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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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634TH MEETING

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

+ + + + +

THURSDAY

MAY 5, 2016

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ROCKVILLE, MARYLAND

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The Advisory Committee met at the
Nuclear Regulatory Commission, Two White Flint
North, Room T2B1, 11545 Rockville Pike, at 8:31
a.m., Dennis C. Bley, Chairman, presiding.

COMMITTEE MEMBERS:

DENNIS C. BLEY, Chairman

MICHAEL L. CORRADINI, Vice Chairman

PETER RICCARDELLA, Member-at-Large

RONALD G. BALLINGER, Member

CHARLES H. BROWN, JR. Member

DANA A. POWERS, Member

HAROLD B. RAY, Member

JOY REMPE, Member

1 GORDON R. SKILLMAN, Member

2 JOHN W. STETKAR, Member

3

4 ALSO PRESENT:

5 STEWART BAILEY, NRR

6 JOSEPH BELLINI, Exelon/Aterra Solutions*

7 ERIC BOWMAN, NRR

8 MARK CARUSO, NRO

9 BILL GALYEAN, NuScale*

10 MARVIN LEWIS, Public Participant*

11 LYNN MROWCA, NRO

12 WILLIAM RECKLEY, NRR

13 JOSEPH SEBROSKY, NRR

14 MOHAMED SHAMS, NRR

15 OMID TABATABAI, NRO

16 MARK TONACCI, NRO

17 MICHAEL TSCHILTZ, NEI

18 ANDREA VALENTIN, Executive Director, ACRS

19 TOM ZACHARIAH, NEI

20

21 *Present via telephone

22

23

24

25

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Adjourn	

P R O C E E D I N G S

8:31 a.m.

CHAIRMAN BLEY: The meeting will now come to order. This is the first day of the 634th meeting of the Advisory Committee on Reactor Safeguards.

During today's meeting, the committee will consider the following: additional guidance to support the closure plan for the reevaluation of flooding hazards; review of Fukushima Tier 2 Group 3 recommendation regarding other natural hazards screening evaluations; the NuScale Topical Report TR-0515-13952, Risk Significance Determination, Use of RAW Importance Measures, R-A-W; preparation of ACRS reports.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. Mr. Mike Snodderly is the Designated Federal Official for the initial portion of this meeting.

We have received no written comments or requests to make oral statements from members of public regarding today's sessions.

There will be a phone bridge line. To preclude interruption of the meeting, the phone will be placed in the listen-in mode during the

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1 presentations and committee discussion.

2 A transcript of portions of the meeting is
3 being kept and it is requested that the speakers use
4 one of the microphones, identify themselves, and speak
5 with sufficient clarity and volume that they can be
6 readily heard.

7 I also want to make you aware that this
8 meeting is being webcast with the ability to view our
9 presentation slides on the web. Those out on the
10 bridge line might want to do that primarily because
11 the audio is better and you can follow the
12 presentations through the vugraphs. You can dial into
13 the bridge line or you can connect through the NRC's
14 public meeting website and click on the link. It
15 usually works and the sound is reported to be very
16 good. In fact, I've listened to it. It is. If it
17 doesn't work, please call our office.

18 The committee would like to introduce and
19 welcome Yvonne Wall. Yvonne comes to us from the
20 Office on Nuclear Security and Incident Response on a
21 three-month rotational assignment as the Executive
22 Director's Administrative Assistant. Welcome, Yvonne.

23 At this point, I'll turn the meeting over
24 to Member Stetkar, to lead us through the first topic.

25 MEMBER STETKAR: Thank you, Mr. Chairman.

1 I'll make this introduction brief. This session is
2 inter-staff guidance on activities related to focused
3 evaluations and integrated assessment of external
4 flooding hazard. Our Fukushima Subcommittee reviewed
5 the matter really recently. It seems so long ago, but
6 a couple of weeks ago on April 22nd, so this should be
7 fresh in the minds of most of our members.

8 I think the staff will lead us in their
9 introduction through the torturous path of how we got
10 to where we are with this topic. And with that, I'll
11 turn over the proceedings to Mohamed Shams.

12 MR. SHAMS: Thank you. Thank you, Mr.
13 Chairman and distinguished members. I just want to
14 take a minute and lay out what we're trying to do here
15 in our presentation.

16 As Dr. Stetkar indicated, we were here a
17 couple of weeks ago and we had the opportunity to
18 interact with the subcommittee and go in detail over
19 the guidance itself. So I don't want to belabor that,
20 so it is again a guidance about evaluating plant
21 responses to flooding. We've taken on an activity
22 related to the Japan Lessons Learned activities
23 related to the Fukushima accidents to reevaluate the
24 hazards for all sites, for all operating reactor
25 sites. So this activity is to describe the guidance

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1 related to sites that have exceedance in a hazard and
2 how they are going to deal with it.

3 Part of the feedback we received last when
4 we talked with the subcommittee, was to explain the
5 landscape on how this activity fits in the broader
6 scope of our reevaluated hazard. To just put a
7 pointer on that, late last year or middle of last
8 year, the Commission directed us to carry on with two
9 activities. One relates to ensuring that mitigating
10 strategies are protected and deployable for the
11 reevaluated hazard and one relates to continuing with
12 the 50.54(f) letter assessment such that we have the
13 ability to identify any additional safety margin
14 enhancements that one can identify.

15 This guidance relates to the 50.54(f)
16 letter assessment again searching for additional
17 safety enhancements. We've been interacting with you
18 on the mitigating strategies, reevaluation under the
19 mitigating beyond design basis rule. That's where the
20 guidance is. That's where the activities reside. And
21 we met with you on that, again, on the 22nd. And we
22 plan to meet again later on this year to talk with you
23 again and get your insights on the guidance.

24 So we'll go through that. We'll go
25 through the guidance itself and what the guidance

1 entails and our clarifications, if any. And we'll
2 also lay out for you the landscape and hopefully we
3 may be clear this time around what we're doing and
4 where this activity fits.

5 With that, I'll turn it over to Eric and
6 look forward to your comments and questions on this
7 activity.

8 MR. BOWMAN: Thank you, Mohamed. Good
9 morning, Chairman, members of the committee. I'm Eric
10 Bowman. I'm a Special Advisor in the Japan Lessons
11 Learned Division. I had the privilege of briefing the
12 subcommittee on the 22nd of April on the interim staff
13 guidance document that's the subject of this
14 presentation. That number is JLD-ISG-2016-01 and it
15 provides guidance for the focused evaluations and the
16 revised version of the integrated assessment process
17 for licensees responding to the 50.54(f) on external
18 flooding reevaluation.

19 The purpose of the guidance is to provide
20 guidance for the closure of the hazard reevaluation
21 process by endorsing an industry developed guidance
22 document, NEI 16-05, with some clarifications in order
23 to give us a graded approach to identify the need for
24 and to prioritize the scope of the integrated
25 assessments. The revised integrated assessment

1 process under this interim staff guidance document
2 using NEI 16-05 will provide an input to an additional
3 guidance document we are in the process of developing
4 that will lay out the criteria for regulatory decision
5 making.

6 As Mo mentioned, we committed to providing
7 the committee with a presentation, a map if you will,
8 of how everything fits together with respect to the
9 mitigating strategies and the hazard reevaluation.
10 This is a large, if you will, 50,000-foot view of the
11 lay of the land for it. We've got two separate
12 processes going on with respect to addressing the
13 reevaluated hazards.

14 On the left is a depiction of what we're
15 terming the mitigation strategies assessments and
16 those are intended to evaluate the mitigating
17 strategies that were developed by the licensees under
18 the mitigating strategies order to show that either
19 they are capable of mitigating -- addressing the
20 reevaluated flood hazard levels, or they can be
21 modified in order to address those reevaluated flood
22 hazards.

23 On the right hand side of the slide is
24 what's going on with the 50.54(f) process for the
25 reevaluated hazards. In this ISG, we're going through

1 a focused evaluation to give us the graded approach in
2 order to screen out licensees that we do not believe
3 will have a potential for safety improvements that
4 would justify further regulatory action.

5 If a licensee does not screen out, they
6 would go down the process of conducting the revised
7 integrated assessments and then we'd go into the
8 follow-on guidance that we'll be developing for the
9 regulatory decision making.

10 VICE CHAIRMAN CORRADINI: So all licensees
11 have to go through the blue and the green?

12 MR. BOWMAN: Yes.

13 VICE CHAIRMAN CORRADINI: So -- I was
14 afraid you were going to make it more complicated.

15 MEMBER STETKAR: It gets a lot simpler.

16 MR. SHAMS: Let me go back to just a
17 slight correction, the previous slide, can I go back
18 to the previous slide?

19 So all licensees go through the blue. The
20 green, not quite. Some licensees that their hazard,
21 their evals did not exceed their current license and
22 current design basis would not need to go through the
23 green. They're already closed out.

24 MEMBER STETKAR: Is that what screen out
25 means?

1 MR. SHAMS: We can think it as such, but
2 I --

3 MEMBER RICCARDELLA: Actually, it would be
4 the screen out before even getting to this guidance
5 because their reevaluated flood hazards did not exceed
6 the design basis flood hazard level.

7 MEMBER STETKAR: When you say -- but for
8 clarity, when you say "this guidance" you mean JLD-
9 ISG-2016-01.

10 MR. BOWMAN: The guidance that is under
11 consideration by the committee in this meeting. But
12 when I speak of licensees, I'm only speaking of
13 operating reactor licensees, operating power reactor
14 licensees. We are not talking about combined license
15 holders that just got their licenses through the
16 Office of New Reactors. They were not subject to the
17 50.54(f) letter.

18 VICE CHAIRMAN CORRADINI: Okay, but can I
19 say it back to you since I played hooky that Friday.
20 I wasn't here. So what we're speaking about today is
21 guidance for the green path?

22 MR. BOWMAN: Yes, correct.

23 VICE CHAIRMAN CORRADINI: And we've yet to
24 see -- or we're still in discussion, as I understand
25 it, with the guidance for the blue path. Because

1 we're going to revisit that and all its complicity in
2 July.

3 MR. SHAMS: Yes and no. We've been
4 interacting with you on this. You've seen Appendix G
5 related to flooding and now we've talked to the
6 subcommittee about also the updates on the seismic
7 size as well --

8 MEMBER STETKAR: Mohamed, to get people
9 indexed quickly, think blue path is Appendix G and H
10 to NEI-1206. Okay, if that will settle in. And the
11 draft regulatory guide that will be a compendium of
12 that will eventually go on with the rulemaking, you
13 have the mitigation of beyond design basis external
14 events rulemaking. That's the blue path stuff.

15 The green path stuff is what we're talking
16 about today, but as they'll say there's sort of a --
17 they're not completely independent.

18 MR. SHAMS: When I say yes and no, we
19 provided some. We owe you some more and we'll come
20 back and talk with you later on.

21 MEMBER STETKAR: But what we're talking
22 about in July is the continuation of the green path
23 stuff.

24 MR. SHAMS: Correct.

25 MEMBER STETKAR: But July right at the

1 moment.

2 MR. SHAMS: Right. We'll talk a little
3 later on that.

4 MEMBER STETKAR: We'll talk about that
5 later.

6 MR. SHAMS: Yes.

7 MEMBER RAY: John or -- the thing that
8 interests me is how the green path is being affected
9 as we're in it now by what we anticipate occurring in
10 the blue path. And I don't know whether that's what
11 this slide -- I was waiting to see if that's what this
12 slide is going to tell me, but that's what I'm most
13 interested in. How is it, as we look at the green
14 path, we're paying attention to oh well, but we're
15 going to solve this over in the blue path.

16 MR. BOWMAN: Okay, to try and give you a
17 preview, they are fundamentally following different
18 regulatory processes, but we are recognizing that
19 there is a lot of work that's being done on the
20 individual paths that can be relied upon in the other
21 path in order to achieve efficiency in the use of
22 resources and make it a more effective overall effort.

23 MEMBER RAY: I realize this is very hard
24 to articulate as to exactly how this takes place, but
25 it seems clear that the green path is being influenced

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1 by the blue path. The question is how. It's not just
2 flooding.

3 So as I say, one more time, that's what is
4 of most interest to me. I'm not quite able to digest
5 what John said about the appendices, but the
6 interaction and to what extent going down the green
7 path we're keeping in mind, oh well, but we're going
8 to go down the blue path, too, and that's going to
9 enable us to do something different than the green
10 path than we would if there were no blue path. That's
11 what I'm most interested in.

12 MR. BOWMAN: And I think we've articulated
13 very well -- we're actually very cognizant of the fact
14 that the two paths are parallel, they interact with
15 each other. You'll see in the guidance that we have
16 specific revisions on if assessments were done in the
17 blue path, you need to take or can have the
18 opportunity to take advantage of that in the green
19 path.

20 Also, at the end of the green path when
21 one assesses what additional safety enhancements need
22 to be added, one would have to recognize that there
23 are safety enhancements gained already in the blue
24 path and to what degree we want to add beyond what
25 we've already achieved in the blue path.

1 MEMBER RAY: Well, basically, the blue
2 path stems from the idea that we may exceed the design
3 basis. We need to be able to mitigate that. But then
4 it raises the question inevitably to what extent do we
5 not make changes that would otherwise be made in the
6 design basis because we have the mitigating
7 capability. And that's -- I know at the Commission
8 level that's a huge issue for the Agency as a whole,
9 and I just think we ought to try and focus on that
10 enough so that we understand it and it isn't just
11 somewhere in the background, but we don't know how it
12 works.

13 MR. SHAMS: Yes, it is not and that's
14 actually -- it is not forgotten, I should say. And it
15 is the focus of the Phase 2 guidance which is the
16 reason it's difficult because we're trying to draw
17 that line in the sand to what degree we should take
18 credit for the mitigating strategy, not over sell it
19 and also not under sell it.

20 MEMBER RICCARDELLA: Could I just try to
21 understand? As I understand it, the blue path refers
22 to ability to deal with two certain things, loss of
23 offsite power and loss of access to the ultimate heat
24 sink.

25 MR. BOWMAN: That is true to a certain

1 extent. It's more complicated than that and I'll get
2 to that.

3 MEMBER RICCARDELLA: But I would think the
4 green path may have to consider some different
5 scenarios, right?

6 MR. BOWMAN: Oh, yes.

7 MEMBER RICCARDELLA: Maybe not so much for
8 flooding, but certainly for seismic you would have to
9 consider things that happened that aren't necessarily
10 related to those two specific things.

11 MR. SHAMS: In a lot of ways, the green
12 path is a bit more actually free, in the sense that
13 it's free in the sense that the event that happens and
14 whatever consequential failures that come from that
15 event are considered and those that did not happen
16 would not be considered.

17 MEMBER RICCARDELLA: Right.

18 MR. SHAMS: On the other hand, the blue
19 path is a very determined, stylized event that we
20 start with.

21 MR. BOWMAN: If you will, I can run
22 through this diagram quickly and try to lay out how
23 things interact and then after that, we can answer any
24 questions or clear up anything that I've made even
25 less clear by talking about this slide.

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1 This is a more detailed depiction than the
2 prior slide that includes the regulatory instruments
3 that were issued. Where we see the boundary between
4 the order that was issued after the Fukushima event on
5 the mitigating strategies and the upcoming mitigation
6 at the end, design basis events rulemaking, and what
7 the guidance that's directing what's happening, as
8 well as on the right side what's going on with the
9 50.54(f) letter and the direction we've received from
10 the Commission on the subject.

