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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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FUTURE PLANT DESIGNS SUBCOMMITTEE

+ + + + +

THURSDAY

SEPTEMBER 24, 2015

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ROCKVILLE, MARYLAND

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The Subcommittee met at the Nuclear
Regulatory Commission, Two White Flint North, Room
T2B1, 11545 Rockville Pike, at 8:30 a.m., Michael L.
Corradini, Chairman, presiding.

COMMITTEE MEMBERS:

MICHAEL L. CORRADINI, Chairman of the
Subcommittee

RONALD G. BALLINGER, Member

DENNIS C. BLEY, Member

DANA A. POWERS, Member

STEPHEN P. SCHULTZ, Member

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GORDON R. SKILLMAN, Member

DESIGNATED FEDERAL OFFICIAL:

MAITRI BANERJEE

ALSO PRESENT:

GREGORY CRANSTON, NRO

JEAN CLAUDE DEHMEL, NRO

ROBERT FITZPATRICK, NRR

JENNY GALLO, NRO

ZACH GRAN, NRO

JAKE ZIMMERMAN, NRR

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

8:30 a.m.

CHAIRMAN CORRADINI: This meeting will come to order. This is a meeting of the Future Plant Design Subcommittee of the Advisory Committee on Reactor Safeguards. My name is Mike Corradini. I'm acting chairman of this Subcommittee.

ACRS members in attendance today are Dennis Bley, Dana Powers, Ron Ballinger, Steve Schultz, Dick Skillman and Ms. Maitri Banerjee is the designated federal official for this meeting.

Today we have members of the staff to brief the Subcommittee on the staff's development of the NRC's Design Specific Review Standard, or DSRS, for the NuScale small modular reactor. This document is being developed in anticipation of the NuScale design certification application for their integrated PWR technology.

The discussion topics on today's agenda include several sections of the DSRS, in particular 11.1 on coolant source terms and Chapter 8 on electrical systems.

The rules for participation in today's meeting were announced in the *Federal Register* on

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1 September 21st, 2015. The meeting was announced as
2 open to the public, but no request for making a
3 statement to the Subcommittee has been received from
4 the public.

5 We have one bridge line established.
6 The bridge number and password were published in the
7 agenda posted on the NRC public web site. To
8 minimize disturbances the public line will be kept
9 in the listen-in only mode and the public will have
10 an opportunity to make a statement or provide its
11 comments at a designated time towards the end of
12 this meeting.

13 Dr. Rempe, who's in Paris, has a
14 conflict of interest in the area of NuScale severe
15 accident considerations because of her prior work
16 that she completed for NuScale in this area, and Dr.
17 Rempe will recuse herself from discussions in this
18 particular area.

19 I'll start with Mr. Greg Cranston, the
20 NRO project manager, who will introduce the
21 presenters and to start off our briefing. Greg?

22 MR. CRANSTON: Thank you. My name is
23 Greg Cranston. I'm the senior project manager for
24 the NuScale project. As mentioned this morning,
25 we're going to be talking about source term and the

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1 electrical sessions associated with the Design
2 Specific Review Standard for NuScale.

3 Mr. Zach Gran will be presenting the
4 source term and Mr. Bob Fitzpatrick will be
5 presenting the electrical DSRS sections this
6 morning.

7 This is the third in a series on
8 selected DSRS sections to present to the Committee.
9 As mentioned before, we do have the comments. They
10 are being processed and sent out to the respective
11 branches so that they can start reviewing them and
12 decide which ones would be incorporated.

13 CHAIRMAN CORRADINI: A number comes from
14 NuScale, but did you get any substantial comments
15 from other groups?

16 MR. CRANSTON: I would say from the
17 standpoint of comments specifically on DSRS
18 sections. We did get about five general comments
19 from NEI, not specifically related to a DSRS. One
20 of their main comments was they thought maybe there
21 were too many DSRSs that could have remained as
22 standard review plans.

23 CHAIRMAN CORRADINI: Okay.

24 MR. CRANSTON: We did receive a couple
25 of comments from the general public which were

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1 totally unrelated to DSRSs, but just provided an
2 opportunity for them to state their beliefs about
3 nuclear power.

4 CHAIRMAN CORRADINI: Okay.

5 MS. BANERJEE: Can I ask a question,
6 please? Did you figure out which DSRS could go back
7 to the SRPs?

8 MR. CRANSTON: No, we are taking that
9 comment under advisement. And we'd also been
10 starting to look at that ourselves based on comments
11 that we did get back. And we're in the process now
12 of formulating a guidance document to go back to the
13 branch chiefs for them to decide if they want to
14 continue with a DSRS for a particular section or if,
15 based on their knowledge of the NuScale systems at
16 this time and looking at the comments, it doesn't
17 make sense to just revert back to the standard
18 review plan.

19 CHAIRMAN CORRADINI: And that decision
20 will be made sometime in the next couple months?

21 MR. CRANSTON: Yes.

22 CHAIRMAN CORRADINI: Okay.

23 MR. CRANSTON: Definitely, yes. In
24 fact, hopefully we get that done within a month.

25 CHAIRMAN CORRADINI: Okay.

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1 MR. CRANSTON: Because we need to
2 proceed with the processing the DSRs to get the
3 finals issued at least six months prior to the
4 submittal of the design certification application
5 from NuScale.

6 CHAIRMAN CORRADINI: And I'm sure you
7 said this and I just don't remember. When are you
8 expecting that?

9 MR. CRANSTON: They say as early as
10 October of next year, but they said it's more likely
11 the end of next year.

12 CHAIRMAN CORRADINI: So sometime
13 December
14 '16, January '17?

15 MR. CRANSTON: Correct.

16 CHAIRMAN CORRADINI: Which means you
17 need to have something out in the public as a final
18 by June?

19 MR. CRANSTON: Yes, that's what our goal
20 is. Now, they do have the draft comment. They do
21 have the draft DSRs to use in conjunction with
22 their preparation of their DCA, plus they have seen
23 -- well, they've seen all the comments because all
24 the comments are from them.

25 CHAIRMAN CORRADINI: Yes. Yes, that I

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1 gather from what you had told us.

2 MR. CRANSTON: Yes.

3 CHAIRMAN CORRADINI: Okay.

4 MR. CRANSTON: And that kind of covers
5 the last bullet there, too, that some DSRS sections
6 may revert back.

7 Again, this just covers what we
8 mentioned previously as far as what our intent is
9 with respect to making the presentations to ACRS to
10 provide the approach staff took in developing them.
11 Again, the comments were -- closing period was 6/30,
12 or the DSRSs were issued on 6/30 and the comment
13 period closed 8/29, and we're processing them now
14 for inclusion either in the DSRS or if a particular
15 document reverts back to the standard review plan,
16 then those comments will be forwarded to the branch
17 that addresses changes to standard review plans.

18 CHAIRMAN CORRADINI: Just so I
19 understand the process -- so in the next couple
20 months you guys will decide what reverts back, how
21 you're going to answer those. So your responses
22 will also be part of the record once you've decided
23 what the final layout of this is going to be?

24 MR. CRANSTON: That's correct. We have
25 developed a comment matrix for all sections. And

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1 each comment that we've received has a comment
2 response block, and we'll be filling that block out
3 as to how we dispositioned that comment.

4 CHAIRMAN CORRADINI: Okay. Thank you.

5 MR. CRANSTON: Okay. If there are no
6 further comments at this point or questions, I will
7 turn the presentation over to Mr. Zach Gran who will
8 cover Section 11.1, Source Terms.

9 MR. GRAN: All right. Thank you.
10 Hello, all. My name is Zach Gran. I have a
11 master's in health physics from U. Mass.-Lowell and
12 I am a qualified technical reviewer in NRO in the
13 Radiation Protection and Accident Consequences
14 Branch. I have five years of experience doing
15 health physics review in NRO and I am here to
16 present the items that are unique to the DSRS
17 Section 11.1.

18 The current DSRS is based on design
19 information provided to the staff in late 2013.
20 This is the latest information presented to the
21 staff. And the staff also noted that in the recent
22 public comment period there were no comments
23 provided on DSRS Section 11.1.

24 The DSRS Section 11.1 acknowledges that
25 current PWR GALE is not applicable to the NuScale

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1 design, and accordingly NuScale has stated that they
2 would be developing a version of GALE specific for
3 their design.

4 CHAIRMAN CORRADINI: Can you at least
5 remind us why it's applicable?

6 MR. GRAN: There's -- I guess that's --
7 the whole sense of 11.1 is the source term
8 development to allow -- the assumptions that GALE
9 had before were for the traditional reactors, for
10 the much bigger. So now it's a lot smaller, so
11 different design considerations will be incorporated
12 for the new GALE.

13 CHAIRMAN CORRADINI: So it's just the
14 scale of the module that makes it not applicable?
15 I'm sorry, I don't know GALE. I'm sure Dr. Powers
16 is going to punch me and tell me about it privately,
17 but can you go a little further there?

18 MR. GRAN: Sure. I mean, there are
19 aspects of GALE that are applicable, so that the
20 staff will like key in on those when reviewing. So
21 there are certain aspects that we go over in the
22 next slide of the applicability of things from GALE.

23 CHAIRMAN CORRADINI: Okay. If you're
24 going to get to it, that's fine.

25 MR. GRAN: And so NuScale will be

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1 submitting a topical report soon. I believe it's
2 the end of the month based off of their independent
3 GALE code analysis. And in this submission the
4 topical report will address radionuclide
5 distributions and concentrations in the primary and
6 secondary coolant based off of the fuel design
7 characteristics, industry data on expected
8 performance, and the activity due to neutron
9 activation of corrosion --

10 (Simultaneous speaking)

11 CHAIRMAN CORRADINI: So I'm sorry to --
12 so GALE estimates the coolant-based source term --

13 MR. GRAN: Yes.

14 CHAIRMAN CORRADINI: -- from corrosion
15 and activation?

16 MR. GRAN: So normally GALE utilizes the
17 ANSI 18.1 standard, which encompasses the operating
18 history of reactors going way back, I guess, and
19 that normally incorporated all of the knowledge that
20 they had, but since it's a different design,
21 different scale, new assumptions will have to be
22 taken.

23 CHAIRMAN CORRADINI: Okay. All right.
24 I think I get it. All right. Thank you.

25 MR. GRAN: So while the PWR ALE is not

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1 relevant, elements of its guidance are still
2 relevant for the staff's review of the NuScale
3 design. So first, the use of ORIGEN and SCALE is
4 relevant since common PWR fuel will still be used.

5 Second, operating experience estimating
6 coolant activity is still relevant, so neutron
7 activation of corrosion wear products are still the
8 same and that there are adjustments made for the use
9 of internal alloys in service areas that are in
10 contact with the reactor coolant.

11 Third, operating history in
12 characterizing the fuel performance is still
13 relevant. The fuel failure rates and failure
14 mechanisms are still useful for informing the
15 assumptions that may be taken by NuScale.

16 And last, the reliance of the current
17 waste processing --

18 MEMBER POWERS: How do they know what
19 inventories of corrosion products and the like to
20 use?

21 MR. GRAN: I'm sorry?

22 MEMBER POWERS: How do they know what
23 inventories of corrosion products and the like to
24 use for the calculations?

25 MR. GRAN: That I guess will kind of be

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1 part of the topical report, because I guess they'll
2 have to make a very good presentation to us. We
3 were asking for them to just kind of prevent
4 everything, because they were basing a lot of it off
5 of the operating history. So the same type of
6 metals and I guess in a sense some of the same
7 systems instead
8 of --

9 MEMBER POWERS: Different temperatures,
10 different exposure pathways. Geometry is all
11 different.

12 MR. GRAN: So it's --

13 CHAIRMAN CORRADINI: I was guessing the
14 biggest effect is surface area to volume. It's a
15 small module, so that would probably be the biggest
16 scaling different and --

17 (Simultaneous speaking)

18 MEMBER POWERS: -- goes up, but I think
19 we'd get saturation --

20 MR. GRAN: Right.

21 MEMBER POWERS: Okay. But I just don't
22 know how they get --

23 MR. GRAN: Yes, because there's I guess
24 the issue with trying to -- I guess making the case
25 that some secondary systems are being activated and

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1 generating different types of source terms that
2 we're used to as well.

