3 inches in five minutes. The values
8 are used, in part, in determining roof loading, which
9 is reviewed under Chapter 3.

10 In Section 2.3.1 we evaluate the site
11 parameters themselves. The postulated site parameter
12 values are consistent with most of the previously
13 submitted DCAs and on that basis, the staff considers
14 these site parameter values representative of a
15 reasonable number of locations in the contiguous U.S.
16 and for the State of Alaska.

17 Next slide, please.

18 This slide addresses winter precipitation.
19 The applicant site parameters for normal and extreme
20 winter precipitation events, they are 50 and 75 pounds
21 per square foot. They represent roof loads only.
22 Based on Interim Staff Guidance 007 and the SRP,
23 Section 2.3.1 is looking for the basic data as ground
24 snow loads. Conversion to roof loads is handled in
25 Chapter 3.

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1 The applicant did not specify the return
2 period for its postulated values. The guidance in the
3 ISG and the SRP calls for a return period of 100
4 years. Staff performed its review on that base, using
5 the 50-year ground snow load data and conversion
6 factors for other return periods in ASCE/SEI 7-10.

7 The staff focused on the snow load data
8 and the ASCE/SEI document, although the ISG also
9 considers rain on top of snow in the form of probable
10 maximum winter precipitation. The reactor and control
11 building roofs limit accumulation of liquid
12 precipitation so that frozen winter precipitation
13 events should be controlling.

14 The staff considers the site parameter
15 values postulated as roof loads to be representative
16 of a reasonable number of locations in the continental
17 U.S., including some portions of Alaska. Next slide,
18 please.

19 The next two slides summarize the staff's
20 review of the site parameters for design basis winds.
21 One hundred-year return period severe wind speed value
22 on this slide and tornado and hurricane-related
23 extreme winds on the next slide, which have much
24 longer return periods.

25 Severe wind speeds are represented by a

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1 three-second gust, as opposed to a sustained wind
2 speed. Consistent with several other design
3 submittals, this site parameter value, which is 145
4 miles per hour, when multiplied by a designated
5 importance factor shown in Chapter 3, represents a
6 100-year return period. According to the FSAR, this
7 value is applied to the reactor control and
8 radioactive waste buildings.

9 The staff performed its review using the
10 50-year basic wind speed values and 50- to 100-year
11 conversion factors presented in ASCE/SEI 7-05. The
12 staff considers that the site parameter value and
13 related characteristics are representative of a
14 reasonable number of locations in the contiguous U.S.,
15 Alaska, and Hawaii.

16 Next slide, please.

17 The next wind-related slides summarizes
18 the staff's review of design basis tornado parameters,
19 which include a maximum three-second gust wind speed
20 of 230 miles per hour and design-related
21 characteristics, for example, pressure drop and rate
22 of pressure decrease.

23 On the design-basis hurricane wind speed,
24 also a three-second gust but of 290 miles per hour.
25 Each of these design conditions is associated with an

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1 exceedance frequency of ten to the minus seven per
2 year.

3 The staff found that the tornado site
4 parameters are based on the current version of Reg
5 Guide 1.76 for Region 1, which is the highest tornado
6 intensity region in the contiguous U.S.

7 The staff also found that the three-second
8 gust for hurricane wind speed is based on the current
9 version of Reg Guide 1.221. The postulated value, 290
10 miles per hour is the most conservative among those
11 indicated for hurricane prone site locations in the
12 contiguous U.S., along the Gulf of Mexico, and
13 Atlantic coastlines. The staff confirmed that these
14 values are consistent with the NRC regulatory guidance
15 and, on that basis, considers that the postulated
16 tornado and hurricane site parameters are
17 representative of a reasonable number of locations in
18 the contiguous U.S.

19 Next slide, please.

20 This next slide deals with the staff's
21 review of the dry- and wet-bulb temperatures
22 postulated for the NuScale design. For our review,
23 there are three key takeaways on this slide.

24 First, like other design certification
25 applicants, these temperatures are referenced to the

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1 ERPI Utility Requirements Document or the URD. The
2 applicant cites Revision 13 of the URD issued in 2014,
3 which was updated to include small modular reactors.

4 Second, the staff determined that the
5 numerical values for these design-basis temperatures
6 have not changed since at least Revision 8 of the URD,
7 which was issued in 1999.

8 Third, the coincident wet-bulb
9 temperatures in the EPRI URD represent mean values;
10 whereas, the coincident wet-bulb temperatures
11 postulated for the design are said to represent
12 maximum values and that turns out to be a somewhat
13 important distinction.

14 Next slide, please.

15 MEMBER SKILLMAN: If you please, Mike. A
16 picky comment. This is on your Safety Evaluation page
17 220. You write: Zero percent exceedance
18 maximum/minimum amount for design dry-bulb
19 temperatures 46.1 Celsius, 115 Fahrenheit, and 40
20 degrees Centigrade minus 40 degrees Fahrenheit. You
21 actually show 40 and I think you mean minus 40 C.

22 MR. MAZAIKA: If that's a typo then we'll
23 --

24 MEMBER SKILLMAN: It's a typo. You need
25 a minus.

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1 MR. MAZAIKA: Okay. Part of that was a
2 constraint from the editors that we had to put the
3 metric units of measure before these English units.
4 And the site parameters are expressed in English units
5 of measure. So we'll correct that typo.

6 MEMBER SKILLMAN: I'm just saying that
7 there is a minus absent from the 40.

8 MR. MAZAIKA: Okay.

9 MEMBER SKILLMAN: Not a problem.

10 MR. MAZAIKA: Thank you.

11 CO-CHAIRMAN RICCARDELLA: Could you give
12 a little more explanation on that last bullet? You
13 said it was a significant difference. I'd like to
14 understand that a little better if I could.

15 MR. MAZAIKA: Regarding coincident wet-
16 bulb temperatures?

17 CO-CHAIRMAN RICCARDELLA: Well maximum
18 versus mean.

19 MR. MAZAIKA: That was the subject of an
20 RAI question. It is partially addressed in Revision
21 2 of the document and we are only reviewing through
22 Revision 1.

23 The applicant cites the EPRI URD. So
24 that's an inconsistency or an explanation that has to
25 be resolved in a subsequent revision of the document.

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1 Typically, ASHRAE, the air conditioning
2 industry defines their coincident wet-bulb
3 temperatures as mean values, which is why I confirmed
4 it with the folks at EPRI.

5 The applicant can choose to do that.
6 Statistically, it makes it more difficult to comply
7 with both parameters, if you have a dry and a wet-bulb
8 temperature pair or as an individual wet-bulb value.
9 But that's the current definition that the applicant
10 has in their document. So that's something that we
11 have to resolve with them.

12 CO-CHAIRMAN RICCARDELLA: Okay.

13 MR. MAZAIKA: Okay? All right, next
14 slide, please.

15 The staff looked at a climatological
16 database compiled by ASHRAE, which is cited in SRP
17 231, which I mentioned, for the contiguous U.S. and
18 Hawaii. We used our professional judgment for
19 evaluating temperature conditions in Alaska.
20 Acceptability of these site parameters from an
21 engineering standpoint is evaluated under Chapter 9.

22 The maximum design dry-bulb temperatures
23 at the zero, one, and five percent exceedance levels
24 are 115, 100, and 95 degrees Fahrenheit. Postulated
25 minimum dry-bulb temperatures are minus 40, minus 10,

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1 and minus 5 degrees Fahrenheit. These maximum and
2 minimum value are considered to be acceptable at a
3 reasonable number of locations.

4 The postulated one percent exceedance non-
5 coincident wet-bulb temperature is 80 degrees
6 Fahrenheit. It should also be acceptable at a
7 reasonable number of sites in the contiguous U.S.,
8 Hawaii, and, based on our judgment, in Alaska.

9 Next slide, please.

10 The last temperature-related slide deals
11 with our observations on wet-bulb temperatures in
12 previous COL and ESP application submittals and
13 information in the ASHRAE database. That is that
14 these site parameters in the NuScale DCA may be
15 exceeded in many locations. A similar issue was
16 discussed during the ACRS presentations for the
17 APR1400 application review.

18 The applicant's wet-bulb temperature site
19 parameter values apply to non-safety-related HVAC
20 systems and the cooling towers. And I refer you to
21 Tier 2, Table 3.2-1 in the DCA. Therefore, the
22 applicant considers it a business decision not to
23 change the proposed wet-bulb values.

24 Given that position and the applicant's
25 defining coincident wet-bulb temperatures as maximum

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1 rather than mean values, the second bulleted item
2 indicates that the dry-bulb temperatures in those
3 pairs appear to be acceptable at a reasonable number
4 of locations. On the other hand, the ASHRAE database
5 suggests that the coincident wet-bulb values are
6 likely to be exceeded in much of the contiguous United
7 States and Hawaii.

8 The last bulleted item indicates, based on
9 the staff's review, that there is a reasonable
10 expectation of the need for potential COL applicants
11 to request a departure from the postulated zero
12 percent non-coincident or the zero, one, or five
13 percent maximum coincident wet-bulb temperatures,
14 depending on site characteristics.

15 MEMBER BROWN: Question?

16 MR. MAZAIKA: Yes.

17 MEMBER BROWN: In your SER, you didn't use
18 the word much of the contiguous. You said most of the
19 contiguous U.S. Was there a -- I'm just reading from
20 page 39. The ASHRAE data suggests that postulated
21 temperature is likely to be exceeded in multiple -- in
22 most of the contiguous United States. That's a nuance
23 but it's a different word.

24 MR. MAZAIKA: True or not. So you're on
25 page 2-39? I have a different numbering system, so I

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1 must have it --

2 MEMBER BROWN: It's right above -- it's
3 the paragraph above 2.3.1.5 that's the next to the
4 last paragraph right above the next section.

5 MR. MAZAIKA: I do not know the answer to
6 that right now. That may be a transcription error
7 between the text of the document and the slides.

8 MEMBER BROWN: Okay, I just -- it's a
9 nuance work. It's a different word. Much is
10 different than most.

11 MR. MAZAIKA: Agreed. Agreed. I'll take
12 a look at that.

13 MEMBER BROWN: All right, thanks.

14 MEMBER SKILLMAN: Michael, a question just
15 for clarification, not challenge.

16 You said it was a business decision to use
17 the zero, one, and five maximum coincident. And then
18 you identified your third bullet with the potential
19 need for departures for the maximum coincident wet-
20 bulb.

21 It seems to me what that really is getting
22 to is the size of your condensers for your turbines
23 and your decay heat removal systems, heat exchanger
24 size. Is there anything else besides turbine
25 condenser and decay heat removal heat exchangers that

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1 is an economic consideration?

2 MR. MAZAIKA: I can't answer that question
3 directly because I'm not an engineer. I'm a
4 meteorologist. So I would defer that to somebody
5 under Chapter 3.

6 The systems that were identified were
7 based on RAI responses and conversations back and
8 forth with the applicant.

9 MEMBER SKILLMAN: Okay.

10 MR. MAZAIKA: So that's the best I can do
11 right now.

12 MEMBER SKILLMAN: That's fair enough.
13 Thank you.

14 MEMBER CORRADINI: I think we'd have to
15 ask NuScale but my immediate guess is control room
16 habitability issues are going to be affected by this.
17 Otherwise, you'd have to make modifications because in
18 APR1400, when we brought up -- the most recent one
19 when we brought up APR1400, it was relative to that.

20 MR. HOUGHTON: This is Zack Houghton. I'm
21 a mechanical design engineering manager with NuScale.

22 This would apply to the control room
23 ventilation system, not the control room habitability
24 system.

25 MEMBER CORRADINI: I'm sorry. I'm sorry.

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1 MR. HOUGHTON: It would apply to the
2 turbine condensers but it would not apply to the DHR
3 condensers. Those are located directly in the reactor
4 building pool, which is the ultimate heat sink which
5 also isn't affected by ambient conditions.