11 Starting on the top left part, after
12 Fukushima Daiichi, we issued the mitigating strategies
13 order. That's Order EA-12-049 and the licensees, the
14 operating power reactor licensees, have been
15 developing and implementing the mitigating strategies
16 taking into account for the most part the external
17 hazards at the current design basis levels. Those
18 levels were informed by other processes going on to
19 the extent that they could. Licensees took into
20 account what they believed would be the outcome of the
21 hazard evaluations that were underway in response to
22 the regulatory instrument on the right-hand side of
23 this vugraph which is the request for information that
24 was issued on the same day as the orders under
25 50.54(f) to reevaluate seismic and flooding hazards.

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1 In the guidance document for the
2 mitigating strategies and that's in this box here, our
3 interim staff guidance document, JLD-ISG-2012-01 at
4 its endorsement of NEI 12-06, Revision 0, for the
5 flooding hazards, we had licensees look to flooding
6 evaluations that had been accomplished for adjacent
7 sites, nearby early site permits, and other
8 information they might have rather than merely looking
9 to the information that was in the final safety
10 evaluation or safety analysis reports, so that they
11 had a better understanding of what they would likely
12 need to be able to address in the end.

13 Going down the request for information
14 path on the reevaluated hazards, we had a couple of
15 interactions with the Commission on the situation, in
16 order to try and harmonize the efforts that were going
17 on, on both the part of the licensees and on the part
18 of the staff, for the development of mitigating
19 strategies and the reevaluation of the flooding hazard
20 in particular. The first of those interactions was a
21 document that went up to the Commission, COMSECY-14-
22 0037. You had a number of interactions with us on
23 that and provided a recommendation to the Commission
24 on the subject.

25 In that interaction, we had suggested the

1 integration of the two bodies of work viewing that the
2 establishment of mitigating strategies that were
3 capable of addressing the reevaluated hazard would
4 provide sufficient safety benefits to essentially make
5 the regulatory decision making for the 50.54(f) letter
6 no longer an evaluated activity.

7 The Commission directed that we instead
8 continue down the path of having the mitigating
9 strategies order, the strategies that were developed
10 under that order, address the reevaluated flooding
11 hazards and still look to the results of the 50.54(f)
12 reevaluation of the flooding hazard to see if there
13 would be any more safety gains that would be worth
14 achieving through regulatory action. And that's what
15 we are working on in this interim staff guidance
16 document, JLD-ISG-2016-01, that's the subject of
17 today's meeting and the follow-on document that's
18 under development for the regulatory decision making.

19 VICE CHAIRMAN CORRADINI: So I think I get
20 it, but can I say it back to you in simpler terms, or
21 at least in my terms?

22 MR. BOWMAN: You can try.

23 VICE CHAIRMAN CORRADINI: Okay, so the
24 current policy as determined by the Commission is that
25 if I do the reevaluation, let's forget about colors,

1 because I've got to do the reevaluation regardless,
2 and I do the reevaluation in the presence of
3 mitigating strategies, I don't have to redesign -- I
4 don't have to change my design base. I can simply
5 mitigate against the design base if I exceed it.

6 MR. BOWMAN: That is a potential outcome.
7 However, the regulatory decision making under the
8 50.54(f) letter will need to look into the licensee
9 has established a capability to mitigate without
10 changing the design basis of the revised reevaluated
11 flooding hazard level. There may be a safety benefit
12 from in addition to the mitigating strategies capable
13 of addressing the flooding level doing something else.
14 Because it may be more effective to, for example,
15 protect a set of emergency diesel generators and
16 prevent the loss of all AC power, rather than going
17 down the path of mitigating the loss of all AC power.

18 MEMBER RAY: That's key, what you just
19 said, that example. It's just an example, but it's
20 very important because there's maybe a tendency to cut
21 it off and say we don't need to worry about it because
22 we can mitigate it if it happens, but the benefit
23 opportunity would be missed in that case.

24 MR. BOWMAN: Exactly. And there is an
25 interaction between what is the actual risk that's

1 posed by the reevaluated flood hazard level. Do we
2 have the current state of the art in the flooding
3 evaluations to say that it is a 10^{-6} flood or a 10^{-5} or
4 10^{-4} . And we'll talk about that that a little bit
5 later on in the presentation.

6 VICE CHAIRMAN CORRADINI: So one last
7 thing, it's kind of not on your plate, but I'm sure
8 you're thinking about it. If I were to look at the 99
9 current operating plants and I do a little event tree
10 that you've got to do this first and this second and
11 this third and then I get a binary step that nah, no,
12 I screened out, so I'm okay, but no I didn't screen
13 out, so I've got to do this.

14 Have you thought through how all this
15 plays out relative to all the various things? I
16 assume the industry has and they're going to explain
17 to us how they thought about it. But to me, I'm
18 curious if staff has figured out how all this plays
19 out through numbers going through these various
20 pathways or has there not been enough evaluation even
21 to determine? Do you see what I'm asking?

22 MR. SHAMS: If I understand that question
23 correctly --

24 VICE CHAIRMAN CORRADINI: In other words,
25 are 70 -- to pick numbers -- are 70 of them screened

1 out through the simpler boxes and I'm only dealing
2 with 29 or am I dealing with 70 that I had to go
3 through these?

4 MR. BOWMAN: In the flooding area, we
5 believe that for the revised integrated assessments,
6 we will wind up with on the order of 10 to 15 plants
7 that need to go down that path.

8 VICE CHAIRMAN CORRADINI: Okay, thank you.

9 MR. BOWMAN: And in the seismic area, it's
10 about 20 that will be doing the seismic probabilistic
11 risk assessment. That's outside the scope of this
12 presentation. We're just focusing on flooding here.

13 VICE CHAIRMAN CORRADINI: Thank you.

14 MEMBER STETKAR: We have to be a little
15 cognizant of time and we have time for the industry.

16 MR. BOWMAN: To finish up the slide on the
17 lower left hand part are the activities going on with
18 the rulemaking that's underway that we also briefed
19 the subcommittee on the 22nd. We have revised
20 industry guidance document, NEI 12-06 Revision 2, that
21 includes Appendices G and H to talk about how they
22 will look at the mitigating strategies for flooding
23 and seismic hazards respectively.

24 We anticipate we'll get another version of
25 NEI 12-06 to add the one piece that was missing which

1 was the process for addressing plants that are doing
2 the seismic probabilistic risk assessment.

3 The outcomes of the mitigating strategies
4 assessments using those guidance documents will be
5 either mitigating strategies, that is, strategies to
6 mitigate the effects of the initiating event, assuming
7 that it results in a loss of all AC power and a loss
8 of normal access to the ultimate heat sink, either as
9 they were initially devised or modified in order to
10 address the reevaluated hazards.

11 The other alternative is what we've
12 labeled as alternate strategies. They would be as
13 they're laid out in Appendix G as alternate mitigating
14 strategies or targeted hazard mitigating strategies
15 for flooding that do not make the assumption that
16 you've had an extended loss of AC power and a loss of
17 normal access to the ultimate heat sink, but instead
18 treat the event mechanistically rather than
19 deterministically.

20 Are there any more questions on the lay of
21 the land with how these two interrelate?

22 MEMBER REMPE: Just a comment. I
23 appreciate you making this diagram and going through
24 it. It makes it easier to follow, in my opinion.
25 Thank you.

1 MR. BOWMAN: Thank you. In the end, what
2 we see is the regulatory outcomes we'll have. Under
3 the 50.54(f) letter, licensees already took interim
4 actions to address the reevaluated hazards and we
5 anticipate that there will be commitments such as may
6 be necessary to justify improving the realism of the
7 hazard reevaluation to give us something that's closer
8 to what we would anticipate a true hazard to be.
9 Those commitments could be to make plant modifications
10 or to put in place programs and procedures such as
11 procedures to check the clearance of drain systems
12 prior to an anticipated flooding event.

13 And then the other outcome, of course,
14 would be going down the path of regulatory decision
15 making. If we need to impose further requirements
16 using orders or requests for additional information or
17 issue demands for information, then that would be
18 another potential outcome.

19 Under the rulemaking, the mitigation of
20 design basis events rulemaking, the two types of
21 mitigating strategies that I talked about, the pure
22 flex mitigating strategies, if you will, to use the
23 industry terminology for it that assume that there is
24 a loss of all AC power, concurrent with a loss of
25 normal access to the ultimate heat sink at the

reevaluated flood hazard or the ultimate mitigating strategies or targeted hazard mitigating strategies. And those would not be adjusting to get a lower level than a bounding level for the flooding hazards.

The industry's proposed guidance that we're looking at in this interim staff guidance document is NEI 16-05. We published the guidance document itself by reference in the Federal Register on the 22nd of April. The comment period for that runs through the 23rd of May. I've got the page number for the Federal Register notice and the docket ID number on the presentation for the reference on anyone that's participating in this meeting, so you can look it up and make appropriate comments.

I included the diagram from NEI 16-05 to show you the different paths that the flooding focused evaluations and revised integrated assessments will go down following their guidance document. The different paths, the ones in the top three on this flow chart are what we term the focused evaluations. The two that end in the red blocks or the bottom two are the revised integrated assessment paths. The reason they're separated in this manner, the ones that terminate in the orange blocks, the focused evaluations, are the ones where the outcome is a

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1 demonstration of an ability to protect against the
2 revised flooding hazard. And also the path 3 which is
3 an evaluation of the local intense precipitation path.

4 For the local intense precipitation path,
5 we follow the addressing of that hazard in the
6 mitigating strategies order. And we've looked at that
7 and concluded that there will be no need to take
8 further regulatory action on it. We'll talk about
9 that a little bit later.

10 MEMBER RICCARDELLA: You specifically used
11 the word protect when referring to those green -- to
12 those orange ones.

13 MR. BOWMAN: Yes.

14 MEMBER RICCARDELLA: And could you draw
15 that line that the top three are protection versus the
16 bottom two are mitigation?

17 MR. BOWMAN: Well, the top two are
18 protection for the reevaluated hazards. The third
19 one, it can incorporate mitigation of the local
20 intense precipitation hazard. But that's the
21 reasoning underlying how the industry put together
22 this flow chart.

23 In the Commission's direction to the staff
24 in SRM-COMSECY-15-0019, as well as in the prior SRM
25 that we received, that's staff requirements

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1 memorandum, on COMSECY-14-0037, we were told to look
2 to areas where we could make the evaluation of the
3 flooding hazard more realistic by removing over
4 conservatisms and in the prior one, the 14-0037 staff
5 requirements memorandum, it included looking for areas
6 where conservatism was not adequate to represent what
7 the realistic hazard was.

8 In NEI-1605 and in the ISG that we're
9 talking about here, we are looking to the hierarchical
10 hazard assessment process from NUREG/CR-7046 as the
11 process that will be used to look for areas where we
12 can reduce the conservatisms and achieve a more
13 realistic evaluation what the real hazard is.

14 NEI-1605 Appendix A includes a catalog of
15 potential areas that licensees can look to and try to
16 determine if there are indeed over or under
17 conservatisms. It's a very site-specific application
18 of the items that are in Appendix A. The staff plans
19 to look at those on a case-by-case basis because there
20 are areas in that catalog of potential sources of
21 conservatism that may be over or under conservatism.

22 Okay, NEI-1605 gives a couple of different
23 sections that deal with an initial evaluation of the
24 impact of the flooding hazard and the determination of
25 the numerical value of the available physical margin.

1 We've looked to those sections and agree that they
2 provide an acceptable method of doing that. We did
3 have to make a couple of clarifications for the
4 determination of available physical margin. The
5 clarifications are listed on this slide and they have
6 to do with consideration of flood penetration seals
7 and what the capability of those flood penetration
8 seals are with respect to the reevaluated flood hazard
9 levels.

10 NEI-1605 incorporates by reference a
11 request for additional information that was issued for
12 the flooding walkdowns in 2013. That RAI was specific
13 to the capability of the flood penetration seals at
14 the current licensing basis. We're clarifying that it
15 is appropriate to use the considerations of that RAI,
16 but it should be done at the reevaluated flood hazard
17 level rather than the current licensing basis. And
18 we're also clarifying that operating experience on the
19 use of temporary barriers for flooding should be
20 considered in looking to the available physical
21 margin.

22 Path 1 which is the first of the five
23 paths, if a licensee is able to go through and using
24 the hierarchical hazard assessment process reduce the
25 outcome of the flooding evaluation such that it's

1 bounded by the current design basis, that's an
2 appropriate way to disposition the flooding hazard
3 reevaluation for those particular flooding mechanisms
4 because the current licensing basis would be capable
5 of addressing the flooding hazard.

6 Path 2 is similar, but it looks to the
7 effective flood protection that would be available
8 because there is available physical margin. This
9 would be the path that would be taken for flood
10 mechanisms that a licensee can provide protection
11 against, rather than mitigation of. And we make a
12 similar clarification on the RAI that was issued for
13 the flooding walkdowns for the flood penetration
14 seals.

15 The results of the evaluation of the flood
16 protection include the capability to use temporary
17 flood protection measures. We'll be looking to the
18 use of the flood protection measures, temporary and
19 permanent, using qualitative evaluations relying on
20 engineering judgment and operational judgment because
21 of the lack of a good methodology for determining the
22 frequencies of exceedance as we had laid out to the
23 Commission in the flooding action plan in COMSECY 15-
24 0019 and as the Commission approved in its SRM on the
25 subject.

1 Okay, one area of particular concern that
2 we spoke to the subcommittee about was the use of the
3 evaluation of overall site response. The overall site
4 response in NEI 16-05, the evaluation there relies on
5 the feasibility determinations that are being
6 accomplished for the mitigating strategies under NEI
7 12-06, Appendix E which provides the guidance for the
8 conduct of validation.

9 The genesis of that particular appendix,
10 it came about because the mitigating strategies order
11 itself did not require an evaluation of human
12 performance. However, the industry guidance specifies
13 that licensees will provide a reasonable basis to show
14 that they can meet the time criteria that they need to
15 accomplish in order to perform the mitigating
16 strategies.

17 VICE CHAIRMAN CORRADINI: Can I say that
18 back to you? I'm just trying to understand. So I've
19 gone through the boxes. I understand the first box.
20 I understand the second box. So this is the orange
21 box, but it requires some sort of mitigation that is
22 dependent upon timing. Do I have that approximately
23 right?

24 MR. BOWMAN: You have it approximately
25 right, but it also impacts the second box because of

1 the presence of a potential for reliance on temporary
2 flood measures that would require some timing to put
3 those flood measures in place either by shutting a
4 door or building a sandbag barrier or something like
5 that or even to the extent of closing valves or
6 starting a pump.

7 In the mitigating strategies area, the
8 mitigating strategies order does not have any
9 boundaries to the conditions under which the actions
10 that are required by that order would have to take
11 place. That is largely an outcome of several actions
12 that were taking place in concurrence with the
13 issuance of the orders that went out on March 12,
14 2012.

15 We were in parallel considering NTF
16 Recommendation 1 which included a recommendation that
17 the Commission establish a beyond design basis
18 extension category of events. If we had gone down
19 that path, and said a beyond design basis extension
20 category of events, we could have established, for
21 example, that the mitigating strategies under the
22 mitigating strategy order be capable of addressing a
23 flood that was 30 feet higher than the design basis
24 flood level of the facility or a seismic event that
25 1.67 times the size of the seismic event that the

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1 facility was licensed to or any individual set of
2 hazards that set the performance criteria and the
3 reference bounds for which that facility was licensed.

4 Because we were not authorized to set that
5 type of beyond design basis extension criteria, our
6 conclusion was that we would not be able to establish
7 with any degree of certainty what the effects on the
8 performance shaping factors that would be necessary
9 for a consideration of reliability would be.