3 MEMBER POWERS: What do they do about
4 iodine spiking in all this?

5 MR. GRAN: I'm not sure.

6 CHAIRMAN CORRADINI: You're going to
7 find out?

8 MR. GRAN: Yes.

9 CHAIRMAN CORRADINI: And this is the
10 next topical report you're expecting from the
11 applicant?

12 MR. GRAN: Yes, the one at the end of
13 this month, or soon after.

14 MEMBER BLEY: And will this DSRS be used
15 as a guide for reviewing that topical?

16 MR. GRAN: Yes, so the DSRS points out
17 aspects of the design that we'll be looking for
18 source terms, so it pointed out like the neutron
19 activation of secondary components like feedwater
20 intake valves or the nozzles and pointing out some
21 of the ideas that additional source terms may be
22 generated because it's a smaller design now, but
23 whether or not there's going to be neutron
24 activation outside -- in like the pool coolant or
25 some of the secondary systems is identified in the

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1 DSRS, and we'll be looking for that stuff within the
2 topical report.

3 MEMBER SCHULTZ: Zach, could you explain
4 further the statement that operating history in
5 characterizing fuel performance is still relevant?
6 Is that when you say -- what operating history are
7 you referring to?

8 MR. GRAN: So I'm referring to like the
9 activation rights of certain materials where can say
10 the stainless steel or the production of corrosion
11 products. They might use those assumptions for
12 developing their best estimates for saying this is
13 what we expect to see, because we're still using all
14 -- I believe that they're still using all the same
15 materials, so they try and make the same assumptions
16 for corrosion products. I'm sure there will be some
17 sort of scaling since there's a lot less --

18 (Simultaneous speaking)

19 MEMBER SCHULTZ: So that goes to the
20 second bullet, the operating experience --

21 (Simultaneous speaking)

22 MR. GRAN: Yes, they're largely
23 connected, yes.

24 MEMBER SCHULTZ: So the fuel performance
25 is what I'm thinking about. I understand it's the

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1 same --

2 MR. GRAN: Type of fuel, but it's just
3 smaller, or shorter.

4 MEMBER SCHULTZ: Shorter. And --

5 MR. GRAN: But this mainly --

6 MEMBER SCHULTZ: But are you talking
7 about experience associated with fuel failure or are
8 you talking about --

9 MR. GRAN: Yes. Experience associated
10 with the fuel failure rates, yes.

11 MEMBER SCHULTZ: Okay.

12 MR. GRAN: Since it will still -- it's
13 our understanding that it's the same exact fuel,
14 it's just the shorter versions of it.

15 CHAIRMAN CORRADINI: So let's go back to
16 history. So I've got the La Crosse boiling water
17 reactor. I've got Rock -- I can't remember the
18 name, all of the small reactors. But there must be
19 a historical record of what their coolant inventory
20 -- their coolant source term inventory was that
21 staff can look back and see, because this is not
22 really a PWR and it's not really a BWR. It's kind
23 of like a quasi-B since they're so close to boiling
24 at the top of their -- at their pressurizer and
25 pressurized is part of all this. So can you look at

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1 the old plants? I'm trying to think. Was it -- Big
2 Rock Point, Humboldt Bay and La Crosse are all very
3 small reactors. So I would assume the surface area
4 to volume scale -- and then questions like Dana had
5 because lower flow, etcetera, etcetera might be
6 relevant. Has the staff got information on those
7 they can go back and look for some empirical
8 anchoring of whatever is proposed?

9 MR. GRAN: I don't believe that we have
10 that information available.

11 CHAIRMAN CORRADINI: Well, I know it's
12 out there. The people aren't dead. No, I -- the
13 former plant manager for La Crosse is trying to
14 still dispose of his fuel, so he's still around. So
15 my only point is that there is actually empirical
16 data on the small reactors.

17 MR. GRAN: So I guess we'll take a look
18 for that information then.

19 CHAIRMAN CORRADINI: Okay.

20 MEMBER BLEY: Is there any -- since it
21 is first of its kind, is there any requirement for
22 tracking this history over the life of the plant
23 that will feed back into the source term work later
24 on?

25 MR. GRAN: I can't think of any

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1 requirements yet. There will be --

2 MR. DEHMEL: Yes, Jean Claude Dehmel,
3 NRO health physics, here. Yes, there are
4 requirements built into the Appendix I requirements
5 there is a requirement for the staff to follow the
6 releases reported in the annual effluent release
7 reports. And then you look at this history and
8 determine whether or not some adjustments need to be
9 made. So there is a process by which we can track
10 and make determination as to whether or not certain
11 operational LCOs, limiting conditions for operation,
12 would have to be revised or modified for this
13 particular type of plant. So there are provisions,
14 yes, built in.

15 MEMBER BLEY: Is that a continuing
16 process or is that an occasional process?

17 MR. DEHMEL: Well, the annual effluent
18 release reports are issued annually and--

19 MEMBER BLEY: And you look at them --

20 (Simultaneous speaking)

21 MR. DEHMEL: -- so they are looked at by
22 the staff, the region as well as headquarters. So
23 the question then is we need to look at the first
24 results, look at the trend, look what was stated in
25 the FSAR and make some comparison and maybe some

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1 projections.

2 MEMBER BLEY: Thank you.

3 MR. GRAN: And I guess the last point we
4 had was the reliance of current waste processing
5 systems to manage waste is still relevant. So the
6 staff would expect NuScale to contain a lot of the
7 same PWR collection treatment systems in some form
8 if they have different names.

9 MEMBER POWERS: I really get puzzled by
10 how the SCALE results on scaling -- just the
11 corrosion of things from one reactor system to the
12 other, because you have different gradients,
13 different temperature distributions, different
14 absorption, desorption. I mean, that looks like --
15 you know, if I was confronted with that, I'd have to
16 stay up nights studying to figure that one out.

17 CHAIRMAN CORRADINI: That's a comment.
18 You don't have to try anything on that.

19 (Laughter)

20 MEMBER POWERS: Well, in essence I'm
21 asking how do you stay up nights studying to figure
22 out what's an acceptable way to scale historical
23 data from power reactors down to a smaller reactor?

24 MR. GRAN: I guess I'd have to see what
25 they kind of give us at first. So if they use --

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1 scale it down --

2 MEMBER POWERS: Well, I think I would
3 want to think about it first --

4 MR. GRAN: All right.

5 MEMBER POWERS: -- and then see if what
6 they said fit in my --

7 (Simultaneous speaking)

8 CHAIRMAN CORRADINI: I think the
9 philosophical approach that Dr. Powers is suggesting
10 is that always come up with a first guesstimate to
11 see what you can gauge a submission to. Right?

12 MEMBER POWERS: Yes, I mean, that's I'm
13 -- I mean, frequently what you look for in looking
14 at a topical report is what's not there.

15 MEMBER BALLINGER: I think I'd be more
16 interested in looking at area ratios for the
17 different designs if they want to understand.

18 MEMBER POWERS: Well, that's the first
19 cut, but then you'd have to look at the temperature
20 gradients and what the maximum temperatures are and
21 what the flow gradients are. I mean, there's just -
22 - it looks like a difficult problem for me unless
23 you can persuade yourself that your saturation
24 limited. Then you don't care about the -- you don't
25 care about rate processes as soon as you get

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1 saturation limited.

2 CHAIRMAN CORRADINI: The only other
3 thing that came to mind is that with their CVCS
4 system, if I were them, I'd essentially have to
5 argue that I've got an operating CVCS system and
6 keep it at some concentration, right? Because the
7 surface area to volume essentially is going to build
8 up more than you suspect unless you hit saturation.
9 And then you've got to remove it from just a
10 continual --

11 MEMBER POWERS: But see, you've got a
12 very tricky problem there because what you're doing
13 is you're saying, okay, I have a steady state
14 concentration. That means I have balanced a source
15 versus a sink. And where those two come into
16 balance is very sensitive to small things.

17 MEMBER BALLINGER: But the core is
18 basically a filter.

19 MEMBER POWERS: No.

20 MEMBER BALLINGER: Puts crud on the
21 fuel.

22 MEMBER POWERS: No, they got -- the crud
23 on the fuel will quickly get to a fairly steady
24 state situation.

25 CHAIRMAN CORRADINI: Your point is it

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1 will get to some steady state unless it's a
2 saturation. Any sort of right-hand side term could
3 change what --

4 (Simultaneous speaking)

5 MEMBER POWERS: I mean, small things
6 between the source and the sink change where that
7 steady state is. And so, I mean, the problem is
8 you've got to know both very accurately now. And
9 what you're relying on to some extent is what was
10 observed in a different system.

11 CHAIRMAN CORRADINI: The only saving
12 grace is we don't expect it to be large. And if
13 you're going to trend it and they're going to
14 estimate and you trend it and the trend doesn't
15 match the estimate, then there's going to have be
16 some essential action.

17 MR. DEHMEL: Yes, and to follow up on
18 what you just said, and the issue of following what
19 was done in the past with some of the smaller PWR
20 design, some of the issues you've just highlighted
21 plus the different operational history of fuel
22 performance and maintenance of the primary cooling
23 chemistry of those other years I don't think is
24 going to lead and yield much information that's
25 going to be useful here.

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1 CHAIRMAN CORRADINI: Yes, Dennis hit me
2 on the side and told me to --

3 MR. DEHMEL: Right. So I think that the
4 history is going to be somewhat limited and I would
5 say perhaps we should not burden ourselves with
6 that.

7 CHAIRMAN CORRADINI: Okay.

8 MR. DEHMEL: We should look at the
9 current operating history of fuel performance,
10 cladding performance, as well as maintenance of
11 primary and secondary cooling chemistry. We should
12 focus on those and how NuScale is essentially
13 looking at these practices and folding those into
14 this design.

15 MEMBER BLEY: Are they using -- and I
16 haven't seen any -- are they using any materials
17 that are unique we haven't seen in the current
18 plants? Not that I know of.

19 MR. DEHMEL: Not that I know of.

20 MS. BANERJEE: Well, the design has a
21 unique aspect, which is the long riser in the
22 middle.

23 CHAIRMAN CORRADINI: But not different
24 material.

25 MEMBER BLEY: But not different

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1 materials, I don't think. So that would be the
2 thing I would --

3 MR. DEHMEL: They've committed to use
4 alloys that would minimize the corrosion and
5 activation products for sure. I mean, that's kind
6 of an expected practice now.

7 MEMBER BLEY: Yes.

8 MEMBER SCHULTZ: What is the GALE code
9 benchmarked to, to the current fleet of reactors?
10 Is it good --

11 MR. GRAN: Yes, the GALE code would use
12 like the ANSI 18.1 standard, which is benchmarked
13 off the current fleet of reactors.

14 MEMBER SCHULTZ: Okay.

15 MR. GRAN: All right. So continuing on,
16 in DSRS Section 11.1 we address the following unique
17 design elements. First, is the integrated PWR
18 design by NuScale. All of the reactor components
19 are contained in the same vessel and are surrounded
20 by an evacuated reactor containment vessel. This
21 evacuated region is subjected to a high neutron flux
22 with the potential for RCS pressure boundary leakage
23 within its volume.

24 Staff would be reviewing information on
25 the venting operations of this evacuated area as

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1 well as the potential profile of radionuclides that
2 coexist outside of normal refueling source terms.
3 And with all the components being in close proximity
4 to each other, the staff has highlighted the
5 potential for neutron activation of feedwater given
6 the close proximity of feedwater nozzles near the
7 top of the reactor core.

8 And second, radiological control of the
9 secondary coolant does not use a traditional steam
10 generator blowdown and treatment system. NuScale
11 will need to fully address the performance of the
12 steam generator as its design is different from the
13 traditional steam generators that are currently in
14 use. The staff will be seeking information on steam
15 generator tube failure rates to understand whatever
16 primary to secondary leak rates are proposed.

17 MEMBER SCHULTZ: Do you expect those --
18 they're going to be estimates of some kind and
19 you're going to examine the estimates that are
20 provided?

21 MR. GRAN: Compared to what we have for
22 current data, yes.

23 MEMBER POWERS: Tell me what the steam
24 generator looks like?

25 MR. GRAN: The helical coil steam

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1 generator. That's --

2 PARTICIPANT: Boiling inside the tube.

3 MEMBER BLEY: Every time they change a
4 steam generator, despite what my materials friends
5 tell me is hard science, we get great surprises.

6 MEMBER BALLINGER: They're going to get
7 great surprises with this one. That helical coil
8 alloy-690 steam generator has never fabricated
9 before. Helical coil generators have been
10 fabricated alloy-690. Tube steam generators have
11 been fabricated, but not the two in the processing
12 and all that kind of stuff on either end. It's just
13 going to be difficult. They're going to be
14 surprised.

15 MEMBER BLEY: But they have the
16 secondary on the inside, which is different, which
17 ought to help with some of the chemistry problems
18 we've had.