6 So these ambient conditions don't affect
7 any of our safety-related systems.

8 MEMBER SKILLMAN: So it's really the
9 turbine condensers and the HVAC for the control room,
10 those two.

11 MR. HOUGHTON: Correct, turbine condensers
12 and your air conditioning units is what will be sized
13 by this information.

14 MEMBER SKILLMAN: Yes, okay. Thank you
15 very much.

16 MR. MAZAIKA: Did that answer your
17 question?

18 MEMBER SKILLMAN: Yes.

19 MR. MAZAIKA: Okay. All right that will
20 wrap up 2.3.1, unless there are any other questions.
21 And then I'll go to 2.3.2 and 2.3.3 on the next slide,
22 since they represent site-specific conditions, the COL
23 applicant will have to address local meteorology and
24 the on-site met monitoring program and the staff
25 agrees with that position.

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1 With that, if there are no more questions,
2 I'll turn it over to my colleague, Jason White.

3 MR. WHITE: Thank you, Mike. Good
4 afternoon. As Mike stated, my name is Jason White.
5 And I am also a meteorologist in the Office of New
6 Reactors. I've been a member of the NRC staff for
7 just under 10 years and have served as a technical
8 reviewer in both the Office of Nuclear Reactor
9 Regulation and Office of New Reactors.

10 Today I will be discussing the review of
11 Sections 2.3.4 and 2.3.5 of the application.

12 This slide addresses Section 2.3.4, which
13 discusses the short-term atmospheric dispersion site
14 parameters for accident releases. The exclusion area
15 boundary, or EAB, an out of boundary of the low
16 population zone, or LPZ, offsite atmospheric
17 dispersion X/Q value site parameters are used in DCA
18 Tier 2, Chapter 15, to help demonstrate that the
19 offsite radiological consequences of accidents need to
20 specify radiation dose guidelines as specified in 10
21 CFR 52.47.

22 The applicant stated in the application
23 that Topical Report TR-0915-17565 describes their
24 methodology for calculating the accident X/Q values at
25 the EAB and LPZ.

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1 Staff performed an independent
2 verification of the applicant's off flight X/Q site
3 parameter values postulated for EAB and LPZ. Staff
4 used a portion of the NuScale methodology to calculate
5 X/Q values based on meteorological data collected at
6 six nuclear power plant sites.

7 Staff found that only one of these six
8 sites had X/Q values that are bounded by all of the
9 postulated NuScale site parameter values. Therefore,
10 if a COL applicant references a NuScale design and
11 finds that its actual site characteristic X/Q values
12 do not fall within the corresponding site parameters
13 postulated in the DCA, the COL applicant will need to
14 provide sufficient justification that the proposed
15 facility is still acceptable at the proposed site.

16 MEMBER CORRADINI: Let me clarify, make
17 sure I understand you. So one out of six passed based
18 on this. But I could move the boundary out and things
19 would change.

20 MR. WHITE: Yes.

21 MEMBER CORRADINI: Okay, fine.

22 MEMBER KIRCHNER: This was nominally the
23 -- NuScale presented a conceptual design where the EAB
24 and the LPZ were coincident. It's the same box.

25 MR. WHITE: Yes.

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1 MEMBER KIRCHNER: So what are you saying
2 here? The 400 foot distance that they show as the
3 minimum distance that only one out of the six sites.

4 MR. WHITE: Yes. According to our
5 independent verification, yes.

6 MEMBER KIRCHNER: Right. Okay. So in
7 practical terms, what does this mean? That either the
8 LPZ is moved out or you don't site it here?

9 MR. WHITE: Well, the COL applicant would
10 have to provide a justification of why it could be
11 sited there.

12 MEMBER KIRCHNER: Okay.

13 MEMBER MARCH-LEUBA: Now, I haven't seen
14 the numbers, but my suspicion is that NuScale is
15 saying it can be 400 feet because it's much, much
16 smaller than that and they have sufficient margin,
17 meaning that if a COL applicant does not meet the
18 parameters that they use, they may still meet the 400
19 feet most likely. So they have a little more wind or
20 something than assumed. They probably still need the
21 400 feet.

22 MEMBER KIRCHNER: Well, the LPZ is based
23 on dose not on X/Q, indirectly on the source term. So
24 --

25 MEMBER MARCH-LEUBA: What I'm saying is --

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1 MEMBER KIRCHNER: -- and EAB is a
2 different definition.

3 MEMBER MARCH-LEUBA: -- I haven't seen the
4 numbers. But the fact that NuScale is putting their
5 money on 400 feet, it means that they believe it is 10
6 feet.

7 MEMBER KIRCHNER: Okay.

8 MEMBER MARCH-LEUBA: Or actually zero
9 because they probably want to tell us the source time
10 is zero.

11 MR. WHITE: Well, they're saying that
12 their minimum distance will be 400 feet.

13 Next slide. The staff is currently
14 reviewing the topical report to determine if the
15 NuScale methodology is acceptable for calculating the
16 design basis accident offsite X/Q values at the EAB
17 and LPZ in relation to the NuScale design and in a COL
18 application that references the NuScale design.

19 This review is going to track as Open Item
20 2.3.4-1. Subject to resolution of the staff's
21 evaluation of the Topical Report, the staff concludes
22 that the applicant has appropriately provided short-
23 term accident release X/Q site parameter values.

24 Next slide. This slide discusses the
25 onsite main control room, or MCR, and technical

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1 supports in our TSC X/Q site parameter values. The
2 staff performed an independent verification of the
3 applicant's postulated onsite X/Q site parameter
4 values of the MCR and TSC doors and at the HVAC
5 intake.

6 The staff generated X/Q values using the
7 Reg Guide 1.194 endorsed ARCON96 computer code with
8 the source to receive the information presented in the
9 DCA.

10 On the basis of this evaluation, the staff
11 found that the applicant provided onsite X/Q site
12 parameter values of the MCR and TSC doors and the HVAC
13 intake that are representative of a reasonable number
14 of locations that may be considered for a COL
15 application.

16 Next slide. This slide addresses Section
17 2.3.5, which discusses the long-term atmospheric
18 dispersion site parameters for routine releases.
19 These site parameters are an offsite dose location
20 atmospheric dispersion X/Q and atmospheric deposition
21 D/Q values. The staff performed an independent
22 evaluation of the applicant's postulated offsite X/Q
23 and D/Q values.

24 Staff generated X/Q and D/Q values using
25 the XOQDOQ computer code, which implements portions of

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1 the Reg Guide at 1.111, the meteorological data from
2 various nuclear power plant sites and the release and
3 receptor information presented in the DCA.

4 On the basis of this evaluation, the staff
5 found that the long-term routine release atmospheric
6 dispersion and deposition site parameter values
7 selected by the applicant are representative of a
8 reasonable number of sites that have been or may be
9 considered for a COL application.

10 Next slide. This concludes the staff's
11 presentation on Section 2.3. If there are no
12 questions, Yuan Cheng will now present Section 2.4

13 MR. CHENG: Thank you, Jason. My name is
14 Yuan Cheng. I am an NRC technical reviewer for the
15 NuScale DCA Part 2, Tier 2, Section 2.4, hydrologic
16 engineering.

17 I hold a professional engineer's license
18 in several states including Maryland, Pennsylvania and
19 Ohio. I have worked for the NRC for approximately
20 five years as a hydrologist.

21 Prior to joining the agency, I have worked
22 in the private sector for approximately 35 years.
23 Recently, I completed the technical review on
24 hydrologic engineering for the Clinch River Early Site
25 permit applications.

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1 Next slide, please. Regarding applicant's
2 site parameters, the staff reviewed and conferred to
3 NuScale's three parameters related to Section 2.4,
4 hydrologic engineering. They are described in the DCA
5 Part 2, Tier 2, Section 2.0 and Table 2.0-1.

6 The first parameter is the maximum flood
7 level including wind induced wave run-up to be one
8 foot below the baseline to plant elevations.

9 The second is the maximum groundwater
10 level to be 2 feet below the site grade.

11 The third is the maximum precipitation
12 rate 19.4 inches in one hour and 6.3 inches in five
13 minutes.

14 MEMBER CORRADINI: So can I get a
15 clarification on the one foot below plant baseline,
16 plant elevation? What does that mean? So if the
17 ultimate heat sink swimming pool is so high, that's
18 one foot below the top of the swimming pool? But I
19 don't understand what one foot below baseline plant
20 elevation means.

21 MR. CHENG: Excuse me. Here it is talking
22 about the flood hazards. It's not talking about
23 interior tank failures.

24 MEMBER CORRADINI: So I'm looking for a
25 way to identify what that location is. Is that --

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1 MR. CHENG: External flood.

2 MEMBER CORRADINI: But I mean, is it one
3 foot below -- what's the baseline elevation? Is it a
4 piece of equipment or is the control room at baseline
5 elevation? What is baseline elevation?

6 MR. CHENG: Okay. The base plant
7 elevation is the finished floor elevations, finished
8 floor.

9 MEMBER CORRADINI: Okay. Thank you.

10 MR. CHENG: The concrete, the top of the
11 concrete.

12 MEMBER CORRADINI: Okay.

13 MEMBER MARCH-LEUBA: On a related
14 question, we recently reviewed the Turkey Point
15 application. And they actually considered climate
16 change for the sea level change, for really for 60
17 years. If NuScale was to be located close to a body
18 of water, would they need to consider climate change,
19 sea level changes?

20 MR. CHENG: Based on the standard review
21 plan and the current skylines and regulations, the
22 climate change is not included in the design.

23 MEMBER MARCH-LEUBA: But it was in this
24 particular application that we're reviewing.

25 MR. CHENG: Yes. But the ongoing change,

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1 like climate change, have sometimes impact on the sea
2 level rise, which deals with monitors and that kind of
3 documents and research.

4 If they truly have some negative impact or
5 adverse impact, we will re-evaluate the flood.

6 MEMBER MARCH-LEUBA: Is that going to be
7 part of your Chapter 2 contributions?

8 MR. CHENG: No, no. That is not part of
9 the NuScale's review. Climate change is not.

10 MEMBER MARCH-LEUBA: You're saying that
11 whatever the flood level is, you'd better be one foot
12 above it, right? And then we'll determine what the
13 flood level is on your site?

14 MR. CHENG: Yes. Based on this, it's one
15 foot below.

16 MEMBER MARCH-LEUBA: I mean, that's an
17 iffy way out.

18 MR. CHENG: Yes.

19 MEMBER MARCH-LEUBA: But okay.

20 MR. CHENG: The next slide. Reviewing the
21 applicant's Section 2.4, hydrology engineering, the
22 staff confirmed the hydrological conditions are site
23 specific and they will be evaluated in the COL stage.

24 The staff confirmed that in the COL stage,
25 the Section 2.4.1 through 2.4.14 with the exceptions

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1 of Sections 2.4.8 and 2.4.10 will be evaluated as they
2 are related to site specific hydrologic conditions.

3 The applicant provides the COL information
4 items 2.4.1 to defer the site specific analysis on
5 those sections.

6 Next slide. The staff confirmed that
7 cooling water canals and the reservoirs, Section
8 2.4.8, are not required as a safety-related made out
9 water sources for the other heat sink for the NuScale
10 design. The other heat sink design does not rely on
11 external water supply for at least 30 days.

12 Staff confirmed that flood protection
13 requirements, Section 2.4.10, are not applicable since
14 the baseline plant elevation is one foot above the
15 maximum flood level. Therefore, the staff confirmed
16 the COL stage, Section 2.4.8 and 2.4.10 are excluded
17 from the COL information, 2.4-1.

18 Next slide. The applicant provides the
19 COL information items, 2.4-1, and states as follows.
20 It combined licensed COL applicants that reference the
21 NuScale power plant design certification. We'll
22 investigate and describe the site specific
23 hydrological characteristics for the Section 2.4.1
24 through 2.4.14, except Section 2.4 and 2.4.10.

25 Next slide. Conclusions. The staff

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1 confirmed that the NuScale DCA site parameters meet
2 the requirements of 10 CFR Part 100.