10 MEMBER STETKAR: Eric, you're kind of
11 going into a lot of -- a simple answer is you have to
12 show that the actions are feasible regardless of
13 whether you're putting in barriers or whether you're
14 mitigating it. And the feasibility is Appendix E of
15 NEI 12-06.

16 MR. SHAMS: And that applies to box 2, 3,
17 4, and 5.

18 MEMBER RAY: But many of us here went
19 through recently an operating license issuance for a
20 wet site that you could say uses mitigating strategies
21 for certain flooding conditions. Which box would it
22 fit in? Could you say it's most like box path 1 or 2
23 or 3?

24 I'm talking about the recent plant start
25 up licensing action that we were -- because you

1 certainly mitigate in that case, taking steps very
2 much like -- not mitigate, that is not the right word.

3 You certainly take steps to -- that are
4 part of a licensing basis to address wet site
5 conditions. And I was wondering if that was most like
6 one of these boxes that you've just been describing.

7 MR. BOWMAN: To tell you that, I would
8 have to look at what they were actually doing for it.

9 MEMBER STETKAR: I think what you're
10 describing would be analogous to what they're calling
11 a path 2 assessment.

12 MEMBER RAY: That's what I thought.

13 MEMBER STETKAR: You're protecting
14 feasibility, but it's protection, not mitigation.
15 You're not mitigating damage. You're preventing
16 damage and that's analogous to their orange box path
17 2.

18 MEMBER RAY: Yes. I withdrew the word
19 mitigating. That's a misnomer. But anyway, it looks
20 like some of this and path 2 I thought was most like
21 it.

22 MEMBER STETKAR: In my mind, that's the
23 analogy.

24 MR. BOWMAN: It's a little bit of a
25 difficult thing to give you a certain answer to

1 because we have licensees that as part of their
2 response to the mitigating strategies order installed
3 capabilities that are new capabilities that are only
4 relied on for the flex mitigating strategies.

5 One of the licensees that comes to mind
6 readily would be South Texas where they put diesel
7 generators on the roofs of their auxiliary buildings.
8 Those diesel generators are protected from the
9 flooding hazard, but if a licensee were to point to
10 that and say that it's providing flood protection, we
11 would likely call it a mitigation, rather than a
12 protection because it's not the installed plant
13 equipment that reliance is on, although I believe they
14 can already protect against the flooding hazard of
15 that licensee. But it's a complicated question and I
16 didn't want to make the diagram any more complex than
17 it had to be.

18 MEMBER RAY: I just want to remind those
19 who are involved, we've done something that's not
20 dissimilar from what you're talking about here
21 recently.

22 MEMBER STETKAR: We need to be a little
23 aware of time because the industry needs some time.

24 MR. BOWMAN: Okay, bottom line is that
25 although our endorsement of Appendix E to NEI 12-06

1 only allows for crediting it as demonstrating the
2 feasibility, the outcome of the analyses that a
3 licensee does for it will result in a document that
4 shows that time margins are available for all of the
5 individual actions that are necessary to carry out the
6 mitigating strategies as well as an integrated roll up
7 of all those actions to look for double counting of
8 personnel and equipment and a discussion at a
9 qualitative level on what the effects on the
10 performance shaping factors are.

11 We believe that the staff will be capable
12 of looking at that validation and making a qualitative
13 judgment using engineering and operational judgment as
14 to whether or not it is adequate to meet the needs of
15 what our qualitative assessment of the flooding risk
16 is for, in this case, path 2, given our knowledge of
17 what the magnitude of the risk is.

18 For the path 3, the local intense
19 precipitation, as I mentioned before, licensees can
20 approach this hazard using either a demonstration of
21 effective protection or the capability to mitigate the
22 hazard. We have looked at this in the mitigating
23 strategies area and what you see here is the
24 discussion of it as it was proposed to the Commission
25 in COMSECY-15-0019 which had been approved by the

1 Commission in their SRM

2 MEMBER STETKAR: In this, I went back and
3 I read the COMSECY and quite honestly, as I read the
4 COMSECY I was given the impression that local intense
5 precipitation would be resolved through protection,
6 because there are examples in there that talk about
7 clearing drains and more realistic evaluation of
8 precipitation rates which sounds an awful lot like
9 path 1 and path 2.

10 Now you're suddenly getting into a
11 situation well, no, you can mitigate the effects of
12 local intense precipitation that causes damage within
13 the plant and yet that evaluation that pertains to
14 mitigation now will not be subject to staff review in
15 the same way as an integrated assessment of a
16 different flooding hazard, let's say a riverine flood
17 or a coastal flood. And therefore, it won't be
18 subject to potential consideration in phase 2 for
19 regulatory action.

20 Why exactly is that? Because I don't read
21 that in COMSECY-15-0019. Why is that? Because that
22 was developed before this whole framework was
23 established. Now you have a framework.

24 MR. SHAMS: I think this goes back to
25 earlier questions about are we recognizing the

1 interrelation between the green boxes and the blue
2 boxes. And essentially that's us recognizing that
3 given the characteristics of the hazard itself, it's
4 localized over the site itself, given the fact that
5 local, intense precipitation for a site is a bad
6 drain.

7 So I'm going through just the
8 characteristics of the hazard itself. It's about --

9 MEMBER STETKAR: I'm sorry, if the river
10 comes to visit me, that's also local to me, so I don't
11 understand why local intense precipitation is any
12 different from riverine or lake front or coastal zone
13 flooding. If the flood came to visit me, regardless
14 of how the flood got here, in this case it rained on
15 my site and in another case it rained 150 miles up the
16 river and the river decided to come visit me, so I
17 don't get that. So go on to the next thing, because
18 we do need to be a little short of time here.

19 Don't give me a history. I want to
20 understand philosophically why mitigation of a local
21 intense precipitation flooding that causes damage
22 inside the plant, that causes damage inside the plant,
23 is treated from your perspective differently than a
24 riverine flood that causes damage inside the plant,
25 because it's being treated differently.

1 MR. SHAMS: As I shared simply in our mind
2 was that it's a hazard that's better predicted given
3 our forecasting abilities. It's a hazard that we saw
4 that it's a frequency from some of the information we
5 have out there is too low such that they would not go
6 through backfit. It's a hazard that we in our
7 guidance we still are seeking an appropriate balance
8 between mitigation and protection.

9 We still have that ability to comment on
10 a licensee's approach and say that's still not the
11 appropriate balance of mitigation and protection. But
12 we feel that this is an appropriate hazard to declare
13 up front that a mitigation process for it is
14 appropriate. And we're being responsive to the
15 Commission that says focus the integrated assessments
16 on hazards that are cliff-edge hazards that have the
17 potential for the safety enhancement. And we did not
18 believe that it would fit in there.

19 MEMBER STETKAR: So you know the frequency
20 of this is much, much lower than the frequency of the
21 probable maximum precipitation 200 miles away from the
22 site that causes over-topping failure of 6 intervening
23 dams. You know that this is much lower than that.

24 MR. SHAMS: I wouldn't declare that I know
25 that that --

1 MEMBER STETKAR: No, you know that because
2 that event that I just described will be subject, if
3 it causes damage in the plant, to a mitigating
4 assessment that goes through path 4 or path 5 and in
5 the subject to your review in phase 2 for possible
6 regulatory action. It will be by definition.

7 MR. SHAMS: That's true.

8 MEMBER STETKAR: Okay, thanks. We should
9 go on because we need to -- I needed to get that on
10 the record. We need to go on and get to the other
11 paths.

12 MR. BOWMAN: Okay, we did include a
13 clarification on local intense precipitation to state
14 that licensee should assess the protection of the key
15 SSCs prior to going on to demonstrating the mitigation
16 capability.

17 For path 4, the demonstration of effective
18 mitigation, path 4 and path 5 are the two paths that
19 industry has laid out as the revised integrated
20 assessment paths.

21 In path 4, the clarification that we have
22 made is that licensees should provide information
23 corresponding to the critical flood of elevations or
24 as they've been referred to elsewhere, the
25 consequential floods including the frequencies of

1 exceedance of those consequential floods. This is an
2 area where we are still working with industry on how
3 that would need to be addressed and we anticipate that
4 we will receive comments from industry on that
5 subject.

6 For the frequency determinations, for path
7 4 and path 5, Appendix D of NEI 16-05 provides
8 methodologies by reference that can be used for
9 finding frequencies of exceedance in the range of the
10 10^{-3} to 10^{-4} area. We've made a few clarifications to
11 the use of the Appendix D methodologies, and we've
12 also provided in enclosure 2 that provides examples of
13 characteristics of a methodology for determining
14 frequencies that when appropriate can be used in
15 conjunction with the Appendix D methodologies.

16 Path 5 of NEI 16-05 is a scenario-based
17 path that will select a variety of different flood
18 mechanisms at different particular frequencies of
19 occurrence and include -- our clarification is that
20 they should include the same critical flood elevations
21 as one of the scenarios so that we will have the
22 frequencies of exceedance for the consequential flood
23 heights.

24 The consequential floods heights that I
25 mentioned previously and I'm talking about right now

1 would be that flood height or flood criteria at which
2 the licensee would no longer be providing protection
3 of the plant, but may be needing to go to mitigation.

4 This will give us, when we have the
5 information, an indication of where the balance
6 between mitigation and protection that the licensee is
7 proposing is and that will be an input to the path 2
8 regulatory decision making.

9 VICE CHAIRMAN CORRADINI: A clarification.
10 You said this now three or four times. The transition
11 between protection and mitigation for some sort of
12 flooding events is protection is I've already got it
13 there and I just watch the event happen and mitigation
14 is I actively have staff do things?

15 MR. BOWMAN: No.

16 VICE CHAIRMAN CORRADINI: In your mind,
17 where does that -- how do I put it as a protection
18 versus a mitigation?

19 MR. BOWMAN: A protection is I have
20 installed structure systems and components, safety
21 related or possibly not safety related that the plant
22 relies on to provide core coolant containment and
23 spent fuel pool cooling.

24 In the flood protection area, those
25 particular structure systems and components are

1 protected against the flooding so that the flooding
2 does not affect them.

3 VICE CHAIRMAN CORRADINI: And they don't
4 require operators to do so.

5 MR. BOWMAN: They could, because flood
6 protection includes the potential for reliance on
7 temporary flood protection measures that a licensee's
8 operators would need to put in place or activate by
9 some means in order to provide the flood protection.

10 Flood mitigation would be the use of
11 something different other than the normal plant
12 equipment that's already been looked at and is already
13 relied upon, for example, the use of a flex pump
14 that's provided under the mitigating strategies order
15 or generator to replace the functionality of an
16 installed structure system for component.

17 VICE CHAIRMAN CORRADINI: So by definition
18 flex is not in category 1 of installed. It's there
19 just in case based on the flex -- to satisfy the
20 rules, so therefore you don't count it in the
21 protection category. You count it in the mitigation
22 category?

23 MR. BOWMAN: That's correct.

24 VICE CHAIRMAN CORRADINI: Okay, fine.

25 MEMBER STETKAR: Eric, one of the things

1 that you didn't really, we talked a little bit about
2 at the subcommittee meeting, is that if I do a Path 4
3 now, now that we've introduced the Paths and the
4 distinctions in Path 5, I wanted to bring this up.

5 If I do a Path 4 assessment, or what I'll
6 call for the moment a higher frequency Path 5
7 assessment, so I've got a frequency that I've assessed
8 somewhere above 10 to the -4 event per year or
9 thereabouts.

10 The guidance talks about I have to
11 demonstrate effective mitigation. And there's
12 distinct guidance in terms of effective mitigation of
13 -- having confidence in both the reliability and
14 availability of hardware. Those pumps, for example,
15 that they take credit for. There's a whole appendix
16 in NEI 16-05 that addresses hardware reliability.

17 If I take the lower frequency Path 5
18 approach, something that has a low flooding event
19 frequency, the guidance says I have to demonstrate
20 feasibility of the mitigating strategies.

21 And that, in a general risk informed kind
22 of hierarchy, that makes a lot of sense, that I have
23 to have some confidence that I can indeed achieve for
24 what I intended to achieve.

25 But at very low frequencies, perhaps, I

1 don't have to have the same confidence in the
2 reliability of achieving those end points as I do for
3 higher frequency events.

4 And that's, in the subcommittee meeting we
5 had some discussion about the difference between now
6 using the guidance for human performance, that's
7 focused on demonstration of feasibility, versus
8 guidance for human performance that would give me
9 higher confidence in both feasibility and reliability.

10 Do you want to comment on that? I know we
11 had some discussion already on the feasibility.

12 MR. BOWMAN: I can comment on that, and if
13 we go back to where we started out with the where
14 things came from, we will be in the position of having
15 already had a great deal of work done using the NEI
16 12-06 Appendix E, Guidance for the Development of
17 Demonstration that the manual actions have been
18 feasible.

19 As I mentioned previously, the outcome of
20 that will be a report that documents the time margins
21 available between the time required to take an action
22 and the time that's available to take an action, for
23 all of the actions in the mitigating strategies.

24 NEI 16-05 tries to draw a distinction
25 between the reliance on the Appendix E from NEI 12-06

1 demonstration that the strategies are feasible, and
2 something that's effective by evaluating other aspects
3 of the human performance for those mitigating
4 strategies. We don't really see any true value to be
5 gained in drawing that distinction.

6 It's a little bit too qualitative a stamp
7 to put on something, to say that it's demonstrating
8 that you've got effective strategies as opposed to
9 feasible strategies.

10 And what the staff believes is possible to
11 accomplish is make a qualitative judgment of the
12 degree to which the capability of the licensee to
13 accomplish the strategies relying on the validation
14 that was conducted using the process that's in NEI 12-
15 06 Appendix E as supplemented by NEI 16-05 Appendix C,
16 and use engineering and operational judgment to come
17 to a qualitative determination as to whether that
18 demonstration is adequate to satisfy the needs in
19 order to address the risk that's posed by the flood
20 hazard at that reevaluated hazard level, taking into
21 account our understanding of what the magnitude of
22 that hazard is.

23 Did that answer your question?

24 MEMBER STETKAR: I think so. From what I
25 got out of it, make I sure I understood. You're going

1 to take the results of their integrated assessments,
2 look at them, and make a qualitative judgment about
3 whether or not you think it was effective enough.

4 MR. BOWMAN: Right. I'm not saying to
5 look to whether they've binned it as being a feasible
6 strategy or an effective strategy. I'm going to look
7 to the underlying validation that was accomplished to
8 see that it was good enough or it was not good enough
9 qualitatively.

10 MEMBER STETKAR: Okay, thanks.

11 MR. SHAMS: And thoughts that I can add,
12 it's --

13 MEMBER STETKAR: We don't have the time to
14 go, we talked quite a bit and it's on the record in
15 the subcommittee meeting about this topic.

16 I think that it's, I personally think that
17 there are ways to have higher confidence that
18 something is reliable without doing a quantitative
19 human reliability analysis, if you will, and coming up
20 with some quantitative estimate for, you know, the
21 likelihood of failure of an action.

22 As I said, the hierarchical framework
23 that's been set out makes a lot of sense from a risk-
24 informed, performance-based approach to life, where
25 you ought to have higher confidence that mitigation

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1 strategies for higher frequency events can be
2 accomplished reliably. Compared to, still confidence,
3 but perhaps not the same degree of confidence, of
4 accomplishing mitigation strategies for much lower
5 frequency events.

6 And I mean, that's sort of the notion of
7 a risk-informed, performance-based approach. And all
8 I was doing is trying to probe the notion of how the
9 staff makes a determination for those higher frequency
10 events, or for events that don't take the frequency
11 approach but just look at the magnitude of the hazard,
12 kind of Path 4 assessment.