19 MEMBER BALLINGER: That's more common
20 with the fossil business anyway.

21 MEMBER BLEY: Yes.

22 MEMBER BALLINGER: Yes.

23 MEMBER BLEY: That's true it is, yes.

24 MR. GRAN: The NuScale design will be a
25 multi-module design where multiple reactors are

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1 located in a common reactor pool that is also used
2 for spent fuel storage. The staff will be seeking
3 information on maintaining the quality of reactor
4 pool water that may be introduced during maintenance
5 and refueling activities. The staff will also be
6 seeking information on the design of the reactor
7 pool cleanup system and maintaining radioactivity
8 levels in the reactor pool water. The near constant
9 refueling outages will feed into the radioactivity
10 level of the pool.

11 And last, the NuScale design will have a
12 large volume of reactor pool water that is
13 potentially subject to neutron activation. This
14 includes examples of production of tritium, carbon-
15 14, nitrogen-16 and argon-41 as examples.

16 CHAIRMAN CORRADINI: So one of our
17 colleagues did their homework and she asked me to
18 ask questions. So the outside water pool is going
19 to consider the operation of the n modules, whatever
20 n is, correct? In other words, if eventually they
21 build 12 of these, you're going to have to consider
22 the sum of all 12 and how they affect the pool?

23 MR. GRAN: Oh, we'll be looking at that,
24 yes. I'm not sure whether or not they're making the
25 case of whether or not there's -- neutron activation

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1 is not going to go out that far.

2 CHAIRMAN CORRADINI: Yes, that's for a
3 calculation. But you're going to consider the
4 complete population of water sitting in the pool?

5 MR. GRAN: Correct.

6 CHAIRMAN CORRADINI: Okay. Thank you.

7 MR. GRAN: And the staff will also be
8 looking into information on performance of their
9 HEPA filters and charcoal absorbers given the
10 possible cool water evaporation rates as well and
11 the ventilation of the building.

12 CHAIRMAN CORRADINI: I have another
13 question --

14 MR. GRAN: Sure.

15 CHAIRMAN CORRADINI: -- I've been asked
16 to ask. So the fuel defect assumption of 0.25 to 1
17 percent is the same simply because it's oxide fuel,
18 just half sized?

19 MR. GRAN: So I'm trying to think of how
20 to --

21 CHAIRMAN CORRADINI: You can say yes and
22 we can move on.

23 MR. GRAN: All right.

24 CHAIRMAN CORRADINI: I was guessing the
25 answer was yes because assuming it was the same fuel

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1 technology, but personally I couldn't see anything
2 about half height affecting that, but --

3 MR. GRAN: I don't think it would, but
4 I'd have to I guess take a look at the information,
5 because obviously there's different source terms
6 provided within 11.1 of the normal, and the 1
7 percent and the 0.025 percent being provided in
8 Chapter 12.2.

9 CHAIRMAN CORRADINI: Okay.

10 MR. DEHMEL: Yes, I'd like to add on
11 this, is that they requested and they will be
12 addressing this and including it, maybe not in the
13 topical report, but later on in the FSAR that they
14 would establish specific technical specification for
15 the fuel. So we'd like to see what the proposed
16 technical specification is going to be for this
17 particular fuel and any operating condition within
18 the reactor vessel.

19 CHAIRMAN CORRADINI: Thank you.

20 MEMBER SCHULTZ: Won't they have to set
21 -- you're saying you don't know if that level of
22 detail will be in the GALE document, the revised
23 GALE document --

24 (Simultaneous speaking)

25 MR. DEHMEL: Yes, the GALE document --

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1 MEMBER SCHULTZ: In order to exercise it
2 you'd think they would need that information.

3 MR. DEHMEL: Ultimately it will be in
4 the FSAR.

5 MEMBER SCHULTZ: Yes.

6 MR. DEHMEL: It may be premature to have
7 that in the first part of the GALE code. The GALE
8 code, our understanding right now is going to be
9 half of the code, half of the documentation only
10 addressing the modeling of fission products from the
11 fuel into the coolant and into the secondary coolant
12 and estimates of activation and corrosion products.
13 That's all it's going to be at this point. And some
14 estimates of failed -- fuel failures obviously.
15 Scale on operating practices right now. The other
16 aspects on the operational and constrained LCOs and
17 tech specs is going to be addressed later on. That
18 information is really not necessary for the
19 development of the GALE code.

20 MEMBER SCHULTZ: Thank you.

21 MR. GRAN: I guess this concludes my
22 presentation on the unique elements of the DSRS
23 11.1. Thank you.

24 CHAIRMAN CORRADINI: Other comments or
25 questions for Zach? Okay.

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1 MEMBER POWERS: Well --

2 CHAIRMAN CORRADINI: Oh, Dr. Powers?

3 MEMBER POWERS: It just excites my
4 intrigue because everything we know about chemistry
5 becomes very funky in this operating environment
6 because the dielectric constant of water is so low.
7 And the shorter rod means that you have less -- you
8 have a very much sharper temperature gradient and
9 you have a very hot top where absorption onto the
10 oxidized cladding -- things don't want to be in
11 solution here. This is more like acetonitrile than
12 it is water.

13 CHAIRMAN CORRADINI: I was going to say
14 this is more like a BWR --

15 MEMBER POWERS: Yes.

16 CHAIRMAN CORRADINI: -- because the
17 delta-T is going to be a lot more --

18 MEMBER POWERS: Yes.

19 CHAIRMAN CORRADINI: -- kind of like a
20 quasi -- it's not a P, it's not a B, it's kind of
21 like an inbetweenner.

22 MEMBER POWERS: Yes.

23 CHAIRMAN CORRADINI: So I was guessing
24 the chemistry words would be more like a B, knowing
25 nothing about -- but I think their delta-Ts are

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1 smaller than a typical P, if memory serves me. I
2 don't actually --

3 MEMBER POWERS: Interesting.

4 CHAIRMAN CORRADINI: I suggest you
5 engage Dr. Powers offline about what you could think
6 about, because he enjoys this.

7 (Laughter)

8 CHAIRMAN CORRADINI: And he's full of
9 energy.

10 MEMBER POWERS: I'm intrigued.

11 CHAIRMAN CORRADINI: All right.
12 Anything else for Zach?

13 MEMBER BALLINGER: -- definition of
14 torture.

15 MEMBER SCHULTZ: Just to comment on the
16 last bullet there, I think you need to turn that
17 around to more of an expectation; that is, rather
18 than the potential production. And you do of course
19 require information, but you need to have a high
20 expectation that this is going to be covered in the
21 topical.

22 CHAIRMAN CORRADINI: You're talking of
23 the large outside pool and how they're going to --

24 (Simultaneous speaking)

25 MEMBER SCHULTZ: Yes.

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1 CHAIRMAN CORRADINI: Yes.

2 MEMBER SCHULTZ: That's a unique feature
3 of the facility; and you mentioned it earlier, and
4 you want to carry it through to make sure that the
5 conclusions are in their discussion associated with
6 the overall evaluation with the revised methodology.

7 MEMBER BALLINGER: Isn't this big pool
8 sort of -- like from the standpoint of dose because
9 the vessel is going to be shielded and all that kind
10 of stuff sort of --

11 CHAIRMAN CORRADINI: There is a
12 containment in here, too.

13 MEMBER BALLINGER: There is a
14 containment, all that kind of stuff that's in the
15 pool, but there's going to be gamma dose, but not
16 neutron dose.

17 CHAIRMAN CORRADINI: Right. Well, there
18 will be some --

19 MEMBER BALLINGER: And so this is sort
20 of like spent fuel pool --

21 CHAIRMAN CORRADINI: But it's always I
22 think --

23 (Simultaneous speaking)

24 MEMBER BALLINGER: -- fuel elements in
25 there.

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1 CHAIRMAN CORRADINI: I think the staff's
2 issue is it's always there, which mean it's going to
3 be accumulating something that one has to consider.
4 That was my --

5 MEMBER BALLINGER: Like a spent fuel
6 pool.

7 MR. GRAN: So you have -- I mean, the
8 constant refueling, there's going to be more and
9 more radionuclides building up in there. The
10 information on the treatment systems will be key to
11 identifying what --

12 MEMBER BALLINGER: Well, I mean from the
13 standpoint of the radiolysis products in the pool.

14 MR. GRAN: Yes.

15 MEMBER BALLINGER: Not fission product,
16 not that kind of stuff.

17 CHAIRMAN CORRADINI: When we were out
18 there I seemed to remember if they had leakers, they
19 had at least a mechanism if they want to get the
20 leakers out of the -- they're not going to leave
21 them inside the spent fuel pool. They're going to
22 reduce them.

23 MR. DEHMEL: No, there's a correction
24 here we need to point out. We're aware that as part
25 of the refueling process they're going to open up

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1 each vessel in the pool. So you have two issues:
2 One is the generation of neutron activation products
3 within the pool itself: the tritium, the carbon-14,
4 nitrogen-16 and argon-41. And then the other thing
5 when each on each module is the refuel. The plan
6 right now or what they propose is that they would
7 cycle it out through the reactor vessel to the CVCS
8 and cleanup system and then open it up underwater
9 within the pool.

10 So ultimately as you do normal refueling
11 they would be essentially a gradual increase of
12 fission product within the pool. So essentially
13 it's multiple source term, what you would normally
14 expect in a spent fuel pool, neutron activation of
15 water components. And then there is slow increase
16 potentially of fission activation or fission
17 products in the pool because of each refueling
18 process.

19 MEMBER BALLINGER: But that's no
20 different than a regular light water --

21 CHAIRMAN CORRADINI: But I think his
22 point is that you've got 12 of these guys and
23 they're going to be continually --

24 MR. DEHMEL: Yes, exactly.

25 CHAIRMAN CORRADINI: -- doing these

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1 operations, so they're going to have to come up with
2 some staff and then we're going to have to come to
3 some expectation it can't be greater than X or the
4 impact of X on dose, right?

5 MR. DEHMEL: Correct, and they also --
6 there are some preliminary discussions. The
7 thinking is that they may have tech specs on the
8 activity on the fuel pool. So they're thinking
9 about that. They realize that there's a potential
10 increase for accumulated activity as they go to
11 multiple refueling and perhaps there should be tech
12 specs on maximizing a limited controlled amount of
13 activity within the pool.

14 CHAIRMAN CORRADINI: Ron, did you have a
15 follow-up?

16 MEMBER BALLINGER: No.

17 CHAIRMAN CORRADINI: No? Okay.

18 MEMBER SKILLMAN: Mike, I think you're
19 right when you say this is really a hybrid. It's
20 not a P, it's not a B. It has elements as far as
21 source term for the primary coolant in both designs.
22 But what I'm pondering here is the work that B&W did
23 years and years ago on the CNSG, but more
24 importantly the work that was done by all the boiler
25 manufacturers for natural circulation and where --

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1 CHAIRMAN CORRADINI: What's the CNSG?

2 MEMBER SKILLMAN: That was the
3 consolidated nuclear steam generator.

4 CHAIRMAN CORRADINI: Oh.

5 MEMBER SKILLMAN: And I don't know if
6 you remember when NuScale was here. They said there
7 are elements in this NuScale design that are
8 absolutely derived from what was that CNSG. That
9 was a hard-earned patent by Babcock. Most people
10 don't even know that that design was out there. It
11 was intended to be a merchant ship design. But what
12 I'm thinking is the secrecy around which the
13 downcomer or the recirculation rates were held for
14 the big boiler, the downcomer flow rates, because it
15 was all driven by natural circulation.

16 This machine is really driven by natural
17 circulation. And so what we see in the big Ps with
18 very high Reynolds numbers is a clean function of
19 the corrosion products and the transport of those
20 ultimately to CVCS or to the makeup and purification
21 system. This plant will have a much different
22 residence time and probably a different generation
23 time of corrosion products.

24 CHAIRMAN CORRADINI: You're talking on
25 the primary system side?

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1 MEMBER SKILLMAN: Yes.

2 CHAIRMAN CORRADINI: Okay.

3 MEMBER SKILLMAN: I am. And so the
4 source term, or the primary -- the coolant source
5 terms will be very different than a big pump-driven
6 P, and probably also different from a very large B
7 with fairly high circulation rates.

8 So to Dana's point, there are going to
9 be some very different -- at least my sense is some
10 very different source term concentrations based on a
11 very different interior circulation of the primary
12 system. And we ought to be on top of that. And I
13 don't know if that means that NuScale is going to
14 have to base their GALE -- their custom GALE code on
15 what are the very much smaller reactor coolant
16 system volume and very differently circulation rates
17 and a very small volume. My sense is that's going
18 to drive what will be the NuScale GALE code.

19 MS. BANERJEE: I have a question.

20 CHAIRMAN CORRADINI: Sure.

21 MS. BANERJEE: I'm stuck on the tall
22 riser and I'm wondering if that flow through -- the
23 natural circulation flow through the riser is going
24 to precipitate heavier elements down towards the
25 bottom of the reactor.