3 The staff concludes that all regulatory
4 requirements have been satisfied with no open items.
5 Three confirmatory items remain in the staff's safety
6 evaluation report and will be confirmed with the
7 applicant's Revision 2 of NuScale's DCA Part 2, Tier
8 2, Section 2.4, hydrologic engineering.

9 This concludes my presentation, and I will
10 now pass the presentation to Dr. Weijun Wang for
11 Section 2.5.

12 MR. WANG: Okay. If there is no question
13 regarding 2.4, I will present the summary of the staff
14 review on the Section 2.5.

15 I'm Weijun Wang. I'm a senior
16 geotechnical engineer with the NRO. I have a PhD
17 degree in geotechnical engineering and am a licensed
18 professional engineer in Virginia.

19 I have been working in geotechnical
20 engineering and the related field for over 38 years,
21 including 12 years in accounting at the NRC and 13
22 years at the Federal Highway Administration.

23 I am one of the technical reviewers of the
24 Section 2.5, geologist, seismology and geotechnical
25 engineering.

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1 So this section includes the topics, like,
2 basics geological and the seismic information
3 vibratory ground motion surface faulting and basically
4 we are talking about seismic information here so the
5 stability of the subsurface materials and the
6 foundations on the slope stability.

7 Next slide please. This section, the
8 Section 2.5, the application established the site
9 parameters for the NuScale design and for the site
10 suitability determination. So this slide, just the
11 list related to site parameters because the applicant
12 already presents the details and values. So I just,
13 okay, with the list here.

14 Next slide please. The Section 2.5 and
15 2.5.3 defined geology related site parameters such as
16 no fault displacement potential under the plant
17 structures at the site. And they also specified in
18 COL information item that the site specific basic
19 regional and site geologic information to be addressed
20 by COL applicant.

21 By the way, because of the site
22 parameters, especially in 2.5, it's not site specific.
23 Therefore for the any site parameters here, it has to
24 be addressed by the COL applicant.

25 Next slide, please. The Section 2.5.2

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1 defined the certified seismic design by spectra. And
2 in this design it also defined another CSDRS at a high
3 frequency is best specified for the hot rock site
4 which is chute for the most central east U.S.

5 This tool, CSDRS, seismic loading design
6 bases and it in turn covers most of the south in the
7 U.S.

8 This section also defines as the COL for
9 main items to specify the site specific basic regional
10 and the seismic information with local vibratory
11 ground motion and site safe shutdown earthquake to be
12 addressed by the COL applicant.

13 Next slide, please. This slide shows the
14 example of the certified seismic design response
15 spectra to include the basic one and another one for
16 the high frequency.

17 Next slide, please. Sections 2.5.4 and
18 2.5.5 did not reveal the stuff usual, the RAIs.

19 CO-CHAIRMAN RICCARDELLA: Can I ask you a
20 question?

21 MR. WANG: Yes.

22 CO-CHAIRMAN RICCARDELLA: Go back to the
23 previous slide.

24 MR. WANG: Okay.

25 CO-CHAIRMAN RICCARDELLA: You have the

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1 design specification spectra and you have two other
2 spectras. Are those just shown there for reference?
3 The lower ones.

4 MR. WANG: Okay. The first one on the
5 chart on the left side one is also showed the
6 reference. That's the spectra response. That
7 response spectra it came in the Regulatory Guide at
8 1.60. It just gives the comparison, which we show
9 that for the NuScale design the certified -- the
10 seismic design of one spectra actually is envelope the
11 Regulatory Guide, the spectra.

12 CO-CHAIRMAN RICCARDELLA: Okay.

13 MR. WANG: I will continue. Okay. So in
14 the RAI for Section 2.5.4, the issues involved the
15 site subsurface material uniformity. And also about
16 some of the static and the dynamic parameters of the
17 subsurface material whether those parameters apply to
18 all the subsurface material, including the backfill
19 material and also related to the limits of the total
20 and the differential settlement for safety related
21 structures and the lateral earth pressure evaluation.

22 The applicant adequately addressed all of
23 the RAI issues and the specified pertinent items to be
24 addressed by COL applicants.

25 Next slide, please.

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1 MEMBER SKILLMAN: No, would you stay
2 there, please, on that slide.

3 MR. WANG: Okay.

4 MEMBER SKILLMAN: I'm looking at your
5 safety evaluation and unfortunately the portion of the
6 safety evaluation is protected information. Would you
7 speak a little bit about differential settlement?

8 You state on your third bullet limits of
9 total and differential settlements for safety related
10 structures. And it appears as though you have some
11 settlement details in the safety evaluation that are
12 unlimited. Would you speak to that please?

13 MR. WANG: Okay. The initial application
14 of the NuScale design for the set of parameters
15 regarding the total settlement initially it's a state.
16 There's no limit on the total settlement.

17 But our concern was it's normally for any
18 structures. If you have large the total settlement,
19 normally it's associated with larger differential
20 settlement.

21 Think about that. If a structure that's
22 uniformed, that settled and there's no connection to
23 other structures, it normally won't affect its normal
24 operation although it may cause some problems. For
25 example, if a building settled too much and your door

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1 probably will settle into the ground, you probably
2 will have hard time to get in and out.

3 So if you see anything like that, there's
4 no limit on the total settlement, then it will raise
5 a question. It's really you don't have any limit on
6 the total settlement. So that's one question we ask
7 in our RAI.

8 And finally the applicant responded to us
9 and said, yes, there is a limit. It's a limit of
10 total settlement of four inches. So that's a
11 reasonable value here.

12 MEMBER KIRCHNER: This is a good time to
13 ask a question. Since most of these site parameters
14 that you evaluated, I think NuScale used suggested
15 every industry kind of nominal values. I know we're
16 going to hear about actual evaluation against these
17 site characteristics when we get to Chapter 3 and 15
18 and other places, 15 like the meteorology factors
19 being used for accident analysis.

20 But is there anything that you
21 collectively, all of you found that was unique about
22 this design that would place more demands on the
23 siting characteristics than nominal values that they
24 have taken from EPRI. See what I'm saying?

25 I think settlement might be one because of

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1 the overall weight, mass and hence bearing pressure of
2 a very large building filled with water with 12
3 modules. Anything else like that unique that would
4 say that nominal values taken from an industry
5 recommended standard needs further investigation.

6 It seems like this RAI, for example,
7 focused on something that would be rather unique for
8 a NuScale module for the plant.

9 MR. WANG: Okay. I can only speak from
10 the geologist site module and the geotechnical
11 engineering area and regarding, like, the climate and
12 hydraulic. Probably my colleague can answer that.

13 And based on our review, I did not find
14 like anything really out of the normal run-off the
15 actual standard. Like, for example, if there's a
16 differential settlement, like the tool, it's like a 1
17 over the 600 to 1,200 and the half inch of
18 differential settlement, that's all the normal run-off
19 of the industry standard for the larger structures and
20 so forth.

21 Yes, if you are talking about the unit,
22 the loading for this design, this unit loading
23 actually is greater than, like, 81,000.

24 MEMBER KIRCHNER: Right.

25 MR. WANG: Yes. However, because the

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1 requirement for the bin capacity and the settlement
2 limit is always in the normal standard requirement.
3 So, therefore, at least in our section, we did not
4 identify anything abnormal.

5 MEMBER KIRCHNER: Thank you.

6 MEMBER SKILLMAN: Is the four inches that
7 you just mentioned a change to the safety evaluation?
8 Is there a new safety evaluation that identifies that
9 four inches and its acceptability?

10 MR. WANG: Yes. You know, it's for the
11 four inch in total settlement is not -- if you think
12 of four inches, probably this much, and you probably
13 sort of maybe too much actually for this type of
14 structure. Four inches of total settlement won't
15 cause any problem.

16 The only concern is the total settlement
17 is for -- was building. It doesn't matter. You know,
18 you also need to consider another issue is the so-
19 called another type of differential settlement which
20 is the settlement between two buildings because --

21 MEMBER SKILLMAN: We fully understand
22 that. We are, in your safety evaluation, we are
23 looking at the words of the document that we were
24 asked to review. And we are seeing text that would
25 suggest to us that there is no limit. And you are now

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1 saying there is a limit. It's four. The four is
2 acceptable. It's been evaluated. And it's a
3 differential settlement.

4 And you're also saying it's acceptable
5 because, I guess, you're thinking that the buildings
6 will settle at the same rate and at the same
7 displacement. We understand, at least I understand,
8 that's what you're saying.

9 MR. WANG: Okay.

10 MEMBER SKILLMAN: Thank you.

11 MR. WANG: You're welcome. Next one.
12 Okay. The conclusion --

13 MEMBER SKILLMAN: Is the FSR going to be
14 revised? How is that four inches going to be codified
15 in your safety evaluation? Will there be a revision
16 one?

17 MR. WANG: Okay. That's a number we will
18 be presenting in the, I believe, Revision 2 of the
19 FSR. We'll specify all the change. And by the way,
20 that's two confirmatory items we're tracking here.

21 MEMBER SKILLMAN: Okay. Thank you. Thank
22 you, sir. Thank you.

23 MR. WANG: So the conclusion is there is
24 no open items. And the applicant adequately specified
25 the site parameters related to geology and the

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1 seismology on the geotechnical engineering.

2 And also if the applicant probably
3 identified the site specific information to be
4 addressed in the COL application and it describes such
5 information in the COL open items. So, again, there
6 are two confirmatory items we are currently tracking.
7 I believe that will be my presentation. Any other
8 questions?

9 MEMBER CORRADINI: Other questions by the
10 committee? Should we go around -- why don't we first
11 hear comments from the -- can we open the line to the
12 outside world? The phone line -- she's working on it.
13 Is there any comments from members in the audience?
14 Is the phone line open?

15 MEMBER BLEY: You mean, like, members?

16 MEMBER CORRADINI: Well, Dennis, you're
17 more than welcome to -- but we have a separate public
18 line that's open that I'm also looking for members of
19 the public. We'll come back to the ACRS members after
20 we get the public.

21 PARTICIPANT: It's open.

22 MEMBER CORRADINI: Is any member of the
23 public going to make a comment? Okay. Going once.
24 All right. Why don't we close the line?

25 Okay. Dennis, why don't we start with

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1 you. Any comments you'd like to make about Chapter 2?

2 MEMBER BLEY: I have no extra comments
3 about Chapter 2. Thanks, Mike.

4 MEMBER CORRADINI: Let me ask another
5 question since we're not going to be coming back into
6 session until full committee when this is presented.
7 Do you have anything relative to an interim letter
8 that you want to emphasize, assuming the committee
9 wants to write it in a letter?

10 MEMBER BLEY: Hmm.

11 MEMBER CORRADINI: Is that a hmm or a yes?

12 MEMBER BLEY: That was a hmm. Personally,
13 I don't have anything. There was a lot of discussion,
14 not on Chapter 2 earlier, but you might want something
15 in there. But personally I don't have anything I
16 would feel obliged to call to your attention at this
17 point.

18 MEMBER CORRADINI: Okay. Thank you,
19 Dennis. So let me go around. We'll start with Walt
20 and go around the room.

21 MEMBER KIRCHNER: No further comments.
22 Thank you.

23 MEMBER CORRADINI: Let me make you,
24 though, talk about the opportunity for an interim
25 letter and if so, what things would be in it?

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1 MEMBER KIRCHNER: In my opinion, it's some
2 of the issues we debated with regard to Chapter 17.

3 MEMBER CORRADINI: Deserves to be
4 mentioned in an interim letter.

5 MEMBER KIRCHNER: In some manner this
6 expression, clarification on -- pardon me,
7 sufficiently closed on the ODIs to make a reasonable
8 assurance determination.

9 MEMBER CORRADINI: Okay. Thank you. I
10 actually forgot. Margaret, I assume, is still out
11 there. Margaret, are you still out there? No,
12 different line. Okay. She must have left us. Pete?

13 CO-CHAIRMAN RICCARDELLA: No. We have
14 some comments from our consultant, Steve Shultz, that
15 I think we'll have to take into account in our letter
16 writing.