13 How, for those approach, you're going to
14 make the determination that you have reasonable
15 confidence that those mitigation strategies from a
16 human perspective can be achieved reliably.

17 Because there is distinct guidance about
18 things you need to think about for the equipment.
19 That it's maintained, that it's, you know, tested,
20 that it's got all of those things. There is even
21 guidance on looking up generic failure data to support
22 that notion. Which does get into trying to assess the
23 reliability in terms of failure rates and things.

24 So it's just, I understand from your
25 answer what you're going to do.

1 MR. SHAMS: Yeah, I hope we reflected that
2 we understand and that's our intention, is to look at
3 the hazard, to look at the magnitude of the hazard and
4 its frequency, and then adjust from there. But we had
5 to establish an acceptable baseline which is at
6 feasible human actions, and then we'll go from there
7 as Phase 2 proceeds and we decide we need more than
8 that.

9 MR. BOWMAN: One thing that I didn't
10 mention at the outset of the presentation is that the
11 initial set of guidance that went out in JLV/ISG 2012-
12 05 for the integrated assessments is not being
13 withdrawn, and it may be relied upon by licensees.

14 That guidance includes an appendix,
15 Appendix C, that closely parallels and is based upon
16 the Reg 1852 for the determination of feasibility and
17 reliability.

18 And it may be a path that we need to go
19 down later on requesting further information or
20 demanding further information if we get to a position
21 where we need a greater assurance of reliability for
22 actions than we believe we've achieved by licensees'
23 execution of the validation using the current
24 guidance.

25 MEMBER STETKAR: There's one more topic,

1 and again, I have to make sure we have time for the
2 industry, that we did discuss during the subcommittee
3 meeting. And I noticed in your presentation you have
4 a backup slide that addresses it.

5 And that is, as I read all of the
6 guidance, and I think we had a discussion at the
7 subcommittee, the guidance in NEI 16-05 does say, for
8 example, I need in my assessment -- I tend to use the
9 words poorly. So when I think about hazards for my
10 site, one of the hazards that I need to think about,
11 for example, let's take a riverine site, is a seismic
12 event, for example, that fails an upstream dam, from
13 upsite.

14 Okay, and that's listed. NEI 12-06 also
15 explicitly tells me that I need to consider seismic
16 failures of downstream dams that might drain my
17 ultimate heat sink. So it's clear that either taking
18 the water away or putting water on my site, I have to
19 think about seismic events.

20 The guidance, and we were told this
21 orally, the guidance in some places, tells me that I
22 do not need to consider coincident hazards.

23 So, for example, I do not need to consider
24 the effects of an external flood at my site that's
25 caused by a seismic event that had an epicenter close

1 enough to my site that failed an upstream dam and also
2 affected my site. And those, we were told, are
3 explicitly not considered.

4 And part of the concerns that we had were,
5 as people developed these more focused scenario-based
6 strategies for protecting, either protecting the plant
7 or more particular, developing mitigating strategies
8 where people are talking about housing the mitigation
9 equipment in structures that are robust for seismic
10 events, but may not be protected against flooding.

11 But you can move that equipment for a
12 flood event. Other equipment might be protected
13 against that flood event, but it might not be robust
14 for seismic events.

15 There's a concern that you can get into
16 situations that, should you have seismic damage with
17 an external flood that's a direct consequence from
18 that seismic, not an independent type of thing, that
19 focused mitigation strategies may not adequately
20 account for that.

21 And that these integrated assessments now,
22 because we're talking about mitigation, may not
23 recognize those conditions. And therefore, the
24 staff's evaluations may not recognize those
25 conditions.

1 Can you talk a little bit about that? And
2 I know you came prepared to do that, so I'd say go.

3 MR. BOWMAN: Yes, we can. As we mentioned
4 during the subcommittee, there are a couple of
5 sections in NEI 12-06 that do allow for the
6 consideration of consequential failures. Those are in
7 Section 3213, and I think it was Item No. 9, and 3214,
8 Item No. 4, that set the initial conditions and the
9 boundary conditions for the analyses and the
10 evaluations that were done for developing the
11 mitigating strategies.

12 We discussed the review, to a certain
13 extent, in an internal memo on supplementary staff
14 guidance to the Mitigating Strategies Directorate when
15 it was stood up in 2013. I can provide a copy of the
16 memo to Mike Snodderly for the committee's review, if
17 you like. It was made public and it does talk to
18 consequential events are within the scope of the
19 mitigating strategies.

20 It was unfortunate that the individuals
21 from industry that were present for the subcommittee
22 meeting were not licensees for whom a coupled seismic
23 and flooding event would have been in scope.

24 I know of several licensees that have
25 addressed the potential for coupled seismic and

1 flooding events, and they did address them by
2 providing both seismic and flooding protection against
3 the, or for the mitigating strategies, and then
4 against both hazards at the same time.

5 In addition to that, the flooding
6 reevaluations under NTTF Recommendation 2.1 looked to
7 seismic dam failures, and seismic dam failures will be
8 further addressed in the seismic probabilistic risk
9 assessments. It's within the scope of the SPRAs for
10 things that are to be looked at for what the results
11 of a seismic event.

12 MEMBER RAY: We don't have time to get
13 into it, but when you say dam figures, always include
14 tsunami also, would you, where that's applicable.
15 Because I think that's your intent, isn't it?

16 MR. BOWMAN: It is. Seismic and flooding
17 coupled. We don't have that many licensees that are
18 subject to tsunamis.

19 MEMBER RAY: That's correct, but there are
20 some.

21 MR. BOWMAN: Oh, yeah.

22 MEMBER RAY: So I just, and that's not as
23 well developed. Like I said, I don't want to take
24 time, because we're out of time.

25 MEMBER STETKAR: We do need to move on.

1 For the record, I'd like to quote, because you pointed
2 me to two sections of NEI 12-06. So 3213 No. 9 says
3 no additional events or failures are assumed to occur
4 immediately prior or during the event, including
5 security events. So that doesn't tell me that I have
6 to look at consequential things.

7 And 3.2.1.4 No. 4 says no independent
8 failures, other than those causing the loss of
9 alternate heat sink, and that are assumed to occur in
10 the course of the transient.

11 Now, everybody's been interpreting that as
12 I don't need to consider two what I call independent
13 events, a seismic and a flood. So I just wanted to
14 get that on the record of the points that you said
15 explicitly tells me to look at consequential events,
16 because I don't read that that way.

17 MR. BOWEN: And in any case, it is
18 definitely a recommendation we would take from the
19 committee on the Regulatory Guide 1.226, which will be
20 the outcome of Draft Guide 1301, which we'll be
21 briefing you on in the future when we get to the final
22 series.

23 (Simultaneous speaking.)

24 MR. SHAMS: Two seconds. I'd like to walk
25 away with that it is not lost on us, it is not lost on

1 the sites, that this is an issue for them. A coupled
2 seismic and flooding event in both areas.

3 In 2.1, as we laid out, that that's been
4 looked at. And the entire 2.1 is about ensuring that
5 the plant survives the seismic event and as the flood
6 comes, this entire evaluation here is making sure that
7 they have either protection or mitigation for the
8 flooding.

9 In terms of mitigating strategies, our
10 last bullet actually addresses that directly. Yes,
11 the guidance could have been more explicit. But those
12 sites that understand in their design basis that they
13 could have a coupled event did clearly look at it,
14 whether or not the guidance led them to do that.

15 MEMBER STETKAR: Good, I'm glad to hear
16 that. Anything more, because we want to try a little
17 bit on time here. Anything more for the staff?

18 If not, thanks a lot, covered a lot of
19 ground. Really appreciate the front walk-through on
20 how we got here. Let's bring up the industry, because
21 I know the industry has some comments on the guidance.
22 Admiring comments, hopefully.

23 Tom, you taking the lead, or is Mike?

24 MR. ZACHARIAH: I'm going to take the
25 lead. This is Tom Zachariah, NEI. Good morning. So,

1 we're going to skip over a couple of slides, since we
2 went over in detail and we're struggling with time.

3 There's a bunch of clarifications that I
4 generally make whenever I make this presentation which
5 were already made. The one thing I do want to
6 clarify, just so we're all on the same page, is that
7 the way the paths will work through the flowchart is
8 that it's taken mechanism by mechanism. So there
9 might be a site that has multiple mechanisms, so they
10 may be on multiple paths.

11 MEMBER STETKAR: But for the purpose of
12 the committee and the record, a flooding mechanism is
13 a source of flooding. So a riverine flood is a
14 flooding mechanism, a local intense precipitation
15 event is a flooding mechanism.

16 MR. ZACHARIAH: Yeah, thank you,
17 appreciate that.

18 MEMBER STETKAR: It's jargon, but
19 sometimes on the public record, it's good to get past
20 the jargon.

21 MR. ZACHARIAH: Appreciate it. So before
22 we get into the comments that we're going to be
23 presenting, I want to point out that we feel positive
24 towards the ISG that the NRC staff developed. In
25 general, we think it is hitting the areas that we need

1 to.

2 We will be providing comments on it. The
3 majority of those comments will be clarifications and
4 discussions over wording. There are a few things that
5 we feel strongly about that we will point out.

6 And the first one is mainly in the
7 integrated assessment, this Path 4. And we developed
8 two paths within NEI 16-05 that address the integrated
9 assessment, the first being Path 4, Effective Flood
10 Mitigation, and second being a blended approach for
11 Path 5.

12 So the reason we were very intentional in
13 developing this and the difference between the two,
14 the main difference between the two, is in Path 4, we
15 intended that the utilities or licensees would not
16 develop site-specific frequency development. As we
17 felt that there are certain mechanisms, for example
18 dam failure, where that would be very difficult to do.

19 The ISG clarification on Path 4
20 essentially adds back that element of the frequency of
21 exceedance in developing that for the critical flood
22 elevations. Yeah, our issue with this is a level of
23 complexity.

24 So for frequency development,
25 precipitation in river-type mechanisms, we feel that

1 for the more likely situations or frequencies for
2 floods, it's a simpler evaluation, I shouldn't call it
3 simple, but it's a simpler evaluation, to determine
4 what the overall frequency for those situations are.

5 However, with the higher complexity
6 situations where there are dam failures, and really
7 this would be a very large effort, it would be a
8 large-scale effort, there's a lack of accepted
9 methodologies. And when the utility doesn't own the
10 dam, it's very difficult to get to the information
11 that they need to get to.

12 And when this is a large effort, and
13 essentially building a PRA model for a dam, that
14 access to information and data is very, very critical.
15 And we feel that adding this clarification into the
16 ISG defeats the purpose of having the distinct
17 distinguishing between the two paths. We felt that
18 basically makes Path 4 and Path 5 the same.

19 MR. BELLINI: It's my understanding that
20 the Corps is in fact -- I got it. That the Corps is
21 in effect or has done analysis of dam failures for the
22 licensees already.

23 MR. TSCHILTZ: In some cases, yeah, that's
24 my understanding.

25 MR. BELLINI: Where they have

1 jurisdiction. So the lack of access to dam
2 information from USACE is --

3 MR. TSCHILTZ: Well, to come up with a
4 likelihood is still a challenge though, I believe. I
5 don't think they're necessarily doing that. You know,
6 the lack of accepted methods, the number of mechanisms
7 by which the dams can build make it a very complicated
8 type of analysis.

9 The fact that there's different types of
10 dams out there, some of which are earthen dams,
11 there's a number of different parameters that need to
12 be considered in the determination of the likelihood
13 of flood.

14 And I think we feel that to go down this
15 path with the staff, it would be a research project.
16 It's not an integrated assessment at that point. It
17 would be very complex, it would involve a number of
18 different iterations, and it wouldn't allow a timely
19 response as far as developing an integrated
20 assessment.

21 And we have Joe Bellini, who represents
22 Exelon, on the phone, who can comment on dam failure
23 mechanisms as well, if you can open up the line for
24 him.

25 VICE CHAIRMAN CORRADINI: While they're

1 opening up the line, let me just make sure I
2 understand the final bullet. So your point is, given
3 the complexity under these various upstream dam
4 effects, that 4 and 5 are literally the same thing.

5 MR. ZACHARIAH: Yes.

6 VICE CHAIRMAN CORRADINI: And they're the
7 same thing because I don't know the frequency but I
8 can understand the potential impact when I do a
9 conservative calculation? I'm still not there,

10 MR. ZACHARIAH: So what makes them
11 different in 16-05 is that in Path 4, you would
12 identify the critical flood elevations, but you
13 wouldn't have to determine what the frequency for
14 each, for those scenarios. You would establish that
15 you have effective flood mitigation for all of the
16 critical flood elevations.

17 VICE CHAIRMAN CORRADINI: In 4?

18 MR. ZACHARIAH: In 4. In Path 5, you
19 would distinguish the critical flood elevations,
20 determine the level of likelihood between those
21 critical flood elevations, and depending on that
22 evaluation, you would determine what the appropriate
23 level of response is required.

24 So it may be a blend, so for the more
25 likely, it may be a blend of effective protection and

1 effective mitigation. And with the less likely
2 floods, we would be pointing back to NEI 12-06 for the
3 feasible response.

4 MR. BELLINI: It's my understanding also
5 that the Corps is embarking at some point on a ---

6 MEMBER STETKAR: We ought not to speculate
7 on what the corps may or may not be doing. Okay.

8 MEMBER BROWN: So finish, John, I'm sorry.
9 I just had a question myself. I have a little
10 difficulty with the higher complexity approach by
11 saying this is just too hard.

12 I mean, it's almost similar to me and from
13 the standpoint of looking at the Daichi plants that
14 kind of brushed aside the fact that this has been any
15 induced tsunami and flood would completely flood,
16 overdo their complete plants and wipe them out,
17 because it was very, very, very, very, very, very
18 unlikely. And it's a big, bad thing.

19 And here you've got a very high value
20 asset that's sitting downstream of a major dam or
21 whatever size dam whose complete failure would bury
22 it. I just had a hard time with not, with looking at
23 this thing was just too hard, so the likelihood is too
24 hard to figure out, so therefore we'll do nothing.

25 MR. TSCHILTZ: So I think one comment I

1 would make is that I think you're not recognizing the
2 fact that plants have demonstrated effective
3 mitigation for those type of events. Those strategies
4 exist. So the question now becomes whether you need
5 more protection, or whether effective mitigation is
6 enough.

7 So for these type of Path 4 plants, I
8 guess we're trying to distinguish that they have more
9 rigor that was done in the mitigating strategies
10 assessment using Path 4 in determining effective
11 response than what was done.

12 So you have your mitigating strategies to
13 demonstrate it protects against this mechanism, plus
14 what we do to determine the effectiveness of the
15 response.

16 And let me just comment on that too,
17 because there was a dialog on this during the staff's
18 presentation about whether or not what's done, I think
19 it's in Appendix Charlie for looking at the
20 effectiveness of the actions.

21 At this point, we know more than what we
22 would have known during the mitigating strategy
23 assessment. We'll know when the time line for
24 exceeding the critical flood elevations, we'll be able
25 to more effectively review the site response to that

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1 mechanism.

2 We'll also be looking at the overall
3 strategy of the site and whether there's resources and
4 command and control that's appropriate for that even
5 established. So I would take exception with the
6 statement that it doesn't do anything more than the
7 feasibility assessment that was done for the MSA. We
8 think it does, or else we wouldn't have suggested that
9 we do it.

10 MR. ZACHARIAH: Just to add on to one
11 thing Mike said, that we're responding to, it's not
12 that the Path 4 sites wouldn't be doing anything.
13 They would have the burden of having to demonstrate
14 that they have the highest rigor of mitigation for
15 all, for the entire probable maximum flood for that
16 entire mechanism.