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1 MEMBER SKILLMAN: And, Maitri, that's
2 the kind of thing I'm driving at, too. This is all
3 driven by this elevation. It's -- a thermalsyphon
4 actually is what drives this process.

5 CHAIRMAN CORRADINI: Well, their mass
6 flux through the core is lower, but it's not
7 substantially lower. I'm not sure we can say what
8 it is because I don't even remember if we were ever
9 told it, but in public -- in a meeting in Chicago
10 just a couple weeks ago they did a number of thermal
11 hydraulic scaling presentations and it's
12 approximately half of P. So it's not really low,
13 but it is lower.

14 MEMBER SKILLMAN: Lower, yes. My only
15 point is that since this is a natural circulation-
16 driven machine, we're probably going to see some
17 source term differences that we had not anticipated.
18 I don't know that they will be a problem, but like
19 Ron says, expect surprises. We ought to be
20 expecting surprises.

21 CHAIRMAN CORRADINI: Okay. Bob is up.
22 The world of electrical.

23 MEMBER BLEY: But before Bob gets
24 started, I have a comment and a couple of questions.
25 And they might be more aimed at Greg than Bob.

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1 As we go through this series of guides,
2 review standards, we always begin with the design of
3 NuScale, which doesn't need AC power for safety
4 functions for 72 hours. And after 72 it's non-
5 safety-related. Where in the overall review process
6 does that assumption get analyzed for sure? I mean,
7 it isn't an electrical question. The electrical is
8 designed to that. It really comes out of the
9 thermal hydraulics and everything else.

10 CHAIRMAN CORRADINI: This is a non-
11 Chapter 11 question.

12 MEMBER BLEY: Well, I'm not sure. I
13 don't know where it is. Chapter 11; and Bob will do
14 this some, I hope, shows some places where they make
15 you justify these assumptions in these Chapter 11
16 DSRS, but that overall assumption of how this system
17 performs and whether it needs power or not seems
18 like it's probably somewhere else. And where in the
19 whole scope of the DSRS are our reviewers driven to
20 be sure that's a valid design criteria?

21 MR. CRANSTON: Yes, they'll be looking
22 in the reactor systems areas as far as how the
23 systems --

24 MEMBER BLEY: Have we already done that
25 one? I think we --

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1 MR. CRANSTON: No.

2 MEMBER BLEY: No, we haven't? Okay.

3 MR. CRANSTON: And how the systems are
4 classified, how they have to operate during normal
5 operations, how they have to operate post-accident,
6 post-LOCA in order to maintain plant safety as far
7 as shutdown and cooldown and all those things, those
8 are all analyzed from that perspective. And that
9 will actually -- once we determine what systems are
10 needed for that based on our reviews, then we look
11 at what electrical power is needed or what other
12 things are needed to support those systems. And out
13 of that we'll determine whether or not -- for
14 example, do they need Class 1E power here or not?
15 If nothing needs to operate --

16 MEMBER BLEY: I mean, but that all makes
17 sense to me, but when we get to the reactor systems,
18 will there be anything in there that talks about --
19 that reflects over to the electric power part to say
20 what's being done over there is appropriate for what
21 we know about the thermal performance of this plant,
22 from hydraulics performance?

23 CHAIRMAN CORRADINI: Can I try his
24 question? Can I try his question differently?

25 MR. GRAN: Okay.

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1 CHAIRMAN CORRADINI: So maybe I'm even
2 generalizing it more, but what he says, what I saw,
3 which is you guys picked 72 hours. And I thought,
4 well, that makes sense because you forced AP-1000 to
5 do that and the ESBWR to do that, and now you're
6 back -- well, let's just leave it there.

7 So for the other passive plants 72 hours
8 is a magical time where before thou shalt show that
9 you can do things passively and after that if
10 necessary you have to -- you can use some sort of AC
11 power assist. So is that just a carryover from that
12 policy applied to the large passive plants, or is
13 there something more -- is there other rationale?
14 That's kind of how I frame what I thought you were
15 asking.

16 MEMBER BLEY: That's basically the same
17 thing, yes.

18 MR. CRANSTON: No, it's a carryover.

19 CHAIRMAN CORRADINI: So what makes --
20 okay. So now the next question is why 72 hours?
21 Was that a policy decision? I sense yes.

22 MR. CRANSTON: I will have to get back
23 to you on that. I don't know the details.

24 CHAIRMAN CORRADINI: Or where is it
25 justified?

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1 (Simultaneous speaking)

2 MEMBER BLEY: Where is it codified that
3 we understand technically why there are not 48
4 hours, or 24 hours, or 96 hours?

5 MR. FITZPATRICK: The 72 hours has come
6 down from the SECY papers.

7 CHAIRMAN CORRADINI: Are you turned on?
8 Down at the bottom.

9 MR. FITZPATRICK: The 72 hours has come
10 down to us from SECY papers that discuss that.

11 CHAIRMAN CORRADINI: I was guessing
12 that.

13 MR. FITZPATRICK: Yes, and that is the -
14 -

15 CHAIRMAN CORRADINI: For us that are
16 forgetful, if you could refresh us as to that SECY
17 paper, that would help us.

18 MR. FITZPATRICK: Yes.

19 MEMBER POWERS: Is the 72 hours codified
20 in the advanced reactor requirements document that
21 EPRI put together?

22 CHAIRMAN CORRADINI: Now, that I can't
23 remember. This is a thing from the '90s, right?

24 MEMBER POWERS: Yes.

25 CHAIRMAN CORRADINI: The ALWRS

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1 thingamajigger?

2 MEMBER BLEY: Yes, I don't remember if
3 it's in there.

4 MEMBER POWERS: I think that's where 72
5 hours comes from.

6 CHAIRMAN CORRADINI: Comes from? Oh, it
7 is.

8 MEMBER SCHULTZ: I think it is in there.
9 I don't know if that's where it came from or the
10 dialogue was going on at that time.

11 MEMBER POWERS: Well, I think it did and
12 the discussions and whatnot just got codified here
13 in a -- and that became an object of the oral
14 traditions of reactor safety.

15 CHAIRMAN CORRADINI: What did you say?

16 (Laughter)

17 MEMBER POWERS: The oral traditions of
18 reactor safety.

19 CHAIRMAN CORRADINI: Mythology?

20 MEMBER POWERS: Yes.

21 CHAIRMAN CORRADINI: Okay. Fine.

22 MEMBER POWERS: So, I mean, I think it's
23 -- people said, gee, we've been thinking in terms of
24 24 hours. Now we'll think about 72 hours. That
25 seems better. And that's largely where it came

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1 from.

2 CHAIRMAN CORRADINI: Well, I mean, if
3 that's the source of it, then it always goes back to
4 the '80s when they were saying that you want to show
5 essentially containment, lack of -- high probability
6 of containment survival for a few days, whatever a
7 few days was. Right?

8 MEMBER POWERS: Yes.

9 CHAIRMAN CORRADINI: I think they -- if
10 that's the connection.

11 MEMBER POWERS: I think a few turned out
12 to be three.

13 MS. BANERJEE: Now, I have a question to
14 the staff. We are not going to do any DSRS sections
15 that are currently planned that we'll revisit this
16 area, if I can remember.

17 PARTICIPANT: That's true.

18 CHAIRMAN CORRADINI: The SECY would help
19 us. Now to Bob.

20 MEMBER BLEY: And as you go through,
21 Bob, if you'll highlight places where there are
22 differences --

23 MR. FITZPATRICK: Certainly.

24 MEMBER BLEY: -- here, we'd appreciate
25 it.

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1 MR. FITZPATRICK: I'm Bob Fitzpatrick.
2 I'm a member of the Electrical Engineering Branch in
3 NRR. The label says NRO, but that was a used to be.
4 And I'm going to speak to you today about Chapter 8
5 of the DSRS. I'm here because I led the effort
6 within the staff, within the branch to develop the
7 Chapter 8 for mPower, and then I also led the effort
8 to develop Chapter 8 for NuScale. And we actually
9 derived NuScale DSRS from the work we had already
10 accomplished with mPower.

11 CHAIRMAN CORRADINI: That's kind of
12 noticeable. There are still remnants of mPower
13 sprinkled in the text.

14 MR. FITZPATRICK: Yes.

15 CHAIRMAN CORRADINI: Just a side note.

16 MEMBER BLEY: And, well, since that's
17 been brought up, in 8.4 in particular the last
18 paragraph of the introduction says if you don't have
19 enough guidance here, go to the mPower. And that
20 seemed really odd.

21 CHAIRMAN CORRADINI: I haven't looked,
22 but I bet you NuScale caught that.

23 (Laughter)

24 MR. FITZPATRICK: I may not have, but
25 they did, yes.

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1 The agenda is a brief introduction, and
2 then going through the sections, and a quick summary
3 at the end.

4 The purpose of my being here today is to
5 really present the highlights of the NuScale design
6 philosophy; and I say philosophy because they
7 haven't given us a design to this point, and present
8 changes, highlight changes to the SRP that we've
9 made accordingly.

10 I do want to highlight the following
11 items before we get started:

12 We have not received the detailed
13 design. We've seen pieces of design along the way.
14 I don't think we've attended any two meetings. We
15 don't meet that often with them, but they've had the
16 same electrical design of the pieces we've been
17 looking at. CHAIRMAN CORRADINI: So
18 they're evolving?

19 MR. FITZPATRICK: They're absolutely
20 evolving. I was at the very first meeting with the
21 staff, maybe four years ago or whatever, and ever
22 since then it's evolved and matured in the process.
23 So we'll see. We'll see what we get when that
24 finally comes in.

25 CHAIRMAN CORRADINI: So to put it

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1 another way, when I read Chapter 8, and I have a lot
2 of -- not a lot, a couple of questions, it's more
3 like on the one hand and on the other --

4 MR. FITZPATRICK: Yes.

5 CHAIRMAN CORRADINI: -- the way it's
6 written.

7 MR. FITZPATRICK: Right.

8 CHAIRMAN CORRADINI: Maybe this, maybe
9 that?

10 MR. FITZPATRICK: That's exactly right.
11 We've tried to keep flexibility in there, just
12 depending on what we had.

13 MEMBER SKILLMAN: Bob, let me ask this:
14 As I read 8.1, 8.2, 8.3, 8.4, it seemed that the
15 staff was attempting to preserve in the DSRS every
16 opportunity to maintain an active power supply even
17 though the bidding is toward not needing an active
18 power supply because the system is passive. It
19 appears as though you were always retaining an
20 option for a Class 1E AC, some form of a backup
21 Class 1E AC, or -- and Class 1E DC.

22 MR. FITZPATRICK: We certainly tried to
23 do that, yes.

24 MEMBER SKILLMAN: That appears to --

25 MR. FITZPATRICK: Yes.

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1 MEMBER SKILLMAN: -- show up through --

2 MR. FITZPATRICK: Right.

3 MEMBER SKILLMAN: -- the DSRS. And it
4 also appears as though the wording is such that you
5 could delete that if the mature design should be
6 proven to not need the active and passive AC and DC.
7 Nonetheless, you preserve that option through the
8 DSRS.

9 MR. FITZPATRICK: Right. Another point
10 I make during the presentation here is that we won't
11 know really the acceptability of this design as they
12 say it's going to be configured until we get to the
13 end of the review, because a lot of it is dependent
14 on all -- the NRC staff that supports Chapter 15
15 analyses. If this things really performs exactly
16 the way they say it will, then that's a different
17 story. But that has to be proven.

18 MEMBER BLEY: So I guess the thing I'm
19 thinking about a little is the poor guy who has to
20 review the system when it comes in, a little bit
21 about the applicant when they come in. And they're
22 going to want everything done at once, I'm sure. We
23 try to -- end up doing all this stuff in parallel.
24 It sounds like whoever reviews the electrical is
25 going to have to review it under two different

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1 options essentially and generate questions under
2 each option until it becomes clear that either we
3 need some 1E power or we don't ever. And then half
4 that work wasn't needed, whichever way it goes. Am
5 I reading that wrong? That's the way it --

6 (Simultaneous speaking)

7 MR. FITZPATRICK: I personally don't
8 envision that. I think that the reviewer would be
9 going in and reviewing what's there and determining,
10 in the context of the way it's presented, is that
11 really going to make it?

12 MEMBER BLEY: Unless there's a challenge
13 from --

14 (Simultaneous speaking)

15 MR. FITZPATRICK: And then if we got a
16 challenge at the end -- well, it's a big deal
17 getting it at the end, but I mean, that's their
18 design on what they defended. If they didn't make
19 it -- but I don't see the staff really doing a
20 double parallel review.