17 MEMBER CORRADINI: Okay. But nothing from
18 you?

19 CO-CHAIRMAN RICCARDELLA: Nothing from me.

20 MEMBER CORRADINI: Okay.

21 MEMBER SKILLMAN: Yes. I would like to
22 ask the staff -- this is on Section 2.3 and this has
23 to do with identification of missiles more energetic
24 than design basis missiles defining FSR Tier 2,
25 Section 3.5.14. This is a coal item.

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1 And the question I wanted to ask when we
2 were going through this portion is what are these
3 missiles and what are their sources? And I'm
4 wondering if someone from the staff can respond to
5 that.

6 And I'll cite the SER location here in
7 just a second. I'm going through this as quickly as
8 my computer will allow. Please come back to me. Keep
9 on going and come back to me so I can be accurate when
10 I identify the issue. Matt, go ahead.

11 MEMBER SUNSERI: I don't have anything
12 else to add.

13 MEMBER CORRADINI: Jose?

14 MEMBER MARCH-LEUBA: Yes. I am a little
15 slow today because I have to confess I have not
16 prepared for these two chapters because I have been
17 occupied with other topical reports.

18 But during -- and this is not the worst
19 thing, but a favor I want to ask during the full
20 committee. I would like for, especially NuScale to
21 talk a little bit more about the low population some,
22 the LPZ methodology. Because I buy the Bellefonte
23 site and build a reactor there, I will be required to
24 have a 10 mile radius.

25 So obviously for some reason you are

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1 asking for an exception from the rule. All I hear is
2 that your LPZ must be larger than 400 feet. But I
3 have no idea how you plan to calculate it.

4 So if you could shed some light on what
5 you plan to do with LPZ, I mean, obviously, there's
6 going to be some cut of frequencies that you will not
7 --

8 MR. BERGMAN: I think those were probably
9 addressed better when you look at the EPZ methodology
10 report, which is separate from the DCA. It's not part
11 of our DCA application.

12 MEMBER MARCH-LEUBA: So this is not this
13 topic even though you included many --

14 MR. BERGMAN: We'll look to see if there's
15 a related question. But if it's specific about the
16 EPZ methodology, that is not part of the DCA.

17 MEMBER MARCH-LEUBA: We'll see that later?

18 MEMBER CORRADINI: We'll see that not as
19 part of the DCA. Not as part of the DCA. It's
20 separate from the DCA.

21 MEMBER MARCH-LEUBA: Will we see that
22 before summer?

23 MR. BERGMAN: I'll have to ask the staff
24 on their schedule.

25 MEMBER CORRADINI: I think, Jose, if I

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1 might, it's going to be part of the source term
2 discussion. The source term will be one of the
3 inputs. But the EPZ determination is a separate
4 entity than from the DCD.

5 MEMBER MARCH-LEUBA: Okay. If we don't
6 have it under CPI on the records, you are excluding
7 them out.

8 MR. CHOWDHURY: We do not have a schedule
9 for the EPZ Topical Report yet.

10 MR. SHAVER: So right now it's tentative
11 but we're going to --

12 MEMBER CORRADINI: Is it on?

13 MR. SHAVER: Thank you. So right now we
14 made the decision that we were going to focus on the
15 SER with open items. And that should be wrapping up
16 in July.

17 So right now we've tentatively scheduled
18 the emergency planning zone topical to have a
19 subcommittee meeting on October 22. And that means we
20 would need the staff's evaluation by September 22.
21 That's the current plan.

22 MEMBER MARCH-LEUBA: All I'm telling the
23 staff, until NTR is reviewed and approved, this
24 crucial zone is certainly larger than 400 feet because
25 it is 10 miles.

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1 MEMBER CORRADINI: Now you're getting
2 confused about emergency planning zone and LPZ.

3 MEMBER MARCH-LEUBA: LPZ.

4 MEMBER CORRADINI: The emergency planning
5 zone is 10 and 50 by rule.

6 MEMBER MARCH-LEUBA: Yes.

7 MEMBER CORRADINI: But that's not the EAB
8 and the LPZ. It's a different calculation.

9 MEMBER MARCH-LEUBA: Mm-hmm.

10 MEMBER CORRADINI: One is a siting
11 calculation and one is an emergency planning zone
12 calculation. Different --

13 MEMBER KIRCHNER: EAB, that's a different
14 definition. These are different terms, Jose. So EAB
15 is the terminology where the owner of the site
16 controls that boundary.

17 MEMBER MARCH-LEUBA: That's my fence.

18 MEMBER KIRCHNER: LPZ is a dose-based
19 designation for distance.

20 MEMBER MARCH-LEUBA: Which we just went
21 through the methodology for calculating for Clinch
22 River.

23 MEMBER KIRCHNER: And the EPZs are
24 currently 10 and 50. But these are different.
25 They're all different. They're all defined

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1 differently. And so just be careful. I think you
2 were confusing --

3 MEMBER CORRADINI: But I think, Jose's
4 point is when are we going to get to it? The answer
5 is probably not until late '19.

6 MEMBER MARCH-LEUBA: Okay. Until such
7 time as the staff gets it, the EPZ, and I think the
8 LPZ, too, is too much. I mean all around the LPZ --

9 MEMBER CORRADINI: I think you're
10 incorrect about the LPZ. You are correct about the
11 EPZ.

12 MEMBER MARCH-LEUBA: Okay. For sure the
13 EPZ.

14 CO-CHAIRMAN RICCARDELLA: Except for
15 Clinch River TVA requests an exemption to the ten
16 mile.

17 MEMBER KIRCHNER: Because the rule-making
18 is in process, what TVA chose to do was to, in their
19 early site permit, ask for two exemptions, which the
20 staff reviewed. And so it's through exemptions that
21 they're looking for a different definition of the EPZ
22 for the plume exposure pathway.

23 MEMBER BLEY: But that's irrelevant for
24 the devices. It's true. But it's irrelevant for the
25 devices.

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1 MEMBER CORRADINI: You have to get closer,
2 Dennis. We can't hear you. You're a bit muffled.

3 MEMBER BLEY: I'm screaming into my phone
4 at the top of my voice. Never mind.

5 MEMBER MARCH-LEUBA: Okay. Given the
6 extent of the discussion, during the full committee if
7 we can have a slide on it, on the concept, so I can
8 understand what we're talking about. I will not
9 proceed. Next.

10 MEMBER BALLINGER: No further comment.

11 MEMBER CORRADINI: Charlie?

12 MEMBER BROWN: No further comment.

13 CO-CHAIRMAN RAY: I don't have a comment
14 on two. Were you asking about 17 also? That's what
15 I thought. I don't know. Were you responding, Matt,
16 for example, on 17?

17 MEMBER SUNSERI: I was deferring to you
18 actually.

19 CO-CHAIRMAN RAY: Okay. I don't expect I
20 would recommend, but I need to think about it some
21 more so everything is tentative here.

22 On recommended comments, Mike, directed
23 toward NuScale, I think that comments may be
24 appropriate in terms of how we look at the process
25 ourselves. And I just need to discuss that among the

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1 members a little further. I've sent an email to you.

2 MEMBER CORRADINI: I'm not following you,
3 I'm sorry.

4 CO-CHAIRMAN RAY: I don't see anything in
5 what NuScale has presented that tells me we need to
6 comment about what they're doing or their program or
7 whatnot.

8 MEMBER CORRADINI: In terms of an interim
9 letter?

10 CO-CHAIRMAN RAY: Correct.

11 MEMBER CORRADINI: Okay. I missed that.

12 CO-CHAIRMAN RAY: But what I am saying is
13 that with regard to how we, the agency, are dealing
14 with it, there may be a comment that we should make.

15 MEMBER CORRADINI: Okay.

16 CO-CHAIRMAN RAY: Because it's related to
17 our process not their process.

18 MEMBER CORRADINI: But let me just get to
19 it though. I mean, my sense of it is though that from
20 your original comments on 17, if we do an interim
21 letter, there are going to be some comments to the
22 staff about the SER that we might want to make
23 relative to, we'll call it, finding reasonable
24 assurance for closure of these ODIs.

25 CO-CHAIRMAN RAY: Well, that's one aspect

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1 of it. There are others as well --

2 MEMBER CORRADINI: Okay.

3 CO-CHAIRMAN RAY: -- having to do with how
4 the status is monitored post-design certification for
5 example.

6 MEMBER CORRADINI: Okay.

7 CO-CHAIRMAN RAY: But it needs some more
8 discussion because we're into a process space here
9 where we need to make sure we understand what the
10 intent is of the design certification relative to what
11 happens before, what happens afterward and so on.

12 But in terms of the program that NuScale
13 presented, I don't --

14 MEMBER CORRADINI: You don't see a need.

15 CO-CHAIRMAN RAY: Personally, right now,
16 I don't see a need. It may evolve --

17 MEMBER CORRADINI: Okay.

18 CO-CHAIRMAN RAY: -- out of further
19 discussion. But that's the way I see it.

20 MEMBER CORRADINI: Okay. Let me go back
21 to Dick. We skipped over Dick.

22 MEMBER SKILLMAN: Thank you. This is a
23 2.2.4 in the safety evaluation. It is on Page 217.
24 And here's the text. NuScale is saying the applicant
25 stated -- or the NRC is communicating what NuScale

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1 communicated. The applicant stated the following
2 principal types of hazards will be considered with
3 respect to each of the above areas of review if they
4 have a probability of occurrence greater than ten to
5 the core minus seven per year. I got it.

6 This is more energetic than tornado
7 missile spectra. I understand that this becomes the,
8 if you will, the applicant's accountability. But I'm
9 just wondering what the NRC was thinking when they
10 wrote missiles more energetic than tornado missile
11 spectra or if that was just, if you will, a statement
12 to establish an envelope for which the safety
13 evaluation is applicable. It's Section 2.2.2.

14 MR. TAMMARA: I think hurricane missiles
15 might be a little bit higher than that one, but that
16 will be looked at by the COL applicant. That's what
17 the intent was.

18 MEMBER KIRCHNER: Dick, I remember --

19 MR. TAMMARA: Because we went through, and
20 the question arose at the PSEG application or
21 whatever. And we discussed it, too, and we discussed
22 this aspect a little bit at that time.

23 And the new regulatory aspect of whatever
24 it is it was proposed it is higher than the --

25 MEMBER SKILLMAN: I think it was the

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1 hurricane straight line winds and the potential for
2 the higher wind field to lift a vehicle or a fairly
3 large component.

4 MEMBER KIRCHNER: Normally the tornado
5 missile dominates. But there were certain sites where
6 it appears. And we saw one that was at the Turkey
7 Point, right, in Florida, where the hurricane
8 generated missile actually was dominant. And so I
9 suspected, the way I interpreted it, is normally it's
10 going to be -- I forget the reg guys. You all live
11 and die --

12 (Simultaneous speaking.)

13 MEMBER KIRCHNER: There was a more recent
14 reg guy for hurricanes.

15 MEMBER SKILLMAN: It's 1.22.1.

16 MR. TAMMARA: The COL applicant will
17 calculate that probability and show that it might be
18 less than ten to the core minus seven.

19 MEMBER SKILLMAN: Thank you. That was the
20 item that was tugging at me. And, Mike, the other
21 item is I think, you know, one man's opinion. This
22 plant is a heavyweight. It's a dense plant. It is a
23 large footprint with a large volume and mass of water
24 in 12 modules.

25 And I understand soil bearing requirement.

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1 But I'm thinking, as large and strong as this building
2 is, it's still an eggshell. And there are some
3 demands on the structure of the reactor building that
4 are different from any, at least that I've seen, in my
5 career. And I'm not sure that that's highlighted as
6 prominently as it needs to be. And that's all I want
7 to say. Thanks.

8 MEMBER CORRADINI: Anything else from any
9 of the members? Okay. With that, we'll adjourn.
10 Happy holidays.

11 (Whereupon, the above-entitled matter went
12 off the record at 4:59 p.m.)