17 They don't have the benefit of making an
18 argument of frequency that, okay, for only these
19 frequencies, I need to have this level rigor. And for
20 these frequency floods, I have something a little bit
21 less. So it's not doing nothing, so I would take --

22 MEMBER BROWN: If I take your response, I
23 would read it as saying we can provide a -- they're
24 required to provide mitigation for the worst, for the
25 entire dam failing totally in a huge way, potentially

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1 inundating the site. Is that correct? So you could
2 mitigate it.

3 MR. ZACHARIAH: Yes.

4 MEMBER BROWN: So you can watch it come
5 and pile up the sand bags, or erect your barriers or
6 whatever's done, the mitigation strategy is what --

7 (Simultaneous speaking)

8 MEMBER RICCARDELLA: Then if you can't do
9 that, then you go to Path 5, correct? And then --

10 MR. TSCHILTZ: Path 5 still has
11 mitigation. There's still --

12 MEMBER RICCARDELLA: I understand that,
13 but if you can't show that you can do it all the way
14 up, that you can take whatever might possibly happen,
15 that's Path 4, then you can look at Path 5 and say,
16 well, now I can look at the frequency. And if the
17 frequency of the things I can't survive is
18 sufficiently low, then I'm okay. Right? Is that the
19 difference between Path 4 and Path 5?

20 MR. ZACHARIAH: That is correct.

21 MEMBER BROWN: That wouldn't have worked
22 at Fukushima, I guess then.

23 MR. TSCHILTZ: I take exception with that.
24 They've demonstrated effective mitigation for the
25 sites where the dam failure's an issue. That to me

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1 means Fukushima wouldn't happen at that site, based
2 upon the response to those events. But I want to give
3 Joe Bellini a chance to talk.

4 MEMBER STETKAR: Let's get Joe, because we
5 do have to kind of stick to the agenda a bit here.

6 MR. TSCHILTZ: Go ahead, Joe.

7 MR. BELLINI: Yeah, I just wanted to step
8 back and comment on the Corps of Engineers'
9 involvement in their assessments of their own dams.
10 You know, it's my understanding that serves for
11 certain sites where they have a Corps of Engineers
12 upstream dams.

13 They performed a deterministic look at the
14 dam's specific PMF and the dam's ability to withstand
15 that PMF, and a seismic event, and made a
16 determination as to whether a dam would fail or not.

17 And then did the hydraulic analysis on the
18 failure that provided the flows at the plant as a
19 result of failure for those dams that they didn't have
20 a high confidence would withstand those initiating
21 events. It's my understanding that they did not use
22 probabilistic characterizations to make those
23 decisions.

24 A lot of the details for that was done
25 behind the scenes within the Corps of Engineers

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1 organization. But it remained in deterministic state.
2 So that dams where there's an issue, it would be an
3 extra bit of effort to go into more of a probabilistic
4 characterization of those failures.

5 MEMBER STETKAR: Thanks, Joe. This is
6 John Stetkar. And just for the record, people have
7 been talking about the Corps of Engineers as if the
8 Corps of Engineers controls every upstream dam from
9 every nuclear power plant. That is not correct. The
10 Corps of Engineers has done assessments for a selected
11 set of plants where they actually operate and control
12 those dams.

13 There are many other plants that are not
14 subject to Corps of Engineers' dams, and this guidance
15 applies for all the plants in the country. So we
16 should not focus on what the Army Corps of Engineers
17 does or doesn't do, because they're only one part of
18 the whole equation here.

19 I just wanted to make sure we get that on
20 the public record, because I didn't want to get the
21 impression that all of the dam failure analyses for
22 every site in the United States are being done by the
23 Corps of Engineers and what they may or may not do in
24 terms of probabilistic sense, so.

25 Thanks, Joe, thanks very much. Go on with

1 your presentation.

2 MR. ZACHARIAH: Yeah, so, we only have two
3 more sites. So the other item that we feel strongly
4 about is this clarification regarding Appendix Delta.
5 Now in 16-05, Appendix Delta is the portion of the
6 guidance that provides a catalog of ways, of methods
7 to estimate the frequencies that are greater than 10
8 to the fourth per year scenario.

9 So, it's the second part of the
10 clarification that we take issue with is, when
11 applying these methods, the licensee should consider
12 the attributes described in Enclosure 2 of the ISG.
13 Now Enclosure 2 provides a high level overview
14 guidance for a PFHA, which is not required for the
15 flooding assessment as described in the NEI guidance,
16 and even the ISG I think recognizes this is not
17 necessary.

18 So though we understand that the staff
19 believes that it's not a requirement, including
20 Enclosure 2 in the ISG causes confusion, as the
21 attributes that are to be addressed and how to address
22 them haven't really been described.

23 And the other issue with Enclosure 2 is
24 the implementation of peer reviews. We feel that will
25 prove difficult to accomplish. Anyone that's been in

1 the PRA realm can probably speak to that. There's
2 limited flood experts out there in the industry,
3 there's a lack of a peer review process, there's a
4 lack of a standard that we could point to and use in
5 the process, which would, we feel that this would be
6 a huge effort.

7 MEMBER STETKAR: Thank you. Any questions
8 for the industry? Sorry to rush you a little bit,
9 there's a lot of stuff here, I know, so. I think you
10 got everything in? I want to make sure that you did
11 indeed get a chance to make all the points you wanted
12 to.

13 MR. ZACHARIAH: Yes.

14 MEMBER STETKAR: We really appreciate the
15 feedback. If nothing more for the industry, I'd like
16 to ask if there's anyone in the room who'd like to
17 make a comment. If you would, please come up to the
18 microphone, identify yourself and do so.

19 And I know we have the external line open,
20 so if there's anyone on the external bridge line who
21 would like to make a comment, please identify yourself
22 and do so.

23 Joe, if you're still out there, just say
24 hello. I'm pretty sure it's still open.

25 MR. BELLINI: Yes, I'm still on. So I can

1 hear you.

2 MEMBER STETKAR: That's fine, I just
3 wanted to make sure it's open. If no public comments
4 on the bridge line, I'll turn it back to you, Mr.
5 Chairman.

6 CHAIRMAN BLEY: Thank you, Mr. Stetkar.
7 At this time, we will recess for 15 minutes, and we'll
8 return at 10:20 to take up the topic of Fukushima Tier
9 2 Group 3 recommendations on other natural hazards.
10 We'll recess.

11 (Whereupon, the above-entitled matter
12 went off the record at 10:05 a.m. and
13 resumed 10:21 a.m.)

14 CHAIRMAN BLEY: We are back in session.
15 At this point, I will turn the meeting over to Mr.
16 Stetkar once again, this time to look at the Fukushima
17 issue. John.

18 MEMBER STETKAR: Thank you, Mr. Chairman.
19 It seems so long since I headed one of these sessions.
20 This next topic is -- we're going to switch gears a
21 little bit. It is the staff briefing us on their
22 interim progress on screening out other external
23 hazards not being seismic and external flooding. I'm
24 sure the staff will walk us into, again, what we're
25 talking about. Without cutting more into their time,

1 I'll turn it over to Joe or Mo --

2 (Simultaneous speaking).

3 MR. SHAMS: A quick start. I'll use my
4 introduction just to --

5 (Simultaneous speaking)

6 -- lay out a quick roadmap for you. As
7 Dr. Stetkar mentioned, we're discussing with you today
8 our interim product to the Commission related to our
9 assessment of other natural hazards, other than
10 flooding and seismic. Essentially, we know what we're
11 doing in flooding and seismic's 50.54(f) letters,
12 collecting information, and seeing responses. We
13 needed to answer the same question, given your
14 recommendations and giving Appropriation Act
15 directions for us, so this process, we laid out for
16 the Commission how to look at the other hazards, other
17 than flooding and seismic, and how to ultimately make
18 a recommendation to the Commission on whether or not
19 any additional regulatory actions are necessary.
20 Today, we're presenting to you our interim report to
21 the Commission, our interim SECY paper. Basically,
22 you'll see that we'll be concluding that for most
23 hazards in most plants, other natural hazards do not
24 -- we don't foresee them needing any regulatory
25 actions, and we'll discuss with you the rationale

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1 behind that conclusion.

2 We would also let you know that for high
3 wind, particularly hurricane, and for snow, we believe
4 that some plants would benefit from additional -- we
5 would benefit, certainly, from additional studies in
6 these two hazards, and we will be doing that in the
7 next few months and, ultimately, reporting to the
8 Commission, again, whether we need any further
9 regulatory actions or we recommend no additional
10 actions. With that, I'll turn it to Joe to walk us
11 through our assessments and our conclusions.

12 MR. SEBROSKY: Good morning. My name is
13 Joe Sebrosky, and I work in Japan Lessons Learned
14 division, in Mohamed's branch. This slide is just a
15 summary of how this particular item fits into the
16 broader Tier 2 and Tier 3 activities, which we've
17 previously briefed the ACRS on. That culminated in a
18 SECY paper that was issued in October, SECY 15-0137,
19 October of last year, that had a listing of all the
20 Tier 2 and Tier 3 activities. What that SECY did is
21 it grouped the various Tier 2 and Tier 3 activities
22 into three different groups. Group 1 was issues that
23 the staff was recommending closure.

24 Group 2, the staff thought it had enough
25 information to close out the issue, but it would

1 benefit from additional interactions. Then Group 3,
2 where the staff just provided a high-level process for
3 how it was going to address the Group 3 activities.
4 For all the Group 3 activities, the staff's statement
5 in SECY 15-0137 was it was targeting the end of
6 December 2016 to provide an updated assessment to the
7 Commission.

8 The Commission responded in an SRN to SECY
9 15-0137, asking for an interim status on this
10 particular history other than the issue being natural
11 hazards other than seismic and flooding. So it
12 separated out the Group 3 issues. This was the only
13 Group 3 issue that the Commission directed the staff
14 to provide an interim product, which is the reason
15 that we're here. With specificity, we laid out a
16 four-step process that we'll talk about here in a
17 little bit, and the Commission wanted the status to
18 include the assessment results through Step 2 of that
19 SECY paper. Next slide, please. To meet the
20 Commission direction, we undertook several activities,
21 including issuing a white paper with the staff's
22 preliminary assessment in March of 2016.

23 We had a Category 3 public meeting in
24 early April, and then we met with the Fukushima
25 Subcommittee on April 21st. There were three

1 high-level action items that we took from that
2 meeting. Provide an updated assessment reflecting
3 additional changes -- what we briefed the subcommittee
4 on at the time was that we were making additional
5 changes mainly to the low water level assessments
6 based on stakeholder comments that we had received.

7 The subcommittee requested that we provide
8 those updates to those draft assessments. We did that
9 on an April 26 letter. That letter transmitted the
10 current draft version of the SECY paper, and also
11 showed a redline/strikeout of the differences between
12 the version that existed at the time we sent the
13 letter to you and the March 24th version. Since that
14 time, we're still responding to comments and including
15 comments that we received at the April 21st
16 subcommittee meeting. We do have a slide that we'll
17 talk about a little later, very high level, to provide
18 one slide on NRC's activities relative to geomagnetic
19 storms or geomagnetic disturbances. There were
20 several items that were provided by the ACRS
21 subcommittee members during the meeting for our
22 consideration on the paper. We'll talk about those in
23 a little bit and how we plan to capture those.

24 The staff is still on target for providing
25 an updated interim assessment by the end of May and a

1 final assessment by the end of December. Throughout
2 the process, we have public comments that we receive,
3 stakeholder comments, internal stakeholders, and also
4 the ACRS from the subcommittee meeting. The next two
5 slides show the 12 non-editorial comments that we
6 received that we're addressing.

7 Right now, the vision is that there would
8 be an appendix that would be added to the document,
9 Appendix D, that would list these items -- this is a
10 shorthand description -- and then show a proposed
11 disposition for each one of them. In some cases, it
12 will result in changes to the staff's assessment; in
13 others, it will point to it potentially being outside
14 the scope of the paper. But regardless, each one of
15 the issues will be described, and a resolution will be
16 described. Right now, we're thinking that will be in
17 Appendix D, with specificity. If you look at the
18 first five items here, we were aware of these first
19 five items before we talked to the subcommittee. We
20 briefed the subcommittee on what we were doing about
21 Item 4 and 5. Those were the low water level
22 evaluations, and that resulted in us sending the ACRS
23 an update at the end of April, showing where those
24 major changes were that we were considering as a
25 result of those comments. Starting with Item 6 --

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1 VICE CHAIRMAN CORRADINI: Could I ask you
2 about 4 and 5? I guess -- again, I wasn't there, so
3 low water level where?

4 MR. SEBROSKY: The low water level
5 evaluation that's in the SECY paper is not -- the
6 issue, when you look at Appendix B of the paper, is is
7 there something that could potentially fall outside of
8 the flood hazard re-evaluation report that licensees
9 are doing? One of the things that --

10 MEMBER STETKAR: Joe, I think he's asking
11 a more basic question, low water in what?

12 MR. SEBROSKY: So it's low water in the
13 ultimate heat sink, and it's based --

14 VICE CHAIRMAN CORRADINI: Versus 6, where
15 it just is gone.

16 MR. SEBROSKY: No. Yes. I was getting
17 Item 4 and 6 confused.

18 VICE CHAIRMAN CORRADINI: So 4, 5, and 6
19 are all for the same location, I guess, is what I was
20 trying to get at.

21 MR. SEBROSKY: That's correct; the
22 location being the plant. Item 6 is asterisked.
23 That's our shorthand for there's a longer description
24 contemplated for Appendix D, but that's the shorthand
25 that we took from the ACRS Subcommittee meeting. If

1 you go to the next slide, all the items on this slide
2 also came from the subcommittee meeting. As I
3 indicated, in some cases, it's going to result in a
4 change to the assessment. For example, Item No. 7, we
5 will be updating -- Appendix A is where we have a
6 discussion about volcanic ash at Columbia.

7 We will be providing additional
8 information about Columbia's capabilities and the
9 assumptions that it made, relative to by-products of
10 volcano, both for the design basis of that, and for
11 the FLEX department. Just as an example, that item
12 would have a disposition that changes were made to
13 Appendix A. Here's the issue, and these were the
14 changes that were made. Next slide.

15 VICE CHAIRMAN CORRADINI: Can I ask --
16 you'd have to go back to the list. These will be all
17 considered as items independent of frequency, or is
18 there a frequency cutoff -- sorry, I used the wrong
19 word. I'm sure I'll get chastised. Is there a
20 probably estimate cutoff that certain things are just
21 a low enough probability I'm not going to concern
22 myself with them?

23 MR. SEBROSKY: When you look at Appendix
24 A of the document that talks about the hazards, we are
25 talking about hazards that are beyond design basis

1 events, some of which don't lend themselves to
2 probability. There is an example in there that
3 meteorites, for example, were screened out because of
4 the probability. But for the most part, it's a
5 qualitative discussion that the staff provides as a
6 basis for either screening a hazard in for additional
7 assessment, or screening out in the first step.

8 VICE CHAIRMAN CORRADINI: And then you said
9 since --

10 PARTICIPANT: Microphone, please.

11 VICE CHAIRMAN CORRADINI: Sorry. It
12 didn't go green fast enough. I'm sorry. As natural
13 hazards, and the probability is hard to get a handle
14 on it, are some of these so general that they affect
15 the general infrastructure, just not the plant? The
16 geomagnetic storm one is the one that pops in my head,
17 but that's a different category?