21 CHAIRMAN CORRADINI: Well, I guess what
22 I heard Dennis asking is what I was thinking, too,
23 which is in some sense you guys are going to come in
24 with an expectation that's going to look like X.
25 Then you're going to see does the system perform

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1 like X, which requires certain instrumentation and
2 electrical systems that support X in terms of
3 safety.

4 MR. FITZPATRICK: Right.

5 CHAIRMAN CORRADINI: And then it turns
6 out it's not X, it's X minus delta-X, or X plus
7 delta-X. Then you have to come back and say, well,
8 what you proposed for the -- I'm focusing on
9 instrumentation because when we visited there was --
10 as I was telling one of the members when we visited,
11 there was this discussion between the ACRS members
12 and NuScale about, well, don't you want to know
13 what's happening? And the answer was no. It will
14 all be good. And the answer was, well, don't you
15 want to at least know it's good?

16 (Laughter)

17 CHAIRMAN CORRADINI: So what power are
18 you going to provide so you know that the
19 instruments are powered, so you know it's good? And
20 so, I guess what I'm getting to is that eventually
21 if it does perform you may actually agree to certain
22 of what they're claims are, but you won't know until
23 pretty much the end of the review.

24 MR. FITZPATRICK: That's true.

25 CHAIRMAN CORRADINI: Okay.

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1 MR. FITZPATRICK: If we find out we're
2 wrong, then we'll have to go back. And they'll
3 really need to change the design before we review it
4 again. There's that possibility as well.

5 MEMBER BLEY: Let me just ask one other
6 thing, because I've never had to review anything
7 against an SRP. I've read them before.

8 CHAIRMAN CORRADINI: Count yourself
9 lucky is what I sense.

10 MEMBER BLEY: Well, yes, but as I go
11 through the first three sections of all of these,
12 the first one says here's what we're going to review
13 and it kind of lays it out and gives the guidance
14 that you'll use that you'll review against. The
15 next one is the criteria that you're going to use,
16 which is almost like the first part. And the third
17 one is the process that you're going to use, which
18 is almost like the first two. It seems to me it's
19 an extremely redundant set of things. But I guess
20 the whole SRP is done that way and --

21 MR. FITZPATRICK: Yes, it is.

22 MEMBER BLEY: -- is that really tough
23 for somebody doing a review, or you get used to that
24 in a hurry?

25 MR. FITZPATRICK: I guess we're used to

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1 it because --

2 CHAIRMAN CORRADINI: Don't answer that
3 question.

4 (Laughter)

5 CHAIRMAN CORRADINI: No, I'm joking.

6 MR. FITZPATRICK: But it is cumbersome.

7 MEMBER BLEY: It's almost redundant, and
8 yet each section has a little bit that's different
9 from the others. So keeping track of that seems
10 tricky.

11 Anyway, go ahead, Bob.

12 MR. FITZPATRICK: Okay. So, the second
13 bullet on this slide, the classification of
14 electrical loads dictate the classification of that
15 power source. This is an important element along
16 the way because when they say they're not going to
17 have any safety-related loads of AC power, then that
18 means they're not going to have a Class 1E AC power
19 system. And the same with the DC.

20 So, I wouldn't say that's a 100 percent
21 driver for the outcome, but it's certainly a big
22 factor in what we do and how we react to what their
23 design ultimately turns out to be. And again, I've
24 already stated that the ultimately acceptability is
25 really we won't know that until near the end. So

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1 that makes it a little more difficult as well.

2 Section 8.1, the introduction. This
3 pretty much provides an executive summary of what's
4 going on in the rest of the chapters.
5 Unfortunately, none of the reviewers are executives,
6 so this really doesn't help us a whole lot in the
7 review itself, but it was there -- put in there from
8 the beginning and we deal with it.

9 The main reason we have 8.1 is the table
10 8-1, and that's where we outline the acceptance
11 criteria on guidelines for all the electrical power
12 systems throughout the rest of the sub-chapters.
13 And I'll try hit some of the table 8-1 things we've
14 done as we go through the rest of the --

15 MEMBER BLEY: Yes, the 8.1's kind of a
16 minimally informative table, but it does show where
17 the acceptance criteria are and where the guidelines
18 are. Is this used as like a checklist as I'm a
19 reviewer to make sure I find all of those?

20 MR. FITZPATRICK: Yes.

21 MEMBER BLEY: Okay.

22 MR. FITZPATRICK: Yes.

23 CHAIRMAN CORRADINI: Can I ask a
24 different question about the table, if I can find my
25 question? So at this point that table is on the one

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1 hand and on the other. In other words, in some
2 sense it's not -- I don't want to use the word
3 "consistent," but it's meant to be all inclusive, so
4 just in case they go one direction, it helps the
5 reviewer. And just in case they go the other
6 direction, it helps the reviewer. Have I read this
7 right?

8 MR. FITZPATRICK: That's pretty much the
9 case, yes.

10 CHAIRMAN CORRADINI: Okay. Fine.
11 Because I looked and I thought, good God, it was
12 just -- I didn't mean it like that.

13 MR. FITZPATRICK: Right.

14 CHAIRMAN CORRADINI: I just meant if I
15 were in your shoes, I wouldn't know what to do with
16 it. It looks --

17 MR. FITZPATRICK: Right.

18 JUDGE KENNEDY: -- so inclusive as to be
19 -- well, "confusing" I guess the word that comes to
20 my mind.

21 MR. FITZPATRICK: We did do a trim on
22 some of the items in there that we figured just will
23 not apply --

24 CHAIRMAN CORRADINI: Okay.

25 MR. FITZPATRICK: -- to the passive

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1 design, but a lot of it's been retained because --
2 I'm not sure.

3 Next page. Off site power. I think the
4 biggest thing to talk about with offsite power in
5 the design philosophy is that they will request --
6 they've told us they will request a partial
7 exemption to GDC 17. And the request will seek
8 approval for zero credited offsite power circuits.
9 And as you know, GDC 17 states that there should be
10 two offsite power circuits from the grid right down
11 into the buses of the plant. And they want to go
12 with zero. The AP-1000 was approved with one
13 offsite power circuit. That's one credited circuit
14 because it -- actually for like Vogtle they have
15 four, four lines. So they have one that they
16 dedicate and then they have three backups.

17 CHAIRMAN CORRADINI: What -- I don't
18 remember. So what is that needed for in the AP-
19 1000, because my question really is if they had one,
20 what would they do with it? In this design, if it
21 stays the way it is, there's nothing to do with it.

22 MR. FITZPATRICK: Well, this design as
23 well as all the others we expect that offsite power
24 will be the power that actually runs everything in
25 the plant. That's steady state power operation

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1 right down to not utilizing the batteries, but
2 running off of --

3 CHAIRMAN CORRADINI: Oh, okay.

4 MR. FITZPATRICK: So it will be the
5 power source. We don't expect that to be different.

6 MEMBER BLEY: And if that's true, if you
7 ever have an event, you have to shift to some other
8 power supply.

9 CHAIRMAN CORRADINI: But I guess --
10 okay. So, all right. I guess I misinterpreted. So
11 your point is if they're down, it's shutdown
12 conditions, this is their power source for all their
13 auxiliaries?

14 MR. FITZPATRICK: Yes.

15 CHAIRMAN CORRADINI: So you've yet to
16 inquire with NuScale why they need zero?

17 MR. FITZPATRICK: Well, I --

18 CHAIRMAN CORRADINI: I'm struggling to
19 understand that -- they do get to shutdown mode, so
20 they might need something.

21 MR. FITZPATRICK: Right. I interpret
22 this as basically -- well, the same interpretation I
23 gave personally to the AP-1000. It's a marketing
24 tool. There's no real technical necessity to not
25 have -- that they can do off these lines. This is a

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1 power generating facility, and so it's going to have
2 lines anyway that come into the plant, but the same
3 lines go back out again. And to have less than two
4 is economic suicide because if you lose the single
5 line, you've lost the entire plant. So on
6 practicality basis there is a --

7 CHAIRMAN CORRADINI: Okay. I
8 understand.

9 MR. FITZPATRICK: But in terms of
10 actually requiring something to be there, that's
11 where we are. And what the staff --
12 recently in response to a gap analysis that --
13 presented by NuScale we sent a letter to NuScale on
14 9/15, so a week, two weeks ago, telling them two
15 things: Currently there's insufficient information
16 to do much of anything and make any kind of judgment
17 on almost anything in the plant. And the second
18 one, the one that I actually quote on the screen
19 here is that NRC staff believes that given
20 considerations for defense-in-depth one offsite
21 power circuit should be available. So, we've
22 already given them a heads up. We'll listen, but
23 that's where we stand at the moment.

24 MEMBER SCHULTZ: Bob, is zero credited
25 offsite power circuits the NuScale terminology?

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1 MR. FITZPATRICK: No.

2 MEMBER SCHULTZ: It is not?

3 MR. FITZPATRICK: No.

4 MEMBER SCHULTZ: It's what you're --

5 MR. FITZPATRICK: Right, what I'm
6 calling it.

7 MEMBER SCHULTZ: What you're calling it?

8 MR. FITZPATRICK: Right.

9 CHAIRMAN CORRADINI: So there's a level
10 of reliability that's required to go from zero to
11 one that they wouldn't have given what you know to
12 be the design? What I'm trying to say is they're
13 going to have what -- when you were explaining it to
14 me, they're going to have this anyway, multiple
15 lines.

16 MR. FITZPATRICK: Yes.

17 CHAIRMAN CORRADINI: It's just they're
18 not dedicated or reliable based on some sort of QA
19 requirement to be counted upon. That's what I
20 interpret what you were saying.

21 MR. FITZPATRICK: Well, there's not a
22 whole lot of QA requirement on an offsite power
23 line. Basically it would keep offsite power lines
24 out of the tech -- those lines out of the tech
25 specs.

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1 CHAIRMAN CORRADINI: Yes, okay.

2 MEMBER SCHULTZ: So is it fair to say
3 then that you could approve zero credited offsite
4 power circuits, but you want to be sure that one
5 offsite power circuit is in fact reliably available?

6 MR. FITZPATRICK: I think that's a fair
7 characterization.

8 MEMBER SCHULTZ: Good. Thanks.

9 CHAIRMAN CORRADINI: Say that
10 characterization again?

11 MEMBER SCHULTZ: That zero credited
12 offsite power circuits could be approved, zero
13 credited, but one offsite power circuit --

14 CHAIRMAN CORRADINI: Will be there?

15 MEMBER SCHULTZ: -- should be reliably
16 available.

17 CHAIRMAN CORRADINI: Reliably available.

18 MEMBER SKILLMAN: Well, let me push back
19 on that. I can understand the marketing strategy
20 here. I believe you're accurate, Bob. It's
21 suicide. But they're saying we want to be a ship.
22 We want to be able to site this thing in Caribou,
23 Maine or in Hudson Bay or in the Arctic or in the
24 Antarctic, and there aren't going to be any other
25 power lines. We are it.

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1 CHAIRMAN CORRADINI: Just be a power
2 supply, yes.

3 MEMBER SKILLMAN: Bingo. We're a ship.
4 The *Sturgis*. The *Savannah*.

5 CHAIRMAN CORRADINI: He always goes back
6 to the same ship. He can't stop.

7 (Laughter)

8 MEMBER SKILLMAN: Well, pick any ship.

9 (Simultaneous speaking)

10 MEMBER POWERS: -- for years because
11 it's a totally filled concept and they've given up
12 on it.

13 (Laughter)

14 MEMBER SKILLMAN: Yes, economically
15 that's accurate. It was very successful. But
16 that's what they're campaigning for here, I think.
17 And you get 12 of these things in a big box, I think
18 sticking with General Design Criteria 17, no
19 exemptions, makes a whole lot of sense. I mean, I
20 think there's a reason that the industry has
21 complied with 17, and it's served us well.

22 MEMBER BLEY: Well, yes, but every plant
23 we've got out there and where it came from were
24 plants that absolutely have to have electric power.

25 MEMBER SKILLMAN: Well, and I'm not so

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1 sure that this plant --

2 CHAIRMAN CORRADINI: That's up to them
3 to prove. So that's where we're -- we're back to
4 the discussion that Dick wasn't at in Oregon, which
5 was that --

6 MEMBER SKILLMAN: At least you need to
7 see it.

8 CHAIRMAN CORRADINI: -- unless they
9 prove this design is X in terms of safety and
10 reliability, your point is well taken.

11 MEMBER SKILLMAN: That's my point. I
12 think you're saying --

13 MR. FITZPATRICK: Right. My response to
14 that would be if they come with a COL, then we'll
15 review that for the DCD.