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ACRS Presentation

Chapter 17 -

Quality Assurance and Reliability Assurance



Patrick Conley
Engineering Programs

Paul Infanger
Licensing Project Manager

December 18, 2018

Purpose

- Provide FSAR Chapter 17 overview
 - Quality Assurance Program (QAP)
 - Design Reliability Assurance Program (D-RAP)

Quality Assurance Program

- Established in accordance with 10 CFR 50 App B and ASME NQA-1-2008 with NQA-1a-2009 addenda as endorsed by RG 1.28, Rev. 4
 - Consistent with guidance in NUREG-0800 and NEI 11-04A Rev. 0 QAPD template

- Consists of
 - Approved TR-1010-859-NP-A, “Quality Assurance Program Description for the NuScale Power Plant,” Rev. 3
 - Quality Management Plan (QMP) - identifies requirements fully implemented and requirements not within scope of design phase, but may be implemented in future
 - Implementing procedures listed in QMP

QAP (cont'd)

Section No.	Description	Remarks
17.1	Quality Assurance during the Design Phase	Described in 17.5
17.2	Quality Assurance during the Construction and Operation Phase	Not applicable to design certification Item COL 17.5-1
17.3	Quality Assurance Program Description	Section 17.5
17.5	Quality Assurance Program Description – Design Certification, Early Site Permits, and New License Applicants	Does not address construction and design QA activities that begin once construction begins

COL Items

- 17.4-1 Describe RAP to be conducted during operations
- 17.4-2 Identify site-specific SSC in RAP
- 17.4-3 Identify QA controls for RAP SSC during site-specific design, procurement, fabrication, construction, and preoperational testing
- 17.5-1 Describe QAP applicable to site-specific design, construction, and operation
- 17.6-1 Describe 10 CFR 50.65 maintenance effectiveness monitoring program

RAIs

- Only three RAIs on Ch 17
 - RAI 8879 17.04-1 (chemical and volume control system)
 - RAI 8879 17.04-2 (expert panel)
 - RAI 8909 17.04-3 (backup power)

- All three are Resolved-Closed

D-RAP Process

- Complies with NUREG-0800, Section 17.4
- Process controlled by procedure
- SSC risk categorization determined by SME and confirmed by expert panel, which makes final decision
 - Expert panel consists of Design Engineering, Operations, PRA, and Safety Analysis
 - Licensing is a non-mandatory member

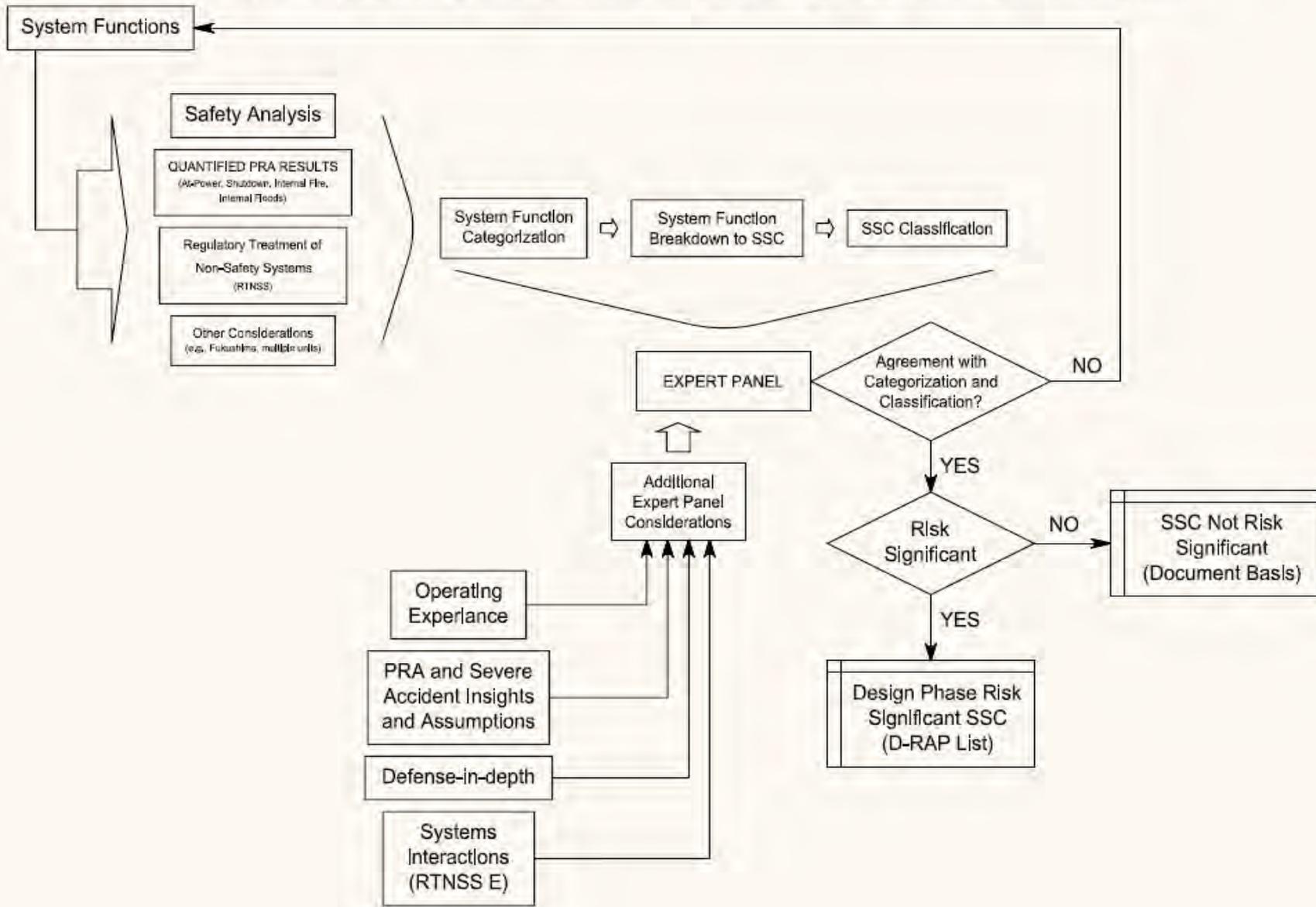
D-RAP Process (cont'd)

- PRA input based on approved TR-0515-13952-NP-A “Risk Significance Determination,” Rev. 0
- Default classification is “risk-significant” for safety-related functions, unless PRA specifically determines SSC functionality is not risk-significant
- Engineering Change Control process determines if expert panel review is required

RTNSS

- FSAR 17.4.3.3 states the process for evaluating SSC for the regulatory treatment of non-safety systems (RTNSS) program is described in FSAR 19.3
 - No RTNSS criterion met
 - No RTNSS SSCs in design

Figure 17.4-1: NuScale D-RAP Process for SSC Risk Significance Determination



Risk Significance Determination (RSD)

Table 1. NuScale criteria for risk significance

Parameter	Criteria for Risk Significance
Component-level basic event	Conditional CDF $\geq 3 \times 10^{-6}$ /yr
System-level basic event	Conditional CDF $\geq 1 \times 10^{-5}$ /yr
Component-level basic event	Conditional LRF $\geq 3 \times 10^{-7}$ /yr
System-level basic event	Conditional LRF $\geq 1 \times 10^{-6}$ /yr
Basic event/contributor	Total FV ≥ 0.20

- Key conditions and limitations in RSD topical report SER
 - Only applicable to NuScale
 - Risk-informed applications include consideration of risk-significant SSCs with other concepts (e.g., defense in depth)
 - Technically adequate PRA that addresses all hazards and all modes
 - Thresholds based on very low CDF ($< 1 \times 10^{-7}$ per year)
- NuScale met all conditions and limitations

D-RAP PRA Candidates

- Candidate risk-significant SSCs from PRA
 - Systems
 - emergency core cooling system (ECCS)
 - module protection system
 - ultimate heat sink
 - Components
 - ECCS reactor vent valves and reactor recirculation valves
 - decay heat removal system actuation valves
 - reactor safety valves
 - containment system containment isolation valves (CIVs)
 - chemical and volume control system CIVs
 - containment evacuation system CIVs
 - combustion turbine generator

D-RAP PRA Candidates (cont'd)

- Other events and initiators (Fussel-Vesely FV>20%)
 - Reactor Building crane
 - LOCA inside containment
 - LOCA outside containment
 - loss of offsite power
 - internal fires
 - internal floods
- Human actions (FV>20%)
 - chemical and volume control system actuation
 - containment flooding and drain system actuation

Final D-RAP Results

- Table 17.4-1: Risk-significant D-RAP SSC
 - containment system
 - steam generator system
 - reactor core system
 - control rod drive system
 - reactor coolant system
 - emergency core cooling system
 - decay heat removal system
 - ultimate heat sink
 - module protection system
 - neutron monitoring system
 - Reactor Building, Reactor Building crane, Control Building

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United States Nuclear Regulatory Commission

Protecting People and the Environment

Safety Evaluation with Open Items: Chapter 17, “Quality Assurance and Reliability Assurance”

NuScale Design Certification Application

ACRS Subcommittee Meeting
December 18, 2018

Agenda

- NRC Staff Review Team
- Summary of the NRC Staff's Review
- Quality Assurance
 - FSAR Sections: 17.1, 17.2, 17.3, and 17.5
- Reliability Assurance
 - FSAR Section: 17.4
- Abbreviations

NRC Staff Review Team

- Technical Staff
 - Odunayo Ayegbusi, NRO
 - Andrea Keim, NRO
 - Mark Caruso, NRO (Retired)
 - Alissa Neuhausen, NRO
- Project Management
 - Omid Tabatabai, Senior Project Manager
 - Greg Cranston, Lead Project Manager

Overview and Summary of Staff's Review

- DCA Rev. 0 submitted in Dec. 2016; Rev. 1 in Mar. 2018; and Rev. 2 in Oct. 2018. The Staff's SER is based on DCA, Rev 1
- Issued 2 RAIs (containing 3 questions) related to Section 17.4. All RAI Questions are resolved-closed
- Conducted two regulatory audits related to Section 17.4 during April-August 2017 and March-April 2018
- Conducted one Quality Assurance Implementation Inspection in June 2017. A follow-up inspection is being planned
- The Staff's Chapter 17 SER contains two open items – details will be discussed in the subsequent slides
- There are no Confirmatory Items in the SER

Section 17.5

Quality Assurance

Regulatory Basis

- 10 CFR Part 50, Appendix A, GDC 1 requires that QA program be established and implemented
- 10 CFR Part 50, Appendix B specifies 18 quality criteria that the QA program description must address
- 10 CFR 52.47(a)(19) requires that a standard DC applicant include a QAPD that satisfies applicable portions of Appendix B to 10 CFR Part 50

Topical Report Review

- NuScale submitted Topical Report NP-TR-1010-859-NP, “Quality Assurance Program Description for the NuScale Power Plant,” Revision 3 on March 24, 2016
- NuScale commits to NQA-1-2008 and NQA-1a-2009 addenda as endorsed by RG 1.28, Revision 4
- The NRC staff reviewed the QAPD using NUREG-0800 Section 17.5
- The NRC staff SER dated September 22, 2016

Staff's Review of DCA, Section 17.5

- References “Quality Assurance Program Description for the NuScale Power Plant,” NP-TR-1010-859-NP-A, Revision 3
- COL Item 17.5-1: A COL applicant that references the NuScale Power Plant design certification will describe the quality assurance program applicable to the site-specific design activities and to the construction and operations phases.
- Open Item 17.5-1: Additional QA implementation inspection

QA Implementation Inspection

- June 5 - 9th, 2017
- NuScale Office Facility in Corvallis, Oregon
- Inspection Procedure 35017, “Quality Assurance Implementation Inspection”
- No findings of significance were identified
- QA Inspection Report is publicly available at (ML1720J382).
- Additional QA inspection is being scheduled and is listed in SER Open Item 17.5-1

Section 17.4

Reliability Assurance Program

(RAP)