18 MR. SEBROSKY: It is. We have a separate
19 slide on the geomagnetic disturbances. There's
20 certainly issues like volcanoes, where you can say
21 broadly --

22 VICE CHAIRMAN CORRADINI: I might want to
23 go to the nuclear plan because it's the safest place
24 to be?

25 MR. SEBROSKY: Yes. There's only plant

1 that we called down that needs additional assessments.

2 MR. SHAMS: All I wanted to add is to the
3 extent that we can calculate these event frequencies,
4 we include them in the assessments. We did that for
5 tornado. We're doing it for hurricane. When it's
6 difficult, as Joe is indicating, we try to
7 qualitatively look at the overall picture. Are we
8 talking about entire infrastructure of a state is gone
9 already, or half the country? We factored in in our
10 qualitative assessment.

11 VICE CHAIRMAN CORRADINI: Okay. So there
12 was some binning based on estimates of probability,
13 although hard to get a number?

14 MR. SHAMS: To the extent that we could,
15 yes.

16 MR. SEBROSKY: Slide 6 shows the four-step
17 process. This was the four steps -- if you go back to
18 SECY 15-0137, when we talked to the ACRS last year,
19 that culminated in the paper in October, Enclosure 1
20 is where evaluation of natural hazards was housed. It
21 was very short. It was only six pages, compared to
22 some of the other evaluations that were quite more
23 substantial.

24 This process was a process that we
25 outlined to the Commission that we would undertake to

1 assess natural hazards other than seismic and
2 flooding. The first was to define the hazards that
3 we're considering. The second was to apply screening
4 criteria to exclude some of those hazards on a generic
5 basis. If we could not do that on a generic basis or
6 it warranted additional technical evaluation, we moved
7 to Task 3.

8 Task 3, when we looked at -- when you look
9 at the paper, we've completed through Task 2 for the
10 white paper. Task 3 and 4 are something that we're
11 targeting to provide the Commission by the end of the
12 year. What we'll be talking about in future slides is
13 how some of these hazards screen out at the first two
14 tasks, and how some of them go on to Task 3 and Task
15 4. When we're looking at Task 3, one of the things
16 that will be considered as part of Task 3 is whether
17 or not we have a basis for issuing a 50.54(f) letter,
18 or if it's so safety significant that we would issue
19 an order, without issuing a 50.54(f) letter. There
20 isn't anything that we've seen right now that
21 warrants, from our perspective, an immediate safety
22 concern. We think we have time. Of course, if
23 something comes up during the evaluation of Task 3,
24 we're not going to wait for the paper.

25 We'll engage management and take the

1 appropriate steps. Task 4 is if we do issue a
2 50.54(f) letter and get information, Task 4 is very
3 similar to Phase 2 of the flooding and seismic
4 re-evaluations. You get the information, and then you
5 make a determination on whether or not additional
6 regulatory actions are needed. Next slide. This is
7 just a high-level result of Task 1.

8 These are the kinds of hazards that were
9 considered, and in some cases, what you see in
10 Appendix A is a short description on why we believe
11 the issue can be screened out at Step 1 of the
12 process. There's asterisks here on four items, two of
13 which, the external flooding and seismic activity, the
14 basis for them being screened out is the flood hazard
15 re-evaluations that are being done in accordance with
16 the March 12th 50.54(f) letter for those items. When
17 you look at geomagnetic storms or geomagnetic
18 disturbances and volcanic activity, there's a double
19 asterisk on those. There is additional justification
20 in the text of Appendix A when it comes to those
21 items. The next slide, if you could go to that, talk
22 about geomagnetic storms. The geomagnetic storms or
23 geomagnetic disturbances had a unique disposition.

24 Its disposition was essentially an
25 argument that it is not a Task 2 activity, that right

1 now, it's being captured as part of Task 1. When I
2 say it's being captured as not Task 1, it's being
3 captured as part of Tier 1 activities. The mitigation
4 of beyond design basis event rulemaking discusses
5 geomagnetic disturbances and references a petition for
6 rulemaking on this very issue.

7 When we issued the proposed rule for
8 mitigation of beyond design basis events, we
9 referenced this petition for rulemaking, and the staff
10 received several comments in response to the proposed
11 rule that we're in the process of assessing. The
12 argument for geomagnetic disturbances, when it comes
13 to this paper, natural hazards other than flooding and
14 seismic, is there's two other processes within the NRC
15 that are evaluating this issue, and there's a
16 mechanism for informing the Commission of the results.
17 With specificity, it's the MBDBE rulemaking, and also
18 the petition for rulemaking, the 50-96.

19 VICE CHAIRMAN CORRADINI: I'm sure the
20 subcommittee discussed -- mechanistically, something
21 occurs naturally that then fouls up the electrical
22 controls within the plant?

23 MR. SEBROSKY: Yes. The issue is
24 depending on the significance of the event -- and what
25 you see in Appendix A of the paper is a high-level

1 discussion of what the issue is and why we don't
2 believe there's an immediate safety concern. But
3 nevertheless, there is a concern that's being
4 followed. The issue, from a high-level perspective,
5 is that the geomagnetic storm could result in a
6 disturbance on the planet such that you use off-site
7 power, potentially damage safety-related equipment,
8 and cause a problem to the plant. That's the concern.

9 VICE CHAIRMAN CORRADINI: There's no
10 current IEEE standards for any sort of pulse like this
11 already for electrical equipment?

12 MR. SEBROSKY: So what's discussed and
13 understand, I am not an expert on geomagnetic storms,
14 so --

15 VICE CHAIRMAN CORRADINI: No, I'm just
16 curious.

17 MR. SEBROSKY: The issue, when you look at
18 the bullet on other federal activities, this issue is
19 broader than the Nuclear Regulatory Commission. The
20 federal family is looking at it. The Federal Energy
21 Regulatory Commission issued a proposed rulemaking
22 last year on how to protect the national grid from
23 geomagnetic disturbances. I'll look to Eric Bowman if
24 I misstate this.

25 One of the challenges that the NRC has

1 when it comes to addressing this issue is first,
2 identify what frequency and what level of disturbance
3 you're talking about, what other federal agencies,
4 such as the Federal Energy Regulatory Commission, is
5 doing to protect the grid, and if there's any gaps,
6 what the NRC has to do to protect the plant. It's
7 difficult. Our MBDBE rulemaking is going to be
8 informed by what FERC is doing. The response to the
9 petition is also going to be informed. Did I
10 accurately characterize that?

11 MR. BOWMAN: This is Eric Bowman. Again,
12 I'm a special advisor in the Japan Lessons Learned
13 division. To the extent that a potential geomagnetic
14 disturbance causes damage within the plant, the
15 rulemaking and the current mitigation strategies order
16 addresses, in part, the concerns that are expressed by
17 PRM 50-96. Where it doesn't completely address PRM
18 50-96 is looking to the potential for a large,
19 widespread effect over a long period of time on the
20 national grid that results in a loss of off-site power
21 and difficulties in resupplying all of the sites in
22 the nation, rather than just a single site.

23 We'll be looking at the issues in PRM
24 50-96 that pertain to that later on, after the actions
25 that are going on with the rulemaking by FERC and the

1 actions by the Space Weather Operations Research and
2 Mitigation Task Force, which is a national task force
3 being led by the White House Office of Science and
4 Technology programs, as it gets further along in their
5 actions. But we are following through on the
6 geomagnetic disturbances, and it will continue to be
7 followed through under the PRM, rather than the
8 rulemaking.

9 MEMBER SKILLMAN: I would like to make a
10 comment here. This is not an imaginary issue. Those
11 who have been at the plants know that when there are
12 solar flares, the transformers will react, and react
13 very strongly, and the higher potential, the greater
14 electrical induction, the more reaction you will see.
15 It affects the VARs, the volt act and reactive, that
16 affect how the plants balance the grid. So this is
17 very real. The outcome can be severe transformer
18 overheating or separation from the grid as a
19 consequence of the disturbance. Like Eric said, this
20 can be an event that leads to widespread loss of the
21 grid.

22 VICE CHAIRMAN CORRADINI: I think I
23 understand that part. I'm more curious about if , now
24 I've separated from the grid, what does this magnetic
25 storm do to equipment, and is there IEEE standards

1 that at least they ought to be capable of standing
2 something, and this something is higher than the
3 standard? You see what I'm asking?

4 MR. SEBROSKY: The argument that's in the
5 white paper is the staff looked at a nuclear power
6 plant in response to a congressional inquiry and drew
7 a circle around the nuclear power plant. One of the
8 things that the staff looked at was diesel generators.
9 If you do separate from the grid, what's the potential
10 for that geomagnetic disturbance to damage the diesel
11 generators?

12 There was some thought that because
13 they're protected behind concrete and would not
14 normally be running that they should be okay. What
15 the issue is, if you have the broader blackout that
16 lasts for a while, you need the diesel generators to
17 be resupplied with diesel fuel oil. Just because the
18 nuclear power plant rides out the geomagnetic
19 disturbance doesn't necessarily mean that the plant's
20 okay indefinitely.

21 MEMBER BROWN: Concrete doesn't
22 necessarily protect you from an EMP or geomagnetic
23 pulse or storm that you have to deal with. It's
24 shielding and other type things that'll protect you
25 from that.

1 MEMBER SKILLMAN: It's also everything
2 that is riding with inductive energy.

3 MEMBER BROWN: It comes down to a lot of
4 different things.

5 (Simultaneous speaking)

6 MEMBER SKILLMAN: -- telephone system;
7 it's communications; it's --

8 (Simultaneous speaking).

9 MEMBER BROWN: The Navy faced this some
10 years ago. We had to end up isolating all of the
11 connections. Anything that went above the main deck
12 you had to shield -- ground to ensure that not just an
13 EMP, but any other type major electromagnetic
14 interference wouldn't be coupled into the electric
15 plant, which then couples into the control systems,
16 which then shuts down the systems that allow you to
17 steer the ship or control it or make it go up and down
18 or shut down the plants. For the nuclear power
19 plants, it's a matter of coupling into the plant. If
20 you've got open cables that are not shielded, that
21 couple in, and they're not probably grounded, yes, you
22 can get stuff coupled -- won't just affect the
23 transformers, which is a major problem, but can also
24 take out all your controls.

25 It can also take out systems that a little

1 -- fiber optics isolates this stuff pretty well from
2 some standpoints, but if you've got any wiring-type
3 couple stuff going into the plants that goes into your
4 control systems for the reactor plant, then you've got
5 -- on the older plants, that would have been an issue.
6 On the newer plants, you have a little bit less of
7 that. Communications are the next item. You can lose
8 all communications outside the plant because that's
9 all RF stuff. It's a fairly big deal. It's just a
10 matter of how you characterize it.

11 MR. SHAMS: We certainly -- I'll just take
12 one second to sort of frame this slide. We put this
13 slide up just to provide the logic for why, in our
14 activity related to Tier 2 and Tier 3 recommendations,
15 we're recommending the closure of this activity just
16 in that track, but to give you reassurance that it is
17 tracked, and it tracked with focus from the staff in
18 other activities that we're working on. We understand
19 the interconnection of this activity between the
20 nuclear plant and the rest of the critical
21 infrastructure for the country. We just wanted to
22 relay that we're tracking it. We're following. We
23 have other activities that have taken place
24 recognizing the importance of the activity. This is
25 just for that reason.

1 MR. SEBROSKY: One other real quick thing
2 I'll offer is -- Eric already talked about this -- the
3 White House Office of Science and Technology Policy
4 leading the effort on a national space weather
5 strategy. We, the NRC, have representatives on that
6 task force. The individual that's on that task force
7 is a senior executive service member, and it's Jim
8 Anderson.

9 He was not available to come over here
10 this morning. He's at a site. He will be back here
11 in headquarters this afternoon, and he indicated that
12 if any member wants to talk to him about it, he can
13 come back over and let you know what that activity
14 encompasses. It is very much on the front end. There
15 was these two important papers that were issued in
16 October, but there isn't anything right now that the
17 NRC has an action on. I'll just look to Cathy, if any
18 member wants to take Jim up on his offer, to make sure
19 Jim's back over here. Slide No. 9, this is just the
20 results of Step 1 of the process. The proposal in the
21 white paper has all the hazards, with the exception of
22 these listed on this slide, would screen out at Step
23 1. That's high winds from tornadoes and hurricanes,
24 snow loads for roof designs, drought and other low
25 water conditions, and extreme temperatures.

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1 Those were the four things that moved on
2 to Step 2. This is a slide with the preliminary
3 results of Step 2. When you look at the white paper,
4 you'll note that we moved the wind and snow loads
5 right to Step 3. There's a paragraph that says we
6 need to do more of an evaluation. We did, in the
7 white paper, propose dispositioning low water
8 conditions and extreme temperatures as part of Step 2.

9 Next slide. There were three low water
10 conditions that were evaluated as part of Step 2,
11 drought, low water conditions due to a downstream dam
12 failure -- this is the Robinson item that was alluded
13 to in the earlier slide. The premise here we'll talk
14 about in a little bit, but it is what happens if you
15 have a sunny day failure of a robust dam. Non-robust
16 dams failing, downstream dams failing, are captured as
17 part of the mitigating strategies. The issue was
18 mitigating strategies did not assess -- it
19 fundamentally assumed that robust, seismically
20 designed dams would not fail. For the natural hazards
21 other than flooding and seismic, we looked at that.
22 Low water conditions due to a seiche, there's a
23 similar logic there that the flood hazard
24 re-evaluations looked at high water levels due to a
25 seiche, but did not assess low water.

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1 MEMBER SKILLMAN: Joe, let me ask a
2 question about low water conditions with a tsunami.
3 In several tsunamis that I'm aware of, the incoming
4 wall of water has been preceded by a fairly extended
5 -- extended in terms of time -- extremely low water
6 level, to where the ocean or the body has pulled out
7 to sea 16, 20, 30 feet of elevation, and that
8 condition has persisted for a couple hours -- 3, 4, 6
9 hours -- and then that water returns as a plate of
10 water that is the tsunami. How, or was, that tsunami
11 low water considered?

12 MR. SEBROSKY: We do not have a
13 description in the white paper on that. It was based
14 on discussions that we had with a hydrologist in our
15 NRO's division of siting and environmental assessment.
16 The discussions with the hydrologist were the coastal
17 plans in the United States are not susceptible to that
18 condition, so that's why it wasn't evaluated. There
19 is not an explicit statement in the paper, though. So
20 we did look at that.

21 MEMBER SKILLMAN: Thank you.

22 MR. SEBROSKY: the criteria that we
23 applied for all these conditions were conservatism of
24 design and operational limits and, if applicable, the
25 warning time. Next slide, please. There's only one

1 bullet on drought. We dispositioned drought as the
2 licensees would have sufficient warning time to take
3 appropriate actions before they got to a point where
4 there would be an issue with safety-related system
5 structures and components.

6 The low water level due to a downstream
7 dam failure, both this issue and the seiche were
8 identified by the staff needing more of a look to make
9 sure that there wasn't a need for additional
10 regulatory action. There's a March 11, 2016 letter
11 that's referenced that dispositions the sites that
12 have seismically qualified dams. It goes through a
13 process and essentially argues if it's non-seismically
14 qualified, it's assumed to fail, as far as making any
15 strategies. Seismically qualified dams are not
16 assumed to fail, but what happens if they fail due to
17 a sunny day dam failure? All sites screened out with
18 the exception of Robinson. What you see in the paper
19 is a discussion of the process that we used to look at
20 downstream dam failures, in general, how that led to
21 an additional look and risk assessments associated
22 with sunny day failures of seismically qualified dams,
23 and then the one plant that warranted additional
24 analysis is provided in the paper, and that's
25 Robinson.