16 MR. CRANSTON: But going along with what
17 you're discussing --

18 MR. FITZPATRICK: They're going to do
19 that as a land-based unit in the middle of here.

20 MR. CRANSTON: Going along with what
21 you're discussing, this is not something they've
22 officially put in -- documented per se, but from the
23 commercial standpoint some of the plants that
24 they're considering would be located adjacent to a
25 facility that needs to be powered all the time. And

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1 if the whole grid goes down around that facility and
2 now the NuScale plant is the only source of power,
3 they want to be basically an extended island mode
4 type plant to be able to keep that facility up and
5 running because of --

6 MEMBER BLEY: Like a major chemical
7 plant or something like that?

8 MR. CRANSTON: Something like that, yes.

9 CHAIRMAN CORRADINI: This would be their
10 dedicated --

11 MR. CRANSTON: So then they would
12 essentially be in an island mode and they're the
13 only source of power, and they'd want to be able to
14 do that. We haven't seen anything like that
15 officially, but that's some of the discussions that
16 have gone on.

17 MR. FITZPATRICK: But that scenario is
18 actually design basis. I mean, all the plants --
19 you lose offsite power, you just react to it. It's
20 all designed in.

21 MR. ZIMMERMAN: Excuse me. This is Jake
22 Zimmerman. I'm the Chief of the Electrical
23 Engineering Branch at NRR. I just want to reiterate
24 what Bob said. So from a design certification
25 standpoint we have to be careful how far we go with

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1 the exemption that they potentially request. And we
2 would certainly evaluate a COL application in their
3 particular location where they want to put it and
4 the circumstances surrounding it. It may in fact
5 require then -- if they do want to seek a full
6 exemption, it may require a design modification such
7 that maybe they would need to have Class 1E
8 emergency diesel generators as backups where they're
9 not currently going to have Class 1E emergency
10 diesel generators for this facility.

11 CHAIRMAN CORRADINI: Oh, I see.

12 MR. ZIMMERMAN: So we're going to have
13 to balance that out.

14 CHAIRMAN CORRADINI: So can I say it
15 back to you so I get it right? So your point is if
16 we go with Bob's thinking process for the moment
17 that they've got to have -- however Steve said it --
18 I'll say it wrong, but some sort of reliable outside
19 line, then there may be then an ability to say that
20 I don't need Class 1E power. But if I want to say
21 that I can go into an island mode and an isolated
22 thing -- and for that site and that construction you
23 guys may say, well, to be absolutely positively sure
24 we might need a different sort of modification to
25 the reliable onsite power.

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1 MR. ZIMMERMAN: Yes.

2 CHAIRMAN CORRADINI: Is that what you're
3 getting --

4 MR. ZIMMERMAN: Yes, based on the land
5 use, the history and some of the applications
6 they're talking about, it appears that it will be
7 acceptable to only have one offsite source. But the
8 devil's in the details, and that may very well be.
9 And that's something they're going to have to
10 consider and I'm sure we'll be talking about.

11 MS. BANERJEE: Can I ask a question?

12 CHAIRMAN CORRADINI: Sure.

13 MS. BANERJEE: This may not be a very
14 smart question, but number of units, does that make
15 a difference in the design of the electrical power
16 system and whether we need offsite power or not?
17 The smaller plant versus a bigger one?

18 MR. FITZPATRICK: No, not in terms of
19 whether they'll need offsite power or not.

20 CHAIRMAN CORRADINI: So whether it would
21 be 1 module or 12 modules, from your standpoint --

22 MR. FITZPATRICK: Right.

23 MEMBER BLEY: And from what we heard
24 they don't want a design cert for anything less than
25 a full package.

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1 MR. FITZPATRICK: They can go to partial
2 packages, but they're going for the full case, so to
3 speak.

4 MEMBER BALLINGER: Can one power
5 another? No?

6 CHAIRMAN CORRADINI: My understanding is
7 the modules are separate. Separate turbine
8 generator sets, separate everything. But I'm not
9 sure if there's cross-over.

10 MEMBER BALLINGER: That's what I mean.

11 (Simultaneous speaking)

12 CHAIRMAN CORRADINI: Yes, but not until
13 you hit the switch.

14 MEMBER BLEY: I think that's what we
15 heard, but I don't --

16 CHAIRMAN CORRADINI: That's what I
17 thought I remembered.

18 If you get a break, go ahead, Bob.

19 (Laughter)

20 MEMBER BALLINGER: They don't have in
21 effect X independent power sources being the
22 reactors themselves?

23 MEMBER BLEY: I have to see their exact
24 design, but they're claiming they're most
25 independent. They're all in the same pool.

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1 MEMBER BALLINGER: Yes, but I think
2 what --

3 MEMBER BLEY: But out past the generator
4 they're separate.

5 MR. FITZPATRICK: I'm sure there are
6 ways they could pull that back in from the
7 switchyard, but we just don't know what they plan to
8 do in any detail. I have yet to see a one-line
9 diagram of the plant.

10 So getting back to Section 8.2 in terms
11 of the SRP, the SRP had a reactor coolant pump
12 discussion in terms of if the grid should decay, the
13 frequency might be such that it would slow down the
14 reactor coolant pumps and maybe get into some DNBR
15 considerations. This thing has absolutely no
16 reactor coolant pumps, and so that discussion was
17 removed, things like that. But that's a good
18 example of just think we've pulled out.

19 I would note that guidance for having a
20 stable grid and for having protection of the onsite
21 power system from the offsite power system, that's
22 all retained. And we've actually added to the DSRS
23 in table 8-1 the newly approved Branch Technical
24 Position, BTP 8-9, Open Phase Conditions and
25 Electric Power System.

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1 CHAIRMAN CORRADINI: We would have asked
2 you about that if you hadn't.

3 MR. FITZPATRICK: And so, on AC power
4 there's not a lot to say here that we already
5 haven't said. They claim there was no need for
6 safety-related Class 1E power supplies. And our
7 guidance includes flexibility reviewing with and
8 without. And that's basically where we stand. And
9 we can say the same thing for the onsite AC power
10 system. This will be a little bit more interesting
11 review because no one's made this claim before on
12 the DC side, and so we'll be taking a harder look at
13 it, but that's the way it's coming in with no Class
14 1E power sources.

15 CHAIRMAN CORRADINI: So the implication
16 of this is they would go black and not after once --
17 of course they would run their batteries very
18 efficiently to get as long -- but once that's gone,
19 they have no instrumentation at all, that the
20 control room would be able to see.

21 MR. FITZPATRICK: They intend to provide
22 very small diesel generators to cover that.

23 CHAIRMAN CORRADINI: But they're not
24 safety-related?

25 MR. FITZPATRICK: No, nor supposedly

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1 would they have to be.

2 MEMBER BLEY: And they would just supply
3 UPS, is that right?

4 MR. FITZPATRICK: Right. Right, and
5 that would take care of the instrumentation, HVAC,
6 if necessary, although they've spoken about passive
7 --

8 (Simultaneous speaking)

9 CHAIRMAN CORRADINI: That's how they
10 explained it to us when we were there.

11 MR. FITZPATRICK: Right, lighting,
12 communications. And it's probably going to be for
13 all 12 modules because it's kind of -- all that's
14 centered in the control room, but they're not going
15 to be big.

16 CHAIRMAN CORRADINI: So just say it
17 again. At least the version you've seen so far is
18 they would have an non-safety diesel to continue to
19 power instruments.

20 MR. FITZPATRICK: The DC bus.

21 CHAIRMAN CORRADINI: DC bus? And
22 therefore provide --

23 MR. FITZPATRICK: Expect to see two
24 diesels, one for each of the two DC buses that are -
25 - but again, they would claim it to be not in Class

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1 1E. 8.4 on station blackout --

2 MEMBER SKILLMAN: Bob, what method -- is
3 this a situation where the staff is so rigidly
4 connected to the SRMs and other documentation that
5 they're paralyzed from challenging nonsense? I
6 don't mean that unkindly.

7 CHAIRMAN CORRADINI: What did you say,
8 though? I didn't hear what you said.

9 MEMBER SKILLMAN: In these passive
10 designs it seems like it's possible to get so tied
11 up in the web of regulation that there's no
12 opportunity to say, stop, this doesn't meet the
13 Snickers test. There's something wrong. Would you
14 really design a plant that has 12 modules, each of
15 which could be doing something differently because
16 each core, my view, has a different personality?
17 And you have a colossal blackout and you accept the
18 idea that you can have a little Evinrude with a
19 small Home Depot generator giving you a couple of
20 lights and a couple indications, and that's plenty
21 okay.

22 In my view there's something that's
23 baffling about being willing to accept that. We
24 ought to be saying, wait a minute, you're not going
25 to run 12 of these modules with the power levels

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1 that the aggregate can create and not have at least
2 some modicum of compliance with backup
3 instrumentation, lighting, ventilation, access to
4 the power supplies that might be available somewhere
5 else. If there's this overriding philosophy it's a
6 passive plant that doesn't need any of the standard
7 equipment that we've learned is important over the
8 last five decades, six decades, then I say to myself
9 what are we doing here? We ought to be saying, now
10 wait a --

11 CHAIRMAN CORRADINI: So just to turn to
12 be the NuScale proponent, AP-1000 with one dedicated
13 outside AC line is essentially that at 3,400 --

14 (Simultaneous speaking)

15 MEMBER BLEY: Well, wait a minute. Wait
16 a minute. The system Dick put forward is one nobody
17 would buy into. Don't forget RTNS. We might not be
18 happy with the way RTNS has been handled so far, but
19 nobody's really handled it yet, because we haven't
20 gotten that far, and we've been tracking that. But
21 all of this stuff that's non-safety in the long term
22 has to meet -- that you need in the long term has to
23 meet the RTNS requirements. You have that somewhere
24 in these documents.

25 MR. FITZPATRICK: Yes.

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1 MEMBER BLEY: I saw it. And that's kind
2 of like a tech spec, but it's not. So it has to
3 have some pedigree to it. And the amount of that
4 depends on how important it is.

5 Now, I agree with you. I'd sure want to
6 be able to see what was going on and a few other
7 things like that, but I don't think that necessarily
8 has to be with 1E, and it's been done with this
9 other kind of stuff in other designs. But it can't
10 just be something you go down to the hardware store
11 and buy either.

12 CHAIRMAN CORRADINI: Yes, it can't be an
13 Evinrude, I guess. But on the other hand, it
14 doesn't have to be safety-related. I mean, again
15 I'm remembering -- I could be remembering it
16 incorrectly for the ESBWR and the AP-1000, but with
17 the dedicated line they have shown that for the
18 first three -- back to the three days, for the three
19 days they can sit there and essentially remove decay
20 heat. Now, in their case they're so big they have
21 to come back with some sort of AC non-safety after
22 three days to take now where they are in terms of
23 pressures and temperatures down to a cold shutdown,
24 but for those three days they're sitting there
25 totally on passive thing. I'm just fighting back a

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1 little bit, very politely.

2 MEMBER SKILLMAN: That's fair enough.

3 MEMBER BLEY: And I don't quite know,
4 and I don't remember what you have in here on it,
5 what the requirements on the batteries are going to
6 be. They're surely not going to last for 72 hours,
7 I don't expect.

8 MR. FITZPATRICK: Yes, they're going to
9 have a bank of 24 and one of 72.

10 MEMBER BLEY: There are going to have
11 one that lasts 72 for instrumentation and --

12 MR. FITZPATRICK: Right.

13 MEMBER BLEY: -- things like that.
14 Okay. I didn't remember that.

15 CHAIRMAN CORRADINI: Because if -- again
16 I'm pretty sure that Dennis and John were here when
17 we were arguing about the worry about overheating of
18 the batteries because they were in the control room
19 and what the ventilation was. So all this kind of
20 ties together. So what you're saying is not -- I'm
21 not dismissing it. It's just that --

22 MEMBER BLEY: Oh, yes, absolutely.

23 CHAIRMAN CORRADINI: -- it's going to
24 have to be looked at, because for at least the ESBWR
25 there was a big discussion about the extreme weather

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1 conditions. You have to show that all these things
2 would function for the three days.

3 MEMBER SCHULTZ: Well, from what you've
4 described, Bob, and what is in here in the draft --
5 well, in the current version is that you've got the
6 opportunity for both approaches. You weave that in
7 because you don't know that the case is going to be
8 made that it can be done without, not having seen
9 the comments coming back from NuScale. I would have
10 expected that they might push back on that approach
11 here. We shall see, but the option is here that if
12 you can't make the case, then it's with a Class 1E
13 onsite DC.