Reliability Assurance Program

- Staff evaluated NuScale’s reliability assurance program, including the design RAP (D-RAP) list in accordance with SRP Section 17.4, Rev. 1
- Staff found the RAP program sufficient in:
 - Program description and implementation
 - Programmatic controls
 - SSC selection methodology
 - Expert panel member requirements
 - Determination of risk significant SSCs

Reliability Assurance Program

- Staff found:
 - the D-RAP list was developed in accordance with its RAP methodology and the D-RAP list is comprehensive.
 - NuScale adequately implemented the expert panel in developing the D-RAP list.
 - COL items provide reasonable assurance that the RAP for a COL applicant which references the NuScale design will be adequate.
- Open Item: D-RAP ITAAC (SECY-18-0093)

Abbreviations

ACRS	<i>Advisory Committee on Reactor Safeguards</i>
COL	<i>Combined License</i>
DC	<i>Design Certification</i>
DCA	<i>Design Certification Application</i>
D-RAP	<i>Design Reliability Assurance Program</i>
FSAR	<i>Final Safety Analysis Report</i>
ITAAC	<i>Inspections, Tests, Analyses, and Acceptance Criteria</i>
NRO	<i>NRC Office of New Reactors</i>
QA	<i>Quality Assurance</i>
RAP	<i>Reliability Assurance Program</i>
SER	<i>Safety Evaluation Report</i>
SSC	<i>Structures, Systems, and Components</i>

ACRS Presentation

Chapter 2 - Site Characteristics and Site Parameters



J. J. Arthur, P.E.

Manager, Structures and Design Analysis

Paul Infanger

Licensing Project Manager

December 18, 2018

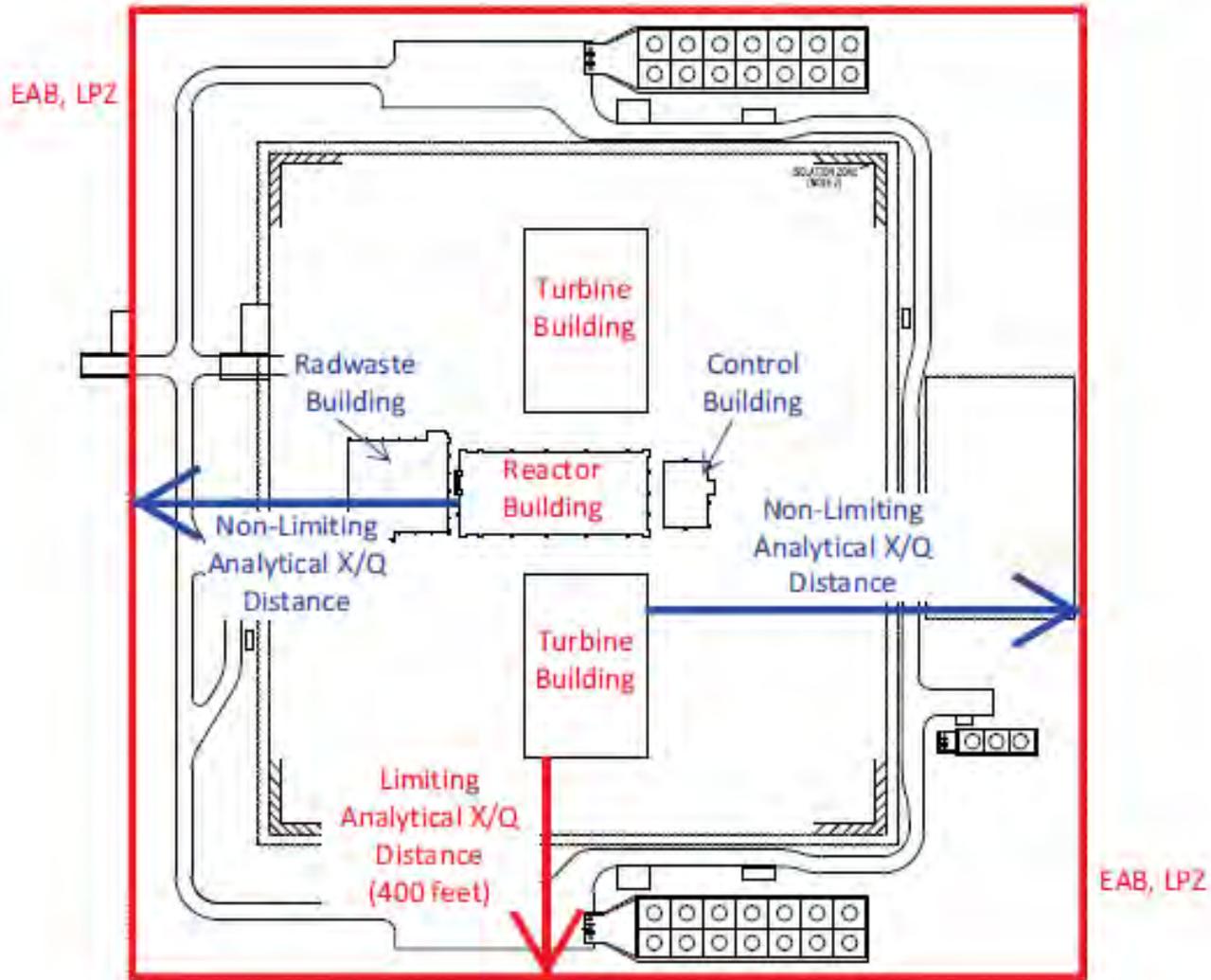
Purpose

- Provide FSAR Chapter 2 overview
 - Site characteristics and parameters
 - RAIs
 - SER open item

Chapter 2 Overview

- Site parameters are generally consistent with past applicant precedents and 2014 EPRI Advanced LWR Utility Requirements Document

Conceptual Site Layout



Site Design Parameters

- Design assumes site parameters representative of a reasonable number of potential plant site locations in the U.S. A summary of the parameters is in FSAR Table 2.0-1 and provided in following slides.
- COL Item 2.0-1: demonstrate site-specific characteristics are bounded by design parameters specified in Table 2.0-1. If not bounded, demonstrate acceptability of site-specific values.

2.1 Geography, Demography

- Minimum distance from EAB to nearest release point – 400 ft
- Minimum distance from LPZ outer boundary to nearest release point – 400 ft
- COL Item 2.1-1: describe site geographic and demographic characteristics

2.2 Nearby Facilities

- No hazards from nearby industrial, transportation, or military facilities postulated
- No aircraft hazards postulated
- COL Item 2.2-1: describe nearby industrial, transportation, and military facilities; demonstrate design acceptability for each potential accident or provide site-specific design alternatives

2.3 Meteorology

- Max precipitation rate [HMR (NOAA), EPRI URD]
 - 19.4 inches/hr (6.3 inches for 5 min period)
- Roof snow load [HMR (NOAA), EPRI URD]
 - normal / extreme 50 psf / 75 psf
- 100-yr return 3-sec wind gust (EPRI URD)
 - 145 mph with importance factor of 1.15 for RXB, CRB, RWB
- Design basis tornado (RG 1.76)
 - max wind speed 230 mph
 - translational speed 46 mph
 - max rotational speed 184 mph (radius 150 ft)
 - pressure drop / rate 1.2 psi / 0.5 psi/sec

2.3 Meteorology (cont'd)

- Tornado missile spectra (RG 1.76 R1, Table 2, Region 1)
- Design basis hurricane (RG 1.221)
 - missile spectra (RG 1.221 R0, Tables 1 & 2)
 - max wind speed 290 mph
- 0% exceedance values (historical limit excluding peaks < 2 hr) used for CRVS design
 - max outdoor design dry bulb temp 115°F
 - min outdoor design dry bulb temp -40°F
 - max coincident wet bulb temp 80°F
 - max non-coincident wet bulb temp 81°F

2.3 Meteorology (cont'd)

- 1% exceedance values used for RXB and RWB HVAC design, and SCWS and CWS design
 - max outdoor design dry bulb temp 100°F
 - min outdoor design dry bulb temp -10°F
 - max coincident wet bulb temp 77°F
 - max non-coincident wet bulb temp 80°F
- 5% exceedance values used for TGB HVAC design
 - max outdoor design dry bulb temp 95°F
 - min outdoor design dry bulb temp -5°F
 - max coincident wet bulb temp 77°F

2.3 Meteorology (cont'd)

- Atmospheric dispersion X/Q methodology based on ARCON96
 - NuScale site boundary (400 ft) vs traditional LWR (~ 2,600 ft – 19,700 ft)
 - NuScale applies ARCON96 methodology based on RG 1.194 for improved accuracy in predicting atmospheric dispersion for a short EAB/LPZ distance, as opposed to a PAVAN methodology based on RG 1.145, which was developed for longer distances
 - Methodology described in Accident Source Term topical report Rev. 2

2.3 Meteorology (cont'd)

- Accident release X/Q at EAB/LPZ boundary
 - 0-2 hr $6.22\text{E-}04 \text{ s/m}^3$
 - 2-8 hr $5.27\text{E-}04 \text{ s/m}^3$
 - 8-24 hr $2.41\text{E-}04 \text{ s/m}^3$
 - 24-96 hr $2.51\text{E-}04 \text{ s/m}^3$
 - 96-720 hr $2.46\text{E-}04 \text{ s/m}^3$
- Accident release X/Q at MCR/TSC door and HVAC intake
 - 0-2 hr $6.50\text{E-}03 \text{ s/m}^3$
 - 2-8 hr $5.34\text{E-}03 \text{ s/m}^3$
 - 8-24 hr $2.32\text{E-}03 \text{ s/m}^3$
 - 1-4 days $2.37\text{E-}03 \text{ s/m}^3$
 - 4-30 days $2.14\text{E-}03 \text{ s/m}^3$

2.3 Meteorology (cont'd)

- Routine release X/Q and D/Q (bounding offsite dose)
 - undepleted/no decay $1.44\text{E-}05 \text{ s/m}^3$
 - undepleted/2.26-day decay $1.44\text{E-}05 \text{ s/m}^3$
 - depleted/8.00-day decay $1.44\text{E-}05 \text{ s/m}^3$
 - D/Q $1.44\text{E-}07 \text{ I/m}^2$
- COL Item 2.3-1: describe site-specific meteorological characteristics for Section 2.3.1 through Section 2.3.5

2.4 Hydrology

- Max flood elevation (EPRI URD)
 - 1 ft below baseline plant elevation
- Max groundwater elevation (EPRI URD)
 - 2 ft below baseline plant elevation
- COL Item 2.4-1: investigate and describe site-specific hydrologic characteristics for Section 2.4.1 through Section 2.4.14

2.5 Geology, Seismology

- Design uses geologic, seismologic, and geotechnical engineering parameters representative of a reasonable number of potential plant site locations in the U. S.
- Two DBEs: CSDRS and CSDRS-HF
- Spectra bound most of central and eastern U.S., and sites in less seismically active portions of western U.S.
- Fault displacement potential none
- Min soil bearing capacity 75 ksf
- Lateral soil variability uniform (< 20° dip)
- Min internal friction soil angle 30°
- Min shear wave velocity \geq 1000 fps

2.5 Geology, Seismology (cont'd)

- Liquefaction potential none
- Max settlement for RXB, CRB, RWB
 - Total 4 inches
 - Tilt 0.5 inch per 50 ft of building length or
1 inch total in any direction
 - Differential 0.5 inch
(RXB-CRB, RXB-RWB)
- Slope failure potential none

- COL Item 2.5-1: describe the site-specific geology, seismology, and geotechnical characteristics for Section 2.5.1 through Section 2.5.5

RAIs

FSAR Section	# RAIs	Resolved Closed	Unresolved Closed	Confirmatory	Suppl Resp In Eval
2.3	13	5		5	3
2.4	1		1		
2.5	5	1		2	2

- Unresolved Closed issue involves analysis of accidental release of radioactive liquid effluents in groundwater and surface water using BTP 11-6 methodology and guidance (RAI 8750 Question 02.04.13-1)

SER Open Item 02.03.04-1

- Acceptability of method for calculating accident offsite X/Q values for EAB and LPZ, which is the outer boundary from the AST topical report TR-0915-17565