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1 MEMBER STETKAR: Joe, could you explain to
2 me -- I had problems getting my hands around the
3 difference between the risk-informed assessments that
4 were done for that set of sites on downstream dams
5 that you're characterizing close out Task 2, and other
6 technical assessments that are going to be done for
7 things like snow loading and high winds that you're
8 characterizing as requiring a Task 3 vision. Why are
9 they conceptually different to me?

10 MR. SEBROSKY: To be honest with you, a
11 lot of it had to do with timing. The issue, when it
12 comes to these, plants, we believe we had enough
13 information that we could close issue out as part of
14 Task 2. When it comes to Task 3, we outlined a
15 process that we would use, what the issues are for
16 snow loads, and also for hurricane and tornadoes. The
17 logic that we would be applying as part of Task 3
18 envisions both potentially qualitative and
19 quantitative analysis.

20 MEMBER STETKAR: But what I was trying to
21 get at is -- let's take a situation where in Task 3,
22 you want to address an issue of, let's say, hurricane
23 missiles, and that you determine there's a subset of
24 sites, because of their locations, that might be
25 susceptible to that hazard -- they might be located

1 close to the Southeast of the U.S., close to a coast
2 -- and that you might, as part of that process, do
3 some sort of risk-informed assessment, in terms of the
4 likelihood of missiles striking a particular part of
5 the plant and determine that the likelihood is low
6 enough so that it doesn't justify any further
7 regulatory action. Conceptually, what's different
8 between doing that and what you did for the downstream
9 dam failures in the potential generic issue?

10 MR. SHAMS: I would say it wouldn't be
11 different. It's just a matter of what would be the
12 least, if you would, resource intensive -- the
13 shortest way to the answer. We'll start with
14 understanding margin built in these facilities. We'll
15 go further to understand administrative controls that
16 would actually eliminate that, and then we can get
17 into risk studies. For tornado, we have risk studies
18 already done. For hurricane, the industry has done
19 some, and we're seeking to understand what they've
20 done.

21 MEMBER STETKAR: I'm not probing how to do
22 the analysis. I'm probing the notion of -- I think
23 you're telling me that you've already done a Task 3
24 assessment for downstream dam failures, and you've
25 checked off the box that it's done. You haven't done

1 the Task 3 assessment for, let's say, hurricane
2 missiles.

3 MR. SHAMS: That's a true statement
4 because we benefited from the fact that the downstream
5 dam failure was a pretty generic issue that started
6 over a year and a half ago, so that's quite a
7 difference.

8 MEMBER RAY: Let me just note to the
9 members that on this slide here, the conclusion,
10 "Generic regulatory action to address downstream dam
11 failures is not warranted," basically what Joe's been
12 talking about. The question as to whether or not we
13 want to look, as a Committee, into that conclusion
14 further is due to be discussed at PNP tomorrow,
15 separately from this presentation here. I'm not
16 wanting to introduce that discussion into the
17 presentation that's made here, but we were asked that
18 question, and we will talk about what our interest is
19 in pursuing that further tomorrow.

20 MR. SEBROSKY: One of the things that you
21 see in the paper, that was discussed in the session
22 earlier on, that's a shorthand conclusion, downstream
23 dam failures are not warranted. There are non-trivial
24 activities that are continuing as part of the NTTF 2.1
25 recommendation. What you see when it comes to

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1 Robinson, as an example, and it was discussed this
2 morning, Robinson has a non-trivial change in ground
3 motion response factor. It's not a plant that's
4 unique in that manner.

5 The seismic that's being done for that
6 plant, is that going to also assess the downstream dam
7 as part of the seismic PRA. Next slide. Low water
8 conditions due to a seiche. This, again, is another
9 pre-generic issue that was identified by the Region 3
10 regional administrator. The concern, when you look at
11 the March 18th letter, if you pull that up, you would
12 see that the regional administrator and her staff were
13 particularly concerned about the plants along Lake
14 Michigan because they were in a drought condition at
15 the time. When they started looking at the FSARs for
16 some of those plants, they noticed that flooding due
17 to a seiche were assessed, but low levels weren't.
18 The concern is that if you start with a low water
19 level and you throw a seiche on top of that, as it
20 oscillates back and forth in a Great Lake, you would
21 get to such a low water level that you would lose net
22 positive suction head to the safety-related ultimate
23 heat sink pumps and either air bind the pump or damage
24 the impeller.

25 That's the concern that the Region 3

1 regional administrator laid out in her letter
2 suggesting that NRC staff needed to take a closer look
3 at it, which is what we do in the paper. We took over
4 the pre-generic issue. The white paper, we evaluated
5 plants along the Great Lakes and the Chesapeake Bay.
6 I don't mention the Gulf of Mexico.

7 We also looked at the Gulf of Mexico
8 plants in the white paper that was discussed in front
9 of the ACRS Subcommittee. We concluded that the two
10 plants along the Gulf Coast did not rely on the Gulf
11 for a safety-related heat sink. They had impoundment
12 ponds. What the staff evaluation looked at -- when we
13 go to the next slide -- just hold on a second -- there
14 was an ACRS comment on we need to look more broadly
15 than just the Great Lakes, Chesapeake Bay, and the
16 Gulf of Mexico. The evaluation that we discussed with
17 the subcommittee, what we looked at is whether or not
18 a site had 24 hours of on-site water supply. If it
19 had 24 hours of on-site water supply, where it didn't
20 have to rely on the Great Lake or the Chesapeake Bay,
21 we felt confident that after that amount of time, the
22 ultimate heat sink should be available for it to get
23 heating removal capabilities.

24 The mitigating strategies equipment, in
25 that case, would allow the plant to ride out the

1 problems with the ultimate heat sink. There were some
2 plants that didn't have a 24-hour water supply, so we
3 looked at their ultimate heat sink closer and made a
4 determination in some cases. That review is
5 continuing, so there's been adjustments to the paper
6 since the April 26 paper that we looked at plants and
7 the intake structure.

8 If the intake structure goes out a quarter
9 of a mile, and it's such that there's enough net
10 positive suction head to ride out any combination of
11 low water level, plus a seiche on top of that, that we
12 would conclude that plant is okay. The preliminary
13 conclusion for all the plants is additional regulatory
14 action to address low water level conditions due to
15 seiche is not warranted. If you go to the next slide
16 --

17 MEMBER STETKAR: Joe, I just want to make
18 sure, for clarity, I think in the April 26th version
19 of the paper that we've had, anyway, you've clarified
20 that the intent on this particular issue is that
21 anything that's documented in the paper that
22 eventually winds its way to the Commission will be
23 used to close out that proposed generic issue, as
24 compared to the downstream dam failure, where there's
25 a separate documentation enclosure of that issue. Is

1 that correct? In the original version that we saw for
2 the subcommittee meeting, it seemed to say that they
3 were kind of continuing in parallel, but everything is
4 now focused on this particular paper, is that right?

5 MR. SEBROSKY: The paperwork has not been
6 completed, but that is the thought, that the generic
7 issue review panel would close out their activity
8 based on our work.

9 MEMBER STETKAR: Based on your work? So
10 that will be -- whatever's in this paper that goes up
11 to the Commission will be the entire documentation to
12 close out that issue?

13 MR. SEBROSKY: That's correct. That's the
14 proposal; whether or not the generic issue review
15 panel agrees to that is a different matter. Slide 14,
16 we did -- and you see some of these changes in the
17 redline/strike out that you've been provided --
18 similar to the Robinson low water level conditions,
19 when we talk about the 24-hour water supply or
20 pressurized water reactor, in particular, we were
21 concentrating on the steam generators because that is
22 typically where you run out of water first. We're
23 adding additional discussion on the primary side to
24 demonstrate that we looked at the water supply for the
25 primary side.

1 MEMBER STETKAR: Joe, did you think about
2 loss of cooling water, for example, for ventilation
3 systems, chilled water -- the ultimate heat sink for
4 chilled water systems that provide ventilation for the
5 rest of the plant, cooling for that type of stuff?

6 MR. SEBROSKY: There was a concern that
7 was expressed -- and that's why you get to the use of
8 low leakage reactor coolant pump seals -- that if you
9 do not have the low leakage reactor coolant pump
10 seals, the concern on the primary side is a loss of
11 cooling capabilities to either the room, or the sealed
12 cooling that normally would be provided by pumps that
13 have power supplied to them by safety-related buses,
14 that if you lose cooling to the pump seals or to the
15 rooms that house the equipment, it's not just that you
16 have a safety injection pump that's pumping water to
17 cool the pump seals. You fundamentally assume if you
18 lose that, you have an issue. You could also lose
19 room cooling to that safety-injection pump. That
20 could cause a problem, such that you lose the reactor
21 coolant pump seal and the mitigating strategies would
22 not be able to compensate for the leakage from a pump
23 seal that fails.

24 What we looked at, to answer your question
25 directly, is can you maintain containment, can you

1 maintain reactor, can you retain the fission product
2 barrier for the fuel? We made a determination that
3 you did not need those support systems for these
4 scenarios. The spent fuel pool, we fundamentally made
5 an assumption that they have enough water in the spent
6 fuel pool to ride out 24 hours without make up.

7 MEMBER STETKAR: I guess I'll be
8 interested to see what you did and what you didn't do.
9 Because I specifically asked you questions that would
10 affect ventilation, that might also affect
11 instrumentation and control power supplies. You
12 focused on reactor coolant pump seals, which is one
13 thing that might be affected. There might be others.
14 So that's why I wanted to make sure that whatever's
15 documented in this paper will be the sum of the
16 analyses that were done to close out this issue --

17 (Simultaneous speaking).

18 MR. SEBROSKY: As part of the mitigating
19 strategies, there is an assessment -- if you lose --
20 Stew, you can correct me if I'm wrong. As part of the
21 mitigating strategies compliance with the order and
22 eventual compliance with the rule, a plant has to
23 demonstrate that it can remove decay heat both from
24 the spent fuel pool and from the reactor, and maintain
25 containment, given the loss of the ultimate heat sink,

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1 and also extended loss of AC power. That does look at
2 whether or not instrumentation is affected. Did I say
3 that correctly, Stew?

4 MR. BAILEY: You did. This is Stewart
5 Bailey. I'm one of the branch chiefs in the JLD.
6 What you're talking about here is part of the staff's
7 overall evaluation of mitigating strategies. It does
8 take a look at loss of heating and cooling around the
9 plant, and looks at the functionality of all the
10 equipment that's relied on for the mitigation
11 strategies.

12 MEMBER STETKAR: So in this case, we're
13 dismissing the hazard because we have assurance that
14 flex is going to protect us?

15 MR. BAILEY: That's correct.

16 MEMBER STETKAR: Okay, thank you.

17 MR. SEBROSKY: So if you can go back to
18 the slide, there was one other thing. The last bullet
19 on this slide, I just wanted to touch on briefly. One
20 of the ACRS member comments was we should look at the
21 Atlantic and Pacific coastal plants. There are plants
22 that are connected to the ocean and there's a bay
23 between, Biscayne Bay, for example.

24 For Turkey Point, there's a bay between
25 the plant and the ocean, and whether or not that bay

1 would be susceptible to a seiche. For every plant
2 along the Atlantic and the Pacific, we're adding an
3 evaluation to look at that condition. Preliminarily,
4 the determination is they are not susceptible to an
5 appreciable seiche or the safety-related ultimate heat
6 sink is not tied to the bay.

7 The next slide, one of the other things
8 that was looked at, we talked about low water level
9 conditions. The other task that was looked at as part
10 of Task 2 is extreme temperatures. We looked at both
11 high and low temperatures. This slide talks about the
12 evaluation for extreme high temperatures. The staff
13 considered tech specs and, essentially, operability
14 determinations that licensees are compelled to do if
15 they see temperatures that are outside their design
16 basis. We concluded that additional regulatory
17 actions are not needed because of those controls. In
18 addition, the last bullet talks about the mitigating
19 strategies equipment as part of NEI 12-06, both the
20 procurement and the operation is to consider high
21 temperature conditions.

22 Next slide, please. For extreme low water
23 level conditions, it is a very similar logic as
24 extreme high level conditions -- extreme temperature
25 conditions, the extreme low, the logic for that is

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1 very similar to the extreme high temperature
2 conditions. That is that plants that are experiencing
3 outside beyond design basis temperatures are expected
4 to take action.

5 There are additional references in the
6 evaluation that talk about information notices,
7 generic communications that we've issued in the past
8 on problems that we've seen with plants due to icing,
9 including frazil ice. Two of the information notices
10 are referenced. That is background that there are
11 existing regulatory processes that continue to look at
12 these types of events and make determinations on
13 whether additional regulatory action is needed.
14 Again, the last bullet on here talks about the
15 mitigating strategies equipment is expected to
16 consider potential impacts on low temperature. The
17 preliminary conclusion is that additional regulatory
18 action for extreme temperatures is not warranted.
19 Next slide.

20 MEMBER SKILLMAN: Joe, would you go back
21 to 15, please? At the last bullet, you have the
22 phrase, "Both procurement and operation," and then on
23 16, you have that same item at the fourth bullet.
24 What do you mean when you write procurement on each of
25 those slides, please?

1 MR. SEBROSKY: I'll look to Eric Bowman if
2 I say anything incorrectly, but when you look at NEI
3 12-06, there is specific guidance that when you
4 procure a pump, for example, that the temperature
5 range for that pump that you procured can work in the
6 environment that you're expected to see. That's the
7 same thing for the operation. When you go to operate
8 the equipment, it has the ability to operate in hot
9 weather or cold weather conditions.

10 MEMBER SKILLMAN: I was thinking when I
11 saw that that it meant procurement of fuel oil and
12 other expendables that you need to operate the plant
13 through what could be dismally extended low
14 temperature conditions, how you bring on your tractor
15 trailers to get your fuel oil. Because if you're
16 running your diesel engines or your boilers, you need
17 that oil. I thought that's what you meant, so that's
18 not it. You're saying that's the design spec for the
19 low temperature for the facility?

20 MR. SEBROSKY: I believe it also considers
21 the operation. If you look at the -- there's specific
22 discussions in there for the cold weather conditions
23 that if you're also experiencing snow and you need to
24 move a flex diesel generator, that you have the
25 capability to get the diesel generator out of the

1 Phase 2 storage area to where it needs to go. I
2 believe it also would encompass the diesel fuel oil
3 that goes with that, that that'll work in those
4 temperature conditions.

5 MEMBER SKILLMAN: Thank you, Joe. Thank
6 you.

7 MR. SEBROSKY: The next slide is a
8 discussion about Step 3 of the assessment. There were
9 two issues that are evaluated in Step 3 of the
10 process. That's snow loads and high winds from
11 hurricanes and tornadoes. The staff identified these
12 issues because in both cases, new guidance had been
13 provided in these areas that was promulgated after the
14 current operating fleet began operation. The
15 preliminary assessment includes a discussion of the
16 issues and the staff's preliminary process for
17 evaluating the issue. The target, again, for
18 completing the assessment is the end of December. For
19 snow loads, the new guidance that we're evaluating the
20 current operating fleet against is ISG 7.

21 It was issued in July of 2009 as a process
22 for calculating 100-year snow loads, and then
23 combining that 100-year snow load with an extreme snow
24 load. The assessment that we're doing is looking at
25 the current operating fleet against that guidance.

1 One of the things that we mention in the paper as part
2 of this assessment, we will look at the design
3 conservatism and warning time associated with this
4 hazard as part of the evaluation to determine if
5 additional regulatory actions are needed.