14 MEMBER SKILLMAN: Yes, Steve, I looked
15 at the comments. There are about 350 pages of
16 comments, and the Chapter 8 comments pick up at page
17 162 and run to 204. And NuScale definitely did push
18 back. I mean, they're definitely heading towards
19 this idea we are passive, passive, passive and we
20 don't got to do any of that stuff. And I guess I'm
21 expressing my own personal frustration at that, at
22 maybe being forced to buy that at this point,
23 because I'm not buying it.

24 It seems to me we learned a lot of stuff
25 in the past number of decades, and at the end of the

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1 day you've got to be able to breathe, you've got to
2 be able to see and you've got to be able to
3 understand what each core is doing. And what we
4 learned at TMI is when the lights go out, things
5 really get scary. You've got to know what the core
6 is doing and you've got to know is it -- either
7 cooling it yourself or being cooled, either actively
8 or passively.

9 And so, it seems that there are a couple
10 of things we've learned and they are foundation
11 posts that have kept us safe for a long time.

12 MR. FITZPATRICK: And it was the same at
13 Fukushima.

14 MEMBER SKILLMAN: Yes, and we ought not
15 to be carried away with this idea of full passive.
16 So first of all, I'm comfortable that you've woven
17 into the proposed changes the ability to require
18 active, but I think you're right, until we see the
19 accident analysis and understand how the pieces fit,
20 this game's not over. We don't know what this
21 design really looks like.

22 MR. FITZPATRICK: That's right. And in
23 defense of the branch, again the quality of the
24 loads are determined by others, and then we make
25 sure they get a power supply to go with it. So from

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1 our perspective we're on board with you.

2 MEMBER SKILLMAN: So, I'm sorry for
3 having a wild hair, but I --

4 MEMBER BLEY: No, no, that was good.

5 MEMBER SKILLMAN: -- just remember
6 losing the lights at TMI about three days in and we
7 said what do we do now?

8 MEMBER BLEY: I've been places with the
9 lights out. It's confusing.

10 MEMBER SKILLMAN: It's really scary.

11 MEMBER BLEY: Bob, I have a couple
12 particular questions, specific questions. And I
13 think you answered this one, but I just want to be
14 sure. On the second page of this DSRS you had that
15 sentence about if additional guidance is needed, the
16 reviewer is directed to the mPower DSRS. That's
17 going away, right?

18 MR. FITZPATRICK: Yes.

19 (Laughter)

20 MEMBER BLEY: Just want to be sure.

21 MR. FITZPATRICK: Yes.

22 MEMBER BLEY: Then a couple of pages
23 later on technical rationale there's a -- No. 1
24 paragraph talks about GDC 17 and some things. And
25 then it has a second paragraph, which to me is an

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1 oxymoron. I think you really mean something
2 different. It says, "Meeting the independence and
3 capacity capability requirements of GDC 17 provides
4 assurance that a reliable electric power supply will
5 be provided to fully respond to an SBO." If you
6 have an SBO, your system is no longer reliable. I
7 think what you're trying to say is reduce the
8 likelihood of an SBO and maybe have ways to recover.

9 MR. FITZPATRICK: Yes.

10 MEMBER BLEY: But we've moved out of the
11 realm of a reliable electrical power system at that
12 point.

13 MR. FITZPATRICK: That's a good point.

14 MEMBER BLEY: Seems to me.

15 MR. FITZPATRICK: Thank you.

16 MEMBER BLEY: Yes, that one I liked.
17 Somebody here covered some of these other questions
18 I had already with they need to prove these things.

19 Ron, you did talk about this on the
20 batteries. The one on the equipment will be
21 considered acceptable for SBO temperature
22 environments if an assessment has been performed
23 that there's reasonable assurance that necessary
24 equipment will operate. Most of the places where
25 they have real temperature problems in plants, when

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1 the power goes away, the temperatures go away. Now,
2 not everywhere, but most of the places. So I don't
3 know if it would make sense to be a little more
4 specific about that, or maybe that's good enough. I
5 think people just need to understand it.

6 I asked that one already.

7 This place where I talked about
8 redundancy as you go from those first three sections
9 one to another, again I think it's probably no big
10 deal, but for me who hasn't used these, you come
11 back in the third section and find a statement that
12 says, "specifically an IE AC power source is not
13 necessary for passive plants." When this was
14 already covered two sections earlier, it just seems
15 like overkill.

16 MR. FITZPATRICK: Yes.

17 MEMBER BLEY: But maybe you need it,
18 because it's a different section that's now on how
19 you do the review.

20 And that same section has a Part 10 that
21 talks about the reviewer should determine the plant
22 operating procedures to develop and respond to SBO
23 are consistent with the following guidelines. A few
24 of these, a couple of them seem like we were
25 expecting more from procedures than we're likely to

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1 get.

2 Plant operating procedures should
3 consider the loss of any heat tracing that would
4 affect equipment necessary to cope with an SBO. I
5 guess that's true, but we ought to be considering
6 that somewhere else, too, because if -- maybe it's
7 okay this way, but what do you do if you don't have
8 heat tracing? It depends on the system and what the
9 heat tracing is there for. If it's there to keep
10 something from freezing -- I think that's probably
11 not true here because everything is all inside. We
12 don't have a yard with all those tanks and things
13 out there. And I don't even remember where they use
14 heat tracing in this kind of plant. I was just
15 wondering if that's something an operating procedure
16 can deal with or if you need some other way to deal
17 with that.

18 Plant operating procedures should
19 identify any portable lighting necessary for ingress
20 and egress to plant access areas. Don't usually see
21 that in the operating procedures. You need that,
22 but it seems an odd place to put it. We haven't had
23 that -- I don't know of any operating procedures
24 that have the emergency lighting stuff built into
25 them. I could be wrong. But I'm not sure it

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1 belongs there.

2 The rest of them all made sense to me.
3 So that was it. Back to you.

4 MR. FITZPATRICK: Okay. For a station
5 blackout NuScale claims that the design will
6 maintain all safety functions without electrical
7 power, any, relying solely on natural circulation.
8 And here this design, I don't know, but may or may
9 not need a 72-hour battery versus some other length,
10 because it seems to go right into what it needs to
11 do and just stay there.

12 CHAIRMAN CORRADINI: The way it was
13 explained to us, at least in July, was they would in
14 a station blackout mode go immediately to their DHRS
15 system and sit there.

16 MEMBER BLEY: It would take them there.
17 I mean, it would --

18 CHAIRMAN CORRADINI: Right, it would
19 take them to some sort of stable state that wasn't
20 cold shutdown, but would take them to a stable
21 state.

22 MEMBER BLEY: And all the stuff about
23 that seemed to make sense to me except -- it's not
24 an except -- it's those few valves, two in each
25 system have to actuate and they have to actuate in

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1 the failed position. Were they air op valves? I've
2 forgotten if they're air op valves. They might be
3 solenoids. But the reliability of those is really
4 important. And I guess it doesn't go here at all,
5 even if they're solenoids. That's electrical. But
6 somewhere the reliability of those and given their
7 importance, the testing of those is going to be
8 really crucial. And I don't think we've seen that
9 flagged either by them

10 -- they just said, well, we got a redundant set, so
11 we're okay -- nor by anything I've read so far by
12 the staff. And I'm not sure where that needs to be
13 picked up, but it seemed to me that was crucial.

14 CHAIRMAN CORRADINI: You mean that was
15 in terms of guarantee based on testing, periodic
16 testing?

17 MEMBER BLEY: Yes, because those kind of
18 valves -- I mean, you're relying on a spring to put
19 them back where they belong, and very often deposits
20 and other things keep spring return valves from
21 going where they were supposed to go.

22 (Simultaneous speaking)

23 MEMBER BALLINGER: Memory serves they're
24 fail open.

25 MEMBER BLEY: They're fail open.

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1 MEMBER BALLINGER: So, they still got to
2 fail open.

3 MEMBER BLEY: Unless the operating fluid
4 is opening them in a guaranteed way. So you really
5 have to think about just being cocked all kinds of
6 problems that occur in real --

7 (Simultaneous speaking)

8 CHAIRMAN CORRADINI: We did -- I'm
9 trying to think of the staff member who we
10 questioned on this one. This was back in August.
11 Wasn't it back in August? It was -- well, I know
12 who he is. I can't -- I know his --

13 PARTICIPANT: Are you talking about
14 Jeff?

15 CHAIRMAN CORRADINI: Jeff? No, it was
16 before Jeff. It was -- but the DHRS -- it wasn't
17 that ECCS review. It was the DHRS review in August
18 when we were talking about this, because that's
19 where you had added in all the stability questions
20 relative to coming stably to essentially this state
21 and where we were asking what is that stasis? It's
22 not cold shutdown. It's some intermediate pressure
23 and temperature state.

24 MEMBER BLEY: But it's removing the
25 decay heat.

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1 CHAIRMAN CORRADINI: Correct.

2 MEMBER BLEY: Yes.

3 CHAIRMAN CORRADINI: And as you said we
4 only need one --

5 MEMBER BLEY: From the electrical side
6 the only important thing of this that I'm thinking
7 about
8 -- are there any funny failure modes in which we
9 could lose the power to the other stuff we care
10 about and still keep power on these solenoids to
11 keep them in the wrong position? We ought to look
12 at that pretty hard and they ought to look at that
13 pretty hard.

14 MR. FITZPATRICK: And then just the
15 final part of this is changes to the SRP. NuScale
16 will utilize non-safety diesels to recharge the
17 batteries. That's something we didn't actually put
18 in there. So in this new phase we're going through
19 where we're going to make some changes -- were not
20 based on their comments, the comment period. I
21 think that should be beefed up a bit.

22 CHAIRMAN CORRADINI: But that is part of
23 their design?

24 MR. FITZPATRICK: As far as I know.

25 CHAIRMAN CORRADINI: Okay. That's what

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1 I thought they had said.

2 MEMBER BLEY: Have you thought any about
3 what RTNS criteria would have to be on those kind of
4 diesels?

5 MR. FITZPATRICK: No.

6 MEMBER BLEY: Is somebody thinking about
7 that?

8 CHAIRMAN CORRADINI: They promised us --
9 and when we were there --

10 MEMBER BLEY: Well, they should be
11 proposing it.

12 CHAIRMAN CORRADINI: Well, they promised
13 a what-do-you-call-it, a technical report that was
14 going to be -- because this goes back to the topical
15 report you wanted to see that is the first one they
16 released in terms of, what is it called, risk
17 important factors.

18 MEMBER BLEY: Oh, yes. Yes.

19 CHAIRMAN CORRADINI: So we're going to
20 get that. I think you guys just got it.

21 MEMBER BLEY: Yes, this should be in
22 there.

23 CHAIRMAN CORRADINI: So that should be
24 in there as to what they're going to decide as their
25 criteria for classification, right? Isn't that

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1 where it would be?

2 MEMBER BLEY: I don't know.

3 MR. CRANSTON: Well, we just received a

4 --

5 MEMBER BLEY: I would look for it there.

6 MR. CRANSTON: We just received a risk -
7 - topical report on risk, which the PRA Branch is
8 looking at. And we are going to be getting their
9 electrical topical report either this month or next
10 at the latest. And again, that's another
11 opportunity for us to see exactly where they're
12 coming from.

13 CHAIRMAN CORRADINI: So when the time is
14 right after you've scoured it, we would appreciate
15 looking at it.

16 MS. BANERJEE: Well, we have the
17 schedule, the January Subcommittee Future Plant
18 Design --

19 MEMBER BLEY: Well, that's the one.

20 MS. BANERJEE: -- yes, to look at the
21 risk topical report.

22 CHAIRMAN CORRADINI: Yes.

23 MEMBER BLEY: So the sooner we can see
24 it, the better. But you'll have an SER on it or
25 something?

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1 MR. CRANSTON: Yes, that's correct.

2 MEMBER BLEY: Okay.

3 MS. BANERJEE: We can get the topical
4 report at this time, right?

5 MR. CRANSTON: Yes, you can.

6 MS. BANERJEE: Okay. I'll ask for it.

7 MEMBER BLEY: Our risk people are
8 excited.

9 MR. CRANSTON: And then we can also
10 forward to you the electrical topical report when we
11 receive it.

12 MS. BANERJEE: Okay. Thank you.

13 MR. FITZPATRICK: But to answer your
14 question, to date we haven't put a lot of thought
15 into any of that.

16 MEMBER BLEY: Okay.

17 MR. FITZPATRICK: Until we get something
18 concrete --

19 MEMBER BLEY: Well, you don't have a
20 design yet, do you?

21 MR. FITZPATRICK: No. So we can
22 fantasize about it, but --

23 (Laughter)

24 MR. FITZPATRICK: And then the other
25 thing is that they will not have an alternating C

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1 power supply. So if we haven't called out all of
2 that, we'll call out whatever is left that talks
3 about that. And with that, I've tried
4 to highlight the novel aspects of the NuScale
5 electrical power systems design. And as we've
6 discussed all through this, we've tried to retain
7 the flexibility in the VRS to accommodate the design
8 review, but we don't really know what's coming.
9 Thank you.