Abbreviations

AST – accident source term

COL – combined license

CRB – Control Building

CRVS – normal control room HVAC system

CSDRS – certified seismic design response spectra

CSDRS-HF – CSDRS - high frequency

CWS – circulating water system

DCD – Design Control Document

EAB – exclusion area boundary

EPRI – Electric Power Research Institute

Abbreviations (cont'd)

FSAR – Final Safety Analysis Report

HMR – Hydrometeorological Report

HVAC – heating ventilation and air conditioning

LPZ – low population zone

LWR – light water reactor

MCR – main control room

NOAA – National Oceanic and Atmospheric Administration

RAI – request for additional information

RG – Regulatory Guide

RWB – Radioactive Waste Building

Abbreviations (cont'd)

RXB – Reactor Building

SER – Safety Evaluation Report

SCWS – site cooling water system

TGB – Turbine Generator Building

TSC – technical support center

URD – Utility Requirements Document

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Presentation to the ACRS Subcommittee

NuScale Design Certification Application Review

Safety Evaluation Report with Open Items

Chapter 2: SITE CHARACTERISTICS

Project Manager: Prosanta Chowdhury

December 18, 2018



Technical Branch Presentations

Radiation Protection and Accident Consequences Branch

- **Section 2.1 Geography and Demography**
- **Section 2.2 Nearby Industrial, Transportation, and Military Facilities**

Hydrology & Meteorology Branch

- **Section 2.3 Meteorology**
- **Section 2.4 Hydrologic Engineering**

Geoscience & Geotechnical Engineering Branch

- **Section 2.5 Geology, Seismology, & Geothermal**



NRC Staff Interactions with NuScale

Requests for Additional Information

Section 2.3 – 10 questions; 4 Closed; 6 Confirmatory Action pending FSAR update; 1 Open Item

Section 2.4 – 1 question; 1 Closed; 3 Confirmatory Action pending FSAR update

Section 2.5 – 3 questions; 1 Closed; 2 Confirmatory Action pending FSAR update



NRC Presenters

Rao Tammara: NRO/DLSE/ RPAC – Sections 2.1 & 2.2

Michael Mazaika: NRO/DLSE/RHM/RMET – Section 2.3.1 – 2.3.3

Jason White: NRO/DLSE/RHM/RMET – Sections 2.3.4 – 2.3.5

Yuan Cheng: NRO/DLSE/RHMB – Section 2.4

Weijun Wang: NRO/DLSE/RGS – Section 2.5

Stephanie Devlin-Gill: Branch Chief - NRO/DLSE/RHM

Gerry Stirewalt: Branch Chief - NRO/DLSE/RGS

Michael Dudek: Branch Chief - NRO/DLSE/ RPAC

Prosanta Chowdhury: Project Manager - NRO/DLSE/LB1



Presentation to the ACRS Subcommittee

NuScale Design Certification Application Review

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Section 2.1: GEOGRAPHY AND DEMOGRAPHY

**Section 2.2: NEARBY INDUSTRIAL, TRANSPORTATION, AND
MILITARY FACILITIES**

December 18, 2018

Technical Topics of Interest

Section 2.1 - Geography and Demography



Section 2.1 - Geography and Demography

- The review involves the following sections of the NuScale Power DCD:
 - 2.1.1 - Site Location and Description
 - 2.1.2 - Exclusion Area Authority and Control
 - 2.1.3 - Population Distribution

The COL applicant that references the NuScale Power design certification will describe and address the site geographic and demographic characteristics as described above. The COL applicant is to provide this site specific information as part of COL information Item 2.1-1 in the COL application.

Technical Topics of Interest

Section 2.2 - Nearby Industrial, Transportation, and Military Facilities



Section 2.2 - Nearby Industrial, Transportation, and Military Facilities

- The review involves the following sections of the NuScale Power DCD:
 - 2.2.1 - Locations and Routes
 - 2.2.2 - Descriptions
 - 2.2.3 - Evaluation of Potential Accidents

The COL applicant that references the NuScale Power design certification will describe and address the nearby industrial, transportation, and military facilities. The COL applicant is to demonstrate that the design is acceptable for each potential accident or provide site-specific design alternatives. The COL applicant is to provide this site specific information as part of COL information Item 2.2-1 in the COL application.



Presentation to the ACRS Subcommittee

NuScale Design Certification Application Review

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Section 2.3: METEOROLOGY

December 18, 2018

Overview of DCA FSAR

Section 2.3 - Meteorology

- Review involves the following sections through Revision 1 of the NuScale DCA FSAR:
 - 2.3.1 – Regional Climatology
 - 2.3.2 – Local Meteorology
 - 2.3.3 – Onsite Meteorological Measurements Programs
 - 2.3.4 – Short-Term Atmospheric Dispersion Estimates for Accident Releases
 - 2.3.5 – Long-term Atmospheric Dispersion Estimates for Routine Releases
- Potential plant site locations in U.S. including contiguous (lower 48) states, Alaska, and Hawaii. DCA is silent on potential deployment in U.S. Territories

Overview of DCA FSAR (Cont'd)

Section 2.3 - Meteorology

Postulated Site Parameters

- Applicant postulated site parameters related to:
 - Climatic Extremes (i.e., precipitation, winds, ambient temperatures)
 - Atmospheric Dispersion and Deposition Factors (design-basis accident & routine (normal) releases)
- Staff reviewed Section 2.3 of the NuScale DCA FSAR in accordance with SRP Sections 2.3.1 through 2.3.5, associated regulatory guidance, and related data resources
- A COL applicant is required to compare its site characteristics to the site parameters postulated for the NuScale design

Topics of Interest

Section 2.3.1 – Regional Climatology

Climate-related Site Parameters

- Maximum Precipitation (Rainfall) Rates for Roof Design
 - Consistent with most of previously-submitted DCAs
 - PMP values from HMR No. 52 (based on selected storms east of 105th Meridian in contiguous U.S.)
 - Postulated site parameters representative of a reasonable number of locations in contiguous U.S.

Topics of Interest

Section 2.3.1 – Regional Climatology

Climate-related Site Parameters (Contd)

- Winter Precipitation Loads (for Roof Design)
 - Site parameters only provided as normal and extreme roof snow loads. Consistent with intent of DC/COL-ISG-007, Applicant revised Chapter 3 to allow back-calculation of ground loads (reported in Section 2.3.1)
 - Design of RXB and CRB roofs limits accumulation of liquid precipitation such that frozen winter precipitation events should be controlling
 - Staff evaluated 100-year return ground snow loads based on ASCE/SEI 7-10 for contiguous U.S. and Alaska
 - Postulated site parameters are representative of a reasonable number of locations in continental U.S. (including some portions of Alaska)

Topics of Interest

Section 2.3.1 – Regional Climatology

Climate-related Site Parameters (Contd)

- Design-Basis Severe Wind Speed (100-Year 3-Second Gust)
 - Also referred to as straight-line winds. Postulated design-basis severe wind speed (3-sec gust) based on ASCE/SEI 7-05 and is applicable to RXB, CRB, and RWB
 - Staff evaluated 100-year return straight-line wind speed (3-sec gust) using ASCE/SEI 7-05 for contiguous U.S. and Alaska consistent with SRP Section 2.3.1
 - Site parameter value and related characteristics representative of a reasonable number of locations in the contiguous U.S., Hawaii, and much of Alaska

Topics of Interest

Section 2.3.1 – Regional Climatology

Climate-related Site Parameters (Contd)

- Design-Basis Tornado
 - Postulated DBT wind speed (3-sec gust) and pressure parameters (with exceedance frequency of $1E-07$ per year) based on RG 1.76 (Rev. 1) for Region 1 (highest tornado intensity region)
 - Site parameters representative of a reasonable number of locations in contiguous U.S. DBT parameters not specified in RG 1.76 for Alaska or Hawaii. DCA does not address these locations
- Design-Basis Hurricane
 - Postulated DBH wind speed (3-sec gust) with exceedance frequency of $1E-07$ per year based on RG 1.221 represents highest 3-sec gust depicted in RG 1.221
 - Site parameter representative of a reasonable number of locations, including hurricane-prone areas, of contiguous U.S. DBH wind speeds not specified in RG 1.221 for Pacific Coast of contiguous U.S. or Hawaii. DCA does not address these locations

Topics of Interest

Section 2.3.1 – Regional Climatology

Climate-related Site Parameters (Contd)

- Ambient Design Dry- and Wet-Bulb Temperatures
 - Postulated site parameters for 0%, 1%, and 5% exceedance maximum and minimum dry-bulb temperatures, wet-bulb temperatures coincident with indicated maximum dry-bulb values, and 0% and 1% exceedance non-coincident wet-bulb temperatures
 - Applicant referenced numerical values to Rev. 13 of EPRI URD (2014) and indicated (via RAI response) that values represent annual, rather than seasonal, exceedance probabilities. Staff determined that numerical values are same as in Rev. 8 of URD (1999)
 - Coincident wet-bulb temperatures in EPRI URD represent mean values whereas coincident wet-bulb temperatures postulated in DCA represent (via RAI response) maximum values

Topics of Interest

Section 2.3.1 – Regional Climatology

Climate-related Site Parameters (Contd)

- Ambient Design Dry- and Wet-Bulb Temperatures
 - Staff evaluated postulated dry- and wet-bulb temperatures based on data summarized by ASHRAE for contiguous U.S. and Hawaii, and used professional judgement for temperature conditions in Alaska
 - Maximum and minimum dry-bulb values for all exceedance levels acceptable at a reasonable number of locations in most of continental U.S. and Hawaii
 - Postulated 1% non-coincident wet-bulb temperature acceptable at a reasonable number of locations in contiguous U.S., Hawaii, and, based on professional judgement, Alaska

Topics of Interest

Section 2.3.1 – Regional Climatology

Climate-related Site Parameters (Contd)

- Ambient Design Dry- and Wet-Bulb Temperatures
 - Applicant took position (via RAI response) that chosen wet-bulb temperature site parameters are for non-safety related HVAC systems and cooling towers (see Tier 2, Table 3.2-1). Therefore, it is a business decision not to change these values
 - Postulated 0%, 1%, and 5% dry-bulb temperatures appear to be acceptable at a reasonable number of locations (except in desert southwest and drier portions of California). However, ASHRAE database suggests **maximum coincident wet-bulb temperatures** in those pairs likely to be exceeded in much of contiguous U.S. and Hawaii
 - Based on Applicant's position, it is reasonable to expect a need for potential COL applicants to request a departure from postulated **0% non-coincident, or the 0%, 1% or 5% maximum coincident wet-bulb temperature(s)** depending on site characteristics

Topics of Interest

- **Section 2.3.2 – Local Meteorology**
 - FSAR states that “[l]ocal meteorology is site-specific and is addressed by the COL applicant.” Staff agrees
- **Section 2.3.3 – Onsite Meteorological Measurements Programs**
 - FSAR states that “[o]nsite meteorological measurements programs are site-specific and addressed by COL applicant.” Staff agrees

Topics of Interest

Section 2.3.4 - Short-Term Atmospheric Dispersion Site Parameters for Accident Releases

Offsite EAB and LPZ X/Q Site Parameter Values

- Applicant stated that topical report, TR-0915-17565, describes the methodology for calculating accident X/Q values at EAB and LPZ
- Staff performed an independent verification of Applicant's offsite X/Q site parameter values postulated for EAB and LPZ
- Staff used a portion of the NuScale methodology to calculate X/Q values based on meteorological data collected at six nuclear power plant sites
- Staff found that only one of these six sites had X/Q values that are bounded by all of the postulated NuScale site parameter values
- If a COL applicant references the NuScale design and finds its actual site characteristic X/Q values do not fall within corresponding site parameters postulated in the DCA, the COL applicant will need to provide sufficient justification that the proposed facility is still acceptable at the proposed site

Topics of Interest

Section 2.3.4 - Short-Term Atmospheric Dispersion Site Parameters for Accident Releases (Contd)