10 CHAIRMAN CORRADINI: Thank you. So
11 questions from the Committee?

12 MEMBER BLEY: Well, you've got their
13 comments. Have you given any thought to how you're
14 responding to those? I guess I'm in Dick's court on
15 this. I'd sure not like to see you cut a lot of
16 stuff out of this DSRs, but for -- we have the
17 design before us that people have looked at and
18 really understood. So I like the idea you have in
19 there of flexibility and looking at this, depending
20 on what the actual design looks like.

21 MR. FITZPATRICK: Well, we can certainly
22 take that under advisement and maybe that leave that
23 in. Less work to do.

24 MR. CRANSTON: I have a general comment
25 that we consider in conjunction with the DSRs and

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1 why we established them. I know I've mentioned that
2 we're considering maybe moving some back to SRPs,
3 and it sounded appropriate. But the advantage of
4 the Design Specific Review Standard is it does have
5 the flexibility of being revised quicker than if we
6 had to go through the whole revision process for a
7 standard review plan, which can affect a lot of
8 other power plants.

9 CHAIRMAN CORRADINI: So keeping it in
10 the DSRs gives you flexibility?

11 MR. CRANSTON: That's correct, because
12 we can focus on NuScale. And as things -- as we
13 learn more or if something changes, we can
14 accommodate it more rapidly.

15 CHAIRMAN CORRADINI: Which should help
16 the review schedule.

17 MR. CRANSTON: That's correct. But
18 schedule is not our primary goal. We want to find
19 the best place for the information and make sure we
20 review the plant properly.

21 CHAIRMAN CORRADINI: I guess my only --
22 since I've never reviewed any of this stuff and it
23 confuses the heck out of me when I read these
24 documents, is I don't really care about anything
25 other than that the reviewers aren't confused, so

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1 that they understand what is appropriate to look at
2 and kind of mull over as they're looking at how the
3 design evolves. Because the design is going to
4 evolve. I can't imagine it doesn't. It did with
5 the other plants, the other passive plants.

6 MEMBER SCHULTZ: Greg, I think you're
7 right on target. I think I understand the pullback
8 to say, well, the SRP is just fine for this, but I
9 think that needs -- if that is indeed the case, it
10 needs to be established very carefully so that it's
11 not a situation that you've just described or that
12 in fact there are some subtle differences that
13 should be captured in a DSRS so that for the
14 purposes you've indicated it is a good move forward
15 in a better fashion. You've got the right
16 reference. You have the basis, very clear basis
17 upon which the approval was made. You don't have to
18 continuously document the differences or the
19 additions that come from the standard review plan.
20 I think you're on the right track.

21 MR. CRANSTON: Thank you.

22 CHAIRMAN CORRADINI: We're going to go
23 around the table for the Subcommittee, but this is a
24 time for public comments. Apparently, I'm going to
25 ask if there's somebody from the public that wants

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1 to make a statement in the room.

2 Otherwise, I'm going to ask the staff to
3 please turn on the outside lines
4 -- or un-mute it, I should say, so that if there's a
5 public comment on our telephone line, we can receive
6 it and record it. I'm looking forward to the
7 crackling. A-ha.

8 So if anybody's out in the phone line
9 could you please acknowledge your presence by
10 anything at all?

11 MEMBER POWERS: You don't have the best
12 selling Subcommittee.

13 CHAIRMAN CORRADINI: Yes, I don't have a
14 popular Subcommittee.

15 So, why don't we close the phone line?
16 Okay.

17 So, I'm going to turn -- we'll go this
18 way this time. We're right-handed today. So, I'll
19 go with Dr. Ballinger first.

20 MEMBER POWERS: Intrigued.

21 CHAIRMAN CORRADINI: But Zach knows that
22 and will use that intrigue to help him.

23 MEMBER POWERS: I'm independent.

24 CHAIRMAN CORRADINI: Dick?

25 MEMBER SKILLMAN: Yes, just thank you

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1 for the presentation. Let's keep the DSRSs flexible
2 until we know what this design looks like, because
3 it could be at the 11th hour we say enough's enough.
4 We really want 1E power, a moderate amount, AC and
5 we want 1E DC, 120 and 240, because we've learned
6 those are very important.

7 MEMBER POWERS: We want a lot.

8 MEMBER SKILLMAN: We want enough to
9 carry the day. So let's keep these open and
10 flexible until we really understand the design.
11 Thank you.

12 MEMBER SCHULTZ: I agree on all
13 accounts. Thank you for the presentations. And as
14 I just said, I agree with the approach related to
15 DSRS and the approaches that have been taken to
16 maintain the options open until the design is well
17 understood.

18 CHAIRMAN CORRADINI: Dennis?

19 MEMBER BLEY: I agree with my
20 colleagues. I think you've done a good job on this.
21 If I had to use these -- any of the SRP, not just
22 this DSRS, I would be so consumed in checking all
23 those boxes from the sections and making sure I got
24 everything right. I wonder if I'd have the time to
25 sit back and ask those big questions and say does

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1 this whole thing make sense now? And I hope we have
2 a way to make sure our reviewers keep that as a big
3 focus as you do this review, because that's where
4 we're going to find the problems, not in all the
5 little details. But we've got to meet those
6 criteria.

7 CHAIRMAN CORRADINI: Okay. Thanks to
8 the staff. I know that we've been having side
9 meetings so that we can organize this in an
10 understandable fashion, so I appreciate all their
11 flexibility.

12 As I understand it, assuming we are
13 around in two weeks, we will see each other talking
14 about Section 6 -- well, yes, I'm sorry, Section 6.2
15 in all its glory on Wednesday the 7th. So that's
16 our next planned get together.

17 And other than that; I'll say this to
18 the Subcommittee, you guys can react, I still don't
19 see anything here that rises to the need for a
20 letter. I see a lot of logistical changes in the
21 DSRS about making sure mPower is excised
22 appropriately and the right pointers to the right
23 places, but other than that, I still don't see --
24 and you have copies of all our minutes from the
25 meetings; this will be our third meeting, and we've

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1 tried to with that and the transcript at least
2 identify things that we're kind of thinking about.
3 But I don't think at least at this point to me; you
4 guys jump in, nothing rises to the point that we are
5 going to write you a letter about what we're
6 thinking. It's all about just mulling over these
7 things so we get a better understanding.

8 MEMBER BLEY: I agree with you.

9 CHAIRMAN CORRADINI: Okay. So with
10 that, thank you all and I guess we'll see you all in
11 two weeks, fingers crossed. I'm not sure what side
12 of that coin you're on, but adjourned.

13 (Whereupon, the above-entitled matter
14 went off the record at 10:09 a.m.)

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ACRS Presentation on the NuScale Design Specific Review Standard (DSRS) Sections 11.1, 8.1, 8.2, 8.3.1, 8.3.2, and 8.4

Gregory Cranston,
Sr. Project Manager
Office of New Reactors
September 24, 2015



NuScale DSRS Briefings to the ACRS Subcommittee on Future Reactors

- Third in series of meetings on selected draft DSRS sections
- Comments received and being processed
- Opportunity for updates during comment incorporation
- Some DSRS sections may revert back to SRP sections

NuScale DSRS Briefings to the ACRS Subcommittee on Future Reactors

- Purpose: provide ACRS with approach staff took developing selected DSRS sections
- During the course of these presentations staff will cover:
 - What changed SRP to draft DSRS
 - Why change made (new system, elimination of system, significant design difference, etc.)
 - Questions based on the design information available to date

The Status of the NuScale DSRS

- Draft NuScale DSRS issued for public comment on 6/30/2015
- Public comment period closed on 8/29/2015
- Comments being processed and sent to staff for disposition
- Schedule for issuing Final DSRS based on magnitude and complexity of comments and DCA submittal date

NuScale DSRS 11.1 Coolant Source Terms

by
Zachary Gran

September 24, 2015



DSRS 11.1 Coolant Source Terms

- Current DSRS is based on Design Information provided in late 2013
- DSRS 11.1 acknowledges that current PWR-GALE is not applicable
- NuScale is submitting a Topical Report on source term development based on an independent GALE code.

DSRS 11.1 Coolant Source Terms

PWR-GALE Applicability

- While PWR-GALE is not applicable, elements of its guidance are still relevant.
 - Use of ORIGEN and SCALE is relevant since common PWR fuel is used.
 - Operating experience in estimating coolant activity is still relevant.
 - Operating history in characterizing fuel performance is still relevant.
 - Reliance of current waste processing systems to manage waste is still relevant.

DSRS 11.1 Coolant Source Terms

Potential Unique Design Elements

- Integrated PWR design
 - Reactor components are contained within the same vessel and are surrounded by an evacuated reactor containment vessel.
 - Activation of feedwater nozzles near top of core
- Radiological control of secondary coolant
 - Currently does not utilize a traditional steam generator blowdown and treatment system
 - Require information on assumed Steam Generator Tube Failure Rates
 - Require information on assumed Primary to Secondary leakage rates

DSRS 11.1 Coolant Source Terms

Potential Unique Design Elements (cont.)

- Multi-module reactors located in a common reactor pool that is also used for spent fuel storage
 - Require information on maintaining reactor pool water quality
 - Potential uniqueness with maintaining radioactivity levels in the reactor pool water
- Large volume of reactor pool water that is potentially subject to neutron activation
 - Potential production of H-3, C-14, N-16, and Ar-41
 - Require information on the performance of HEPA filters and charcoal absorbers.

PRESENTATION TO THE ACRS

September 24, 2015

NuScale Design-Specific Review Standard
(DSRS) Chapter 8 “Electrical Power
Systems”

Bob Fitzpatrick
NRR/DE/EEEB

AGENDA

- Introduction
- DSRS Section 8.1 Introduction
- DSRS Section 8.2 Offsite Power
- DSRS Section 8.3.1 Onsite AC Power
- DSRS Section 8.3.2 Onsite DC Power
- DSRS Section 8.4 Station Blackout
- Summary

INTRODUCTION

Purpose:

- Present highlights of the NuScale design philosophy
- Present changes to the SRP

INTRODUCTION (2)

Highlight the following items:

- We have not received the detailed design.
- The classification of electrical loads dictate the classification of their power source.
- We will not know the ultimate acceptability of not having a Class 1E power system until the overall staff review is essentially completed.

Section 8.1: “Introduction”

- Provides executive summary
- Serves as a repository of acceptance criteria (Table 8-1 “Acceptance Criteria and Guidelines for Electrical Power Systems.”)
- Ensuing chapter sections: characterize changes to Table 8-1.

Section 8.2: “Offsite Power”

NuScale Design Philosophy:

- NuScale will request a partial exemption to GDC 17.
- Request will seek approval for zero credited offsite power circuits.
- Staff Letter to NuScale (9/15/2015): currently insufficient information. “...NRC staff believes that given considerations for defense-in-depth, one offsite power circuit... should be available.”

Section 8.2: “Offsite Power” (2)

Changes to the SRP:

- Reactor coolant pump discussion removed
- Guidance for having a stable grid and for having protection of the onsite power system from the offsite power system retained.
- One addition to the DSRS (and Table 8-1) is newly-approved Branch Technical Position (BTP) 8-9 “Open Phase Conditions in Electric Power System.”

Section 8.3.1: “Onsite AC Power”

NuScale Design Philosophy:

- NuScale claims there is no need for safety-related (Class 1E) AC power supplies.

Changes to the SRP:

- Guidance includes flexibility for reviewing with/without a Class 1E onsite AC power system

Section 8.3.2: “Onsite DC Power”

NuScale Design Philosophy:

- NuScale claims that no Class 1E DC power supplies are required.

Changes to the SRP:

- Guidance includes flexibility for reviewing with/without a Class 1E onsite DC power system.

Section 8.4: “Station Blackout”

NuScale Design Philosophy:

- NuScale claims design will maintain all safety functions without electrical power
- Relying solely on natural circulation

Changes to the SRP:

- Clarifications:
- NuScale will utilize non-safety diesel generators to recharge the batteries (to be added)
- Will not use Alternate AC power supplies (to be deleted)

SUMMARY

- We have highlighted novel aspects of the NuScale electrical power systems design.
- We have retained flexibility in the DSRS guidance to accommodate the design review.

Closing Remarks

Comments or Questions?