Offsite EAB and LPZ X/Q Site Parameter Values

- **Open Item 2.3.4-1.** Staff is currently evaluating TR-0915-17565 to determine if the NuScale methodology is acceptable for calculating DBA offsite X/Q values at EAB and LPZ in relation to NuScale design and in a COL application that references NuScale design
- Subject to resolution of the Staff's evaluation of TR-0915-17565, the Staff concludes that the Applicant has appropriately provided the short-term (accident release) X/Q site parameters

Topics of Interest

Section 2.3.4 - Short-Term Atmospheric Dispersion Site Parameters for Accident Releases (Contd)

Onsite MCR and TSC X/Q Site Parameter Values

- Staff performed an independent verification of Applicant's postulated onsite X/Q site parameter values at the MCR and TSC doors and HVAC intake
- Staff generated X/Q values using the ARCON96 computer code with the source and receptor information presented in the DCA
- Staff found that the Applicant has provided onsite X/Q site parameter values at the MCR and TSC doors and HVAC intake that are representative of a reasonable number of locations that may be considered for a COL application

Topics of Interest

Section 2.3.5 - Long-Term Atmospheric Dispersion Site Parameters for Routine Releases

Offsite Dose Location X/Q and D/Q Values

- Staff performed an independent evaluation of Applicant's postulated offsite X/Q and D/Q site parameter values using the XOQDOQ computer code
- Staff found that the long-term (routine release) site parameter values selected by the Applicant are representative of a reasonable number of sites that have been or may be considered for a COL application

Acronyms & Abbreviations

Section 2.3 - Meteorology

- ACRS – Advisory Committee on Reactor Safeguards
- ASCE/SEI – American Society of Civil Engineers/Structural Engineering Institute
- ASHRAE – American Society of Heating, Refrigeration & Air Conditioning Engineers
- COL – Combined License
- CRB – Control Building
- DBA – Design-Basis Accident
- DBH – Design-Basis Hurricane
- DBT – Design-Basis Tornado
- DC – Design Certification
- DCA – Design Certification Application
- D/Q - Relative Deposition Factor ($1/m^2$)
- EAB – Exclusion Area Boundary
- EPRI – Electric Power Research Institute
- FSAR – Final Safety Analysis Report
- HMR – Hydrometeorological Report
- HVAC – Heating, Ventilation, and Air Conditioning System

Acronyms & Abbreviations

Section 2.3 – Meteorology (Contd)

- ISG – Interim Staff Guidance
- LPZ – Outer Boundary of the Low Population Zone
- MCR - Main Control Room
- PMP – Probable Maximum Precipitation
- RAI – Request for Additional Information
- RG – Regulatory Guide
- RWB – Radioactive Waste Building
- RXB – Reactor Building
- SRP – Standard Review Plan
- TR – Topical Report
- TSC – Technical Support Center
- URD – Utility Requirements Document
- X/Q – Atmospheric Dispersion Factor (sec/m^3)



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Section 2.4: HYDROLOGIC ENGINEERING

December 18, 2018

Site Parameters For Hydrologic Engineering

- The applicant identified three site parameters related to hydrologic engineering: (Reference to DCA PART 2, Tier 2, Table 2.0-1)
 - Maximum flood level, including wind-induced wave run-up, one foot below baseline plant elevation
 - Groundwater level is a minimum of two feet below the site grade
 - Maximum precipitation rates: 19.4 inches in one hour and 6.3 inches in 5 minutes

Site-Specific Characteristics and COL Information Item 2.4-1

- DCA PART 2, Tier 2, Sections 2.4.1 through 2.4.14, except 2.4.8 and 2.4.10, should be evaluated in COL stage:
 - Staff confirmed that DCA PART 2 Tier 2, Sections 2.4.1 through 2.4.14, except 2.4.8 and 2.4.10, are related to site-specific characteristics
 - Characteristics include: local hydrology, local intense precipitation, probable maximum flood on stream and rivers, potential dam failures, probable maximum surge and seiche flooding, probable maximum tsunami hazards, ice effects, channel diversions, low water considerations, ground water, and a liquid effluent release to groundwater
 - Those sections related to site-specific characteristics will be evaluated in COL stage by future applicant

Site-Specific Characteristics and COL Information Item 2.4-1 (Continued)

- DCA PART 2 Tier 2, Sections 2.4.8 and 2.4.10 are not evaluated in COL stage:
 - Staff confirmed that cooling water canals and reservoirs (Section 2.4.8) would not be designated as safety-related make-up water sources for NuScale design
 - Staff confirmed that the NuScale ultimate heat sink design does not rely on an external water supply for at least 30 days (Section 9.2.5.4)
 - Staff also confirmed that flood protection requirements (Section 2.4.10) are not applicable since the baseline plant elevation is one foot above the maximum flood level elevation

Site-Specific Characteristics and COL Information Item 2.4-1 (Continued)

- COL Information Item 2.4-1:

A combined license (COL) applicant that references the NuScale Power Plant design certification (DC) will investigate and describe the site-specific hydrologic characteristics for Sections 2.4.1 through 2.4.14, except Sections 2.4.8 and 2.4.10

- COL Information Item 2.4-1 addresses the three site parameters.

Staff Conclusions

- NuScale DCA site parameters meets the requirements of 10 CFR Part 100, “Reactor Site Criteria”
- All regulatory requirements have been satisfied
- No open items
- Three confirmatory items

Acronyms & Abbreviations

Section 2.4 – Hydrologic Engineering

CFR – *Code of Federal Regulations*

COL – Combined License

DC – Design Certification

DCA – Design Certification Application

NRC – U.S. Nuclear Regulatory Commission



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Section 2.5: GEOLOGY, SEISMOLOGY, AND GEOTECHNICAL ENGINEERING

December 18, 2018

Technical Topics of Interest

Section 2.5 – Geology, Seismology, and Geotechnical Engineering



The review involved the following sections of the NuScale FSAR:

- 2.5.1 Basic Geologic and Seismic Information
- 2.5.2 Vibratory Ground Motion
- 2.5.3 Surface Faulting
- 2.5.4 Stability of Subsurface Materials and Foundations
- 2.5.5 Stability of Slopes

Technical Topics of Interest

Section 2.5 – Geology, Seismology, and Geotechnical Engineering



Establishes site parameters as NuScale design basis or for a site suitable for the design, which include:

- no fault displacement potential under the plant structures
- certified seismic design response spectra (CSDRS)
- certified seismic design response spectra - high frequency (CSDRS-HF)
- minimum shear wave velocity of the subsurface material
- minimum ultimate bearing capacity
- uniformity of soil layers
- no potential for soil liquefaction
- minimum coefficient of static friction
- minimum soil angle of internal friction
- limits of foundation settlement

Technical Topics of Interest

Section 2.5 – Geology, Seismology, and Geotechnical Engineering



Sections 2.5.1 and 2.5.3 findings:

- DCA defined geology related site parameters such as no fault displacement potential under the plant structures at a site
- DCA specified in COL Information item that site specific basic regional and site geologic information to be addressed by COL applicants

Technical Topics of Interest

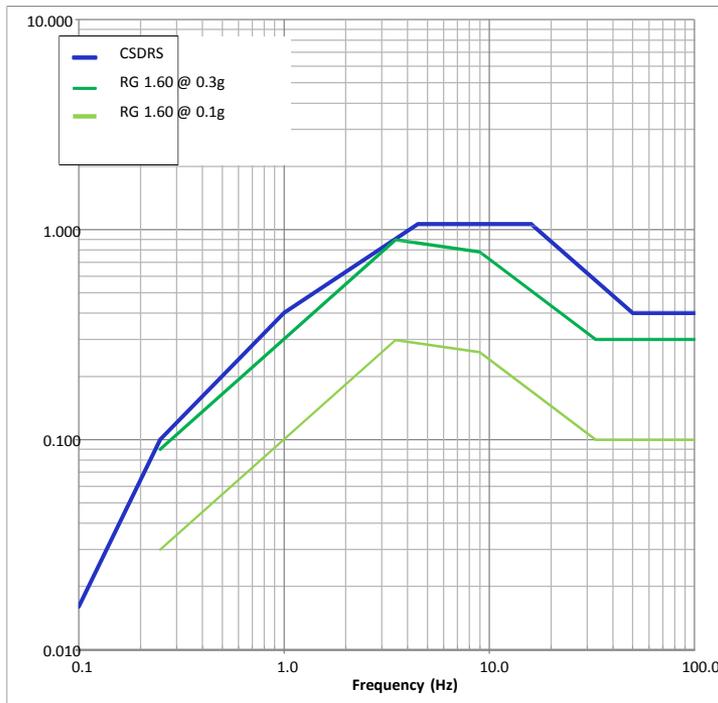
Section 2.5 – Geology, Seismology, and Geotechnical Engineering



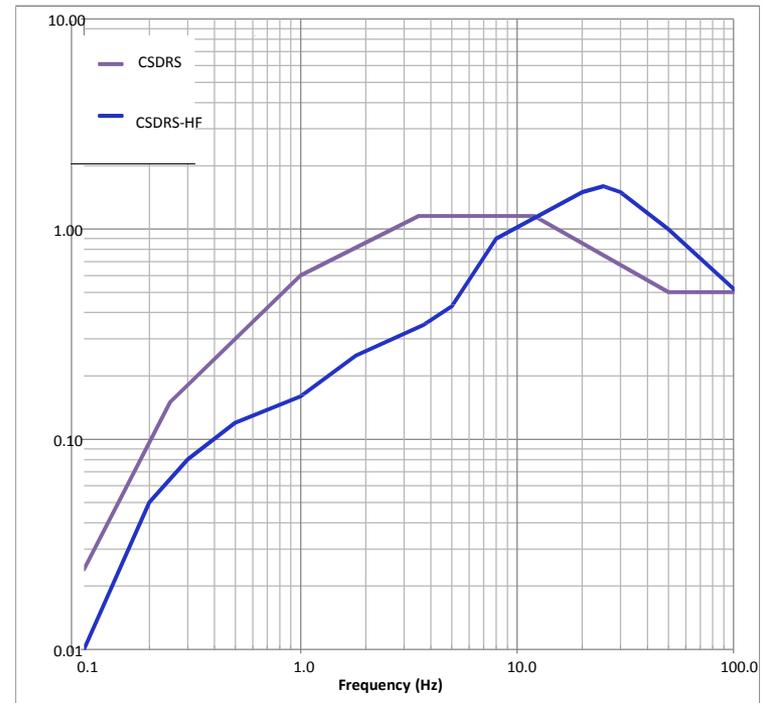
Sections 2.5.2 findings:

- The DCA defined CSDRS and CSDRS-HF as its seismic loading design basis, and intended to cover sites at most of the central and eastern U.S., as well as sites in the western U.S.
- DCA specified in COL Information item that site specific basic regional and site seismic information, with local vibratory ground motion and site safe shutdown earthquake to be addressed by COL applicants

NuScale Horizontal Certified Seismic Design Response Spectra at 5% Damping



CSDRS vs RG 1.60



CSDRS and CSDRS-HF

Technical Topics of Interest

Section 2.5 – Geology, Seismology, and Geotechnical Engineering



Sections 2.5.4 and 2.5.5 findings:

- The staff RAIs focused on:
 - site subsurface material uniformity requirements
 - applicability of static and dynamic parameters of the subsurface materials, including the backfill materials
 - limits of total and differential settlements for safety related structures
 - lateral earth pressure evaluation
- The applicant adequately addressed all RAI issues, and specified pertinent items to be addressed by COL applicants

Technical Topics of Interest

Section 2.5 – Geology, Seismology, and Geotechnical Engineering



Staff Conclusions

- No Open Items in Chapter 2.5
- The applicant adequately specified geologic, seismic and geotechnical engineering related site parameters for NuScale design and for site suitability determination
- The applicant properly identified site specific information to be addressed in a COL application, and adequately described such information in COL Information Items
- Two Confirmatory Items are currently being tracked by the staff to ensure that proposed changes presented in the RAI responses to be incorporated in future revised DCA document