6 When it comes to wind and missile loads
7 from hurricanes and tornadoes, it's a similar story.
8 There's new guidance that was promulgated for
9 tornadoes in 2007, and for hurricanes in 2011. Reg
10 Guide 1.76, Rev. 1 is the updated tornado guidance.
11 The wind speeds actually went down, or generally went
12 down for the majority of the sites. However, when you
13 look at the missile spectrums, which are different,
14 there's three missiles in Reg. Guide 1.76, Rev. 1, and
15 the previous guidance had several different missiles.
16 Even though the wind speed went down for the majority
17 of the missiles, there were some cases where the
18 automobile missile speed went up. Next slide. Reg
19 Guide 1.221 is the hurricane guidance. In general,
20 the hurricane wind speeds are bounded by tornado wind
21 speeds.

22 We showed a graph at the subcommittee
23 meeting. That's the case for the majority of the
24 operating plants, with the exception of the plants in
25 Florida. The hurricane wind speed for the plants in

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1 Florida is higher than the tornado warning guidance.
2 The hurricane missile speeds, even though the
3 hurricane wind speeds are generally less for a given
4 site, the missile speeds, when you look at the
5 missiles, went up.

6 That is because the hurricane generated
7 missile has a longer time in the wind field and has a
8 chance to come closer to the hurricane wind speed than
9 it would in a tornado wind field. Our assessment that
10 we're doing is broken into two generation of plants.
11 There were different criteria for -- we call it the
12 pre-general design criteria plants, essentially plants
13 that were licensed prior to 1970, prior to the 1975
14 version of the standard review plan. Because they
15 have different capabilities, we're separating those
16 two generation of plants out as part of our
17 assessment. Looking forward, as part of Task 3, the
18 IPEEEs that were done in the '80s and '90s, we are
19 going to take advantage of those to see if we can gain
20 any insights, and we're also looking to take advantage
21 of current activities with high wind studies that are
22 ongoing.

23 When it comes to hurricanes, which we
24 believe have much longer lead times, as far as warning
25 goes, than tornadoes, we also want to gain a better

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1 understanding of what licensees do to minimize the
2 potential for missile generation prior to hurricane
3 winds being received on site. Again, the target is to
4 provide a completed assessment by the end of the year.

5 MEMBER STETKAR: Joe, something I actually
6 just thought about. Earlier, you said you're taking
7 credit for flex mitigation as a way of disposing of
8 some of these external hazards that you have on your
9 list. I haven't heard much about flex shelter being
10 protected against high winds and high-wind missiles.
11 Are you also looking at that, or are you just looking
12 at -- because you mentioned IPEEE, as well. I didn't
13 have any flex equipment back in the '90s. Will that
14 be part of your assessment, also, for these? Because
15 then you'll have to look at a broader scope than just
16 looking at what somebody did in their IPEEE.

17 MR. SHAMS: I'll get that question. Part
18 of the design criteria for mitigating strategies
19 equipment in 12-06 is to look at high wind and look at
20 tornado and hurricane as appropriate to these sites.
21 Your observation that we have not brought that into
22 the discussion yet, for instance in snow and
23 hurricane, is true. We're doing an earnest job just
24 to understand the risk and the hazard to the sites,
25 and then as we close the issue, we would be including,

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1 also, the fact that mitigating strategies are there to
2 take care of the plant.

3 MEMBER STETKAR: Thanks, Mo. I just
4 wanted to make sure that I had a picture of what you
5 were going to be looking at. Thank you.

6 MR. SEBROSKY: The only thing that I would
7 add is when you look at NEI 12-06 with specificity, it
8 says if you're in a plant that's susceptible to snow,
9 there's specific guidance on what the Phase 2 facility
10 should be designed to. Similarly, when it comes to
11 hurricanes and tornadoes, there's specific guidance
12 for where the Phase 2 equipment is stored to protect
13 it against those hazards. The last slide is -- we
14 are, right now, in the process of making adjustments
15 based on concurrence, comments we're receiving
16 internally on the document, and also based on the ACRS
17 feedback that we heard from the April 21st meeting.
18 We believe we're still on target for providing the
19 Commission a product by the end of May, and then the
20 completed assessment will be due to the Commission by
21 end of December. We believe that we will need to
22 engage the ACRS again in the fall on the Task 3
23 assessments. That's all I have.

24 MEMBER STETKAR: Thank you. Any members,
25 questions for the staff? If not, thanks a lot. You

1 covered a lot of stuff very efficiently. We're going
2 to get the external phone lines open. While we're
3 doing that, I'll ask if there's anybody in the room
4 who has a comment that you'd like to make? Please
5 come on up to the mic and do so. I heard the telltale
6 noise in our speakers, so if there's anyone on the
7 bridge line, first of all, just do me a favor and say
8 hello or something like that, so that we know you're
9 out there and can hear you.

10 MR. LEWIS: Hello, this is Marvin Lewis.

11 MEMBER STETKAR: Thank you, Marvin. Now,
12 if there's anyone who would like to make a comment,
13 please identify yourself and do so.

14 MR. LEWIS: I sure would like to make a
15 comment, maybe it's more of a question, I'm not sure.
16 I've been worried for a long, long time about
17 something very simple. Namely, in a reactor, you have
18 an accident, whatever it is, water, wind damage, who
19 knows? Sure enough, the reactor's operating. It
20 suffers some kind of a problem. Now, here's my
21 question. It's had a problem. It's operating at
22 criticality. How long does that criticality continue
23 after it's damaged, or does it stop immediately? What
24 is your calculation? I can't find it in whatever.
25 Thank you.

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1 MEMBER STETKAR: Thank you. Are there any
2 other members of the public who'd like to make a
3 comment? If so, just speak up. Identify yourself.
4 Hearing none, we'll reclose the bridge line. Again,
5 thanks to the staff, and I'll turn the meeting back to
6 you, Mr. Chairman, this time early.

7 CHAIRMAN BLEY: Indeed, you are. Thank
8 you very much --

9 (Simultaneous speaking).

10 MEMBER STETKAR: On average, I'm ahead of
11 the game by 17 minutes. That's all I --

12 CHAIRMAN BLEY: That's true.

13 MEMBER STETKAR: You owe me.

14 CHAIRMAN BLEY: At this point, we will
15 recess for lunch and return at 1:00 to consider the
16 NuScale topic report on risk significance
17 determination. We are recessed until 1:00.

18 (Whereupon, the above-entitled meeting
19 went off the record at 11:27 a.m. and resumed at 1:02
20 p.m.)

21 CHAIRMAN BLEY: The meeting will come to
22 order. We're going to proceed to the NuScale Topical
23 Report, and I'll turn it over to Professor Corradini.

24 VICE CHAIRMAN CORRADINI: Thank you. So
25 we're here today to talk about a licensing topical

1 report regarding risk significance determination, so
2 little background for the committee.

3 We had a subcommittee meeting on March the
4 1st, where NuScale who now is online, they're not
5 physically here present, but NuScale presented their
6 LTR on the risk significance, which implies that what
7 they have is an approach which is different than the
8 normal approach to determine candidate lists of risk-
9 significant SSCs for the D-RAP program.

10 MEMBER RAY: Sorry, what? LTR please?
11 You said they presented their LTR. That's an acronym
12 for --

13 VICE CHAIRMAN CORRADINI: Their license
14 topical report.

15 MEMBER RAY: License topical report, thank
16 you.

17 VICE CHAIRMAN CORRADINI: No problem.

18 MEMBER STETKAR: And as long you're
19 speaking in acronyms, Mr. Thermal Hydraulics, D-RAP?

20 VICE CHAIRMAN CORRADINI: Design
21 Regulatory Assurance --

22 MEMBER SKILLMAN: No, Reliability.

23 VICE CHAIRMAN CORRADINI: -- Reliability
24 Assurance Program.

25 MEMBER SKILLMAN: Design Reliability.

1 VICE CHAIRMAN CORRADINI: Thank you,
2 everybody. So the topical report is a proposal by
3 NuScale on a different approach to determine their
4 risk significance SSE candidate list, okay, which I'm
5 sure the NRO folks will explain in better, for
6 tonight.

7 But I just wanted to at least to get
8 across that we had our subcommittee meeting on March
9 the 1st. There were some changes made to the SE so we
10 delayed our consideration in full committee, and the
11 SE you now have in front of you is the final SE from
12 the staff on this license topical report.

13 So let me turn it over to Omid Tabatabai, and
14 you will lead us through this.

15 MR. TABATABAI: Thank you so much, Dr.
16 Corradini. I thank you. Thank you. Thank you. I
17 think you summarized everything very nicely. Thank
18 you very much for making my job easier.

19 MEMBER POWERS: You realize that when you
20 say things like that and I have to sit next to him, he
21 gets the big head.

22 MR. TABATABAI: Well, we can switch --
23 (Laughter)

24 MR. TABATABAI: Well, as mentioned we
25 received some recommendations from the subcommittee to

1 qualify some paragraphs in the draft SER we completed,
2 and we sent you a final SER. Beyond that I won't talk
3 about it and I'll turn the microphone to our PRA
4 analyst, senior PRA analyst Mr. Caruso.

5 MR. CARUSO: Thank you, Omid. So, if we
6 can have the second slide, so I guess what I thought
7 I would do since I think maybe there's some members
8 here that probably weren't here for subcommittee --

9 CHAIRMAN BLEY: We had about four of us
10 were physically here, so I think if you can give us a
11 little bit of a --

12 MR. CARUSO: So I thought I would give you
13 a brief summary, for the new members, of the topical,
14 and NuScale did this at the subcommittee meeting but
15 they're not, you know, the folks are not here.
16 They're on the phone.

17 But I'm going to try and make this quick.
18 So if you go to Slide 3, as Dr. Corradini said,
19 NuScale has proposed a, this is a brilliant topical
20 report proposing some new criteria or revised criteria
21 for assessing the significance.

22 And the criteria are different from the
23 ones that are documented in Reg Guide 1.200 that have
24 been used by the operating reactors for maintenance
25 rules stuff and also been used by the large light-

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1 water reactors.

2 And they're proposing to use a more absolute
3 measure of risk significance than a, you know, a
4 factor beyond some baseline in sensing that I look at
5 how much increase I have in a core damage frequency or
6 large release frequency and set a threshold on that
7 parameter as opposed to a relative parameter of like
8 two times this or three times that. And they've also
9 done the same thing for the Fussell-Vesely importance
10 measure.

11 But here they have stuck with an actual
12 importance measure, but scaled it to match their
13 projected core damage frequency and large release
14 frequency which are expected to be quite a bit lower
15 than the operating reactors.

16 And so in the next slide, as I said, the
17 current criteria were developed for operating reactors
18 back some time ago and sort of implicitly based on the
19 generic core damage frequencies that they have of
20 around 10^{-5} to 10^{-6} .

21 So NuScale has been showing in their PRA
22 analysis that their core damage frequency is expected
23 to be below 10^{-7} and appears to be
24 getting lower every time I talk to somebody.

25 And so it turns out that the original

1 importance measures in criteria essentially have
2 buried in them the, essentially based on the typical
3 core damage frequencies for the older reactors. And
4 what it means is, is that for the, if we use those
5 criteria with very, very low core damage frequency,
6 you end up identifying, you end up having a much
7 different absolute increase in risk associated with
8 the assumption of a 5th component.

9 And the way we do these things is they
10 say, you know, they look at a component and they say,
11 well, what if I completely fail it? That's the
12 conditional part. Conditional on assuming it's
13 completely failed, what happens to the core damage
14 frequency? How high does it go?

15 And so NuScale said I'm going to use a
16 criteria that's based on that value. And if you look
17 at what that value would be for the operating reactors
18 based on the numbers they use it's about in the 10 to
19 the minus 5 per year range.

20 So to get a value that's, you know, near
21 that for NuScale that they would have to use, you
22 know, a much, much different value of importance
23 measure than what the operating reactors are using.

24 So they're saying, you know, the important
25 thing is, is the absolute increase in core damage

1 frequency when I assume the component has failed. So
2 that's the criteria I want to use. I don't want to
3 use the relative number.

4 And these are because if they were to just
5 do it the old way with the old comports measures they
6 would in fact be identifying, probably identifying
7 things that weren't truly risk significant.

8 MEMBER STETKAR: Mark, if I take out a
9 calculator and can divide the difference between $1E$ to
10 the minus 7 and $3E$ to the minus 6, to me is a factor
11 of 30.

12 So I understand people want to call a
13 number a number and people want to call a different
14 number a different number, but I don't understand the
15 fundamental difference between saying I'd like to
16 achieve a factor of 30 in increase in my core damage
17 frequency versus a $3.000E$ to the minus 6.

18 And philosophically I don't understand why
19 there's a difference between those two.

20 MR. CARUSO: I don't understand your
21 question.

22 MEMBER STETKAR: Yes, I was afraid of
23 that.

24 VICE CHAIRMAN CORRADINI: Feel free to
25 expound.

1 MEMBER STETKAR: I will. If my core
2 damage frequency is 1.00E to the minus 4, and I have
3 a risk achievement worth of 2, which is interpreted as
4 a relative measure, it says that I can increase my
5 core damage frequency to 2.000E to the minus 4 --

6 MR. CARUSO: Yes, I understand that.

7 MEMBER STETKAR: -- which is an absolute
8 number. If I have a core damage frequency of 1E to
9 the minus 7 and I have a risk achievement worth of 30,
10 I can increase my core damage frequency to 3.000E to
11 the minus 6. That's math.

12 MR. CARUSO: Yes.

13 MEMBER STETKAR: Okay.

14 MR. CARUSO: I understand that.

15 MEMBER STETKAR: It's not a fundamentally
16 different concept, so I don't understand why we're
17 arguing about is this an absolute measure that we're
18 approving or is it a relative increase?

19 MR. CARUSO: Right. We both understand
20 what's going on here and if you don't want to call it
21 absolute that's fine with me.

22 MEMBER STETKAR: Okay.

23 MR. CARUSO: You know, the reason I think,
24 you know, it was never an absolute, right? There is
25 something beyond it, which is really, the 10 to the

1 minus 5, the 3 times 10 to the minus 6, they're really
2 sort of anchored to the safety goals. That's the
3 absolute here if you want to get to absolute.

4 And those aren't even absolute, you know,
5 you could be fatal when you have different safety
6 goals. So, no problem.

7 MEMBER STETKAR: Okay.

8 MR. CARUSO: So let's see, where were we
9 here? So anyway, so yes, what are these numbers based
10 on, the 10 to the minus 5 or 3 times 10 minus 6, why
11 did you choose those as your threshold for risk
12 significance?

13 And basically what we have, the staff has
14 developed Reg Guide 1.174 and it is sort of the
15 official guideline on where we think changes in risk
16 become significant in terms of frequencies, core
17 damage frequencies and large release frequencies.

18 So these numbers, 10 to the minus 5, 3
19 times 10 to the minus 6 are in line with that and so
20 that's the basis that NuScale provided in their
21 topical report and it's the basis that we were fine
22 with the thresholds that they proposed.

23 They also discussed a component, a system
24 level importance measure over a component level
25 importance measure, and they developed it using the

1 same approach and basis as the current industry
2 practice in NEI 00-04 which is an industry document
3 that I'll talk about a little bit more later on
4 assessing risk significance of sister structures and
5 components using PRA and other deterministic factors
6 that is being utilized for the application of 10 CFR
7 50.69 which is about ranking and categorizing SSCs
8 according to risk and safety.

9 So if we go to Slide 6, so this is a
10 summary of what's the findings that we have in the
11 safety evaluation report. So this idea of using, you
12 know, a threshold that's a core damage frequency, a
13 large release frequency, a threshold on that, a
14 conditional threshold there as opposed to using an
15 importance measure, it's fine with us because the two
16 are related. There's an equation.

17 So, you know, if you wanted to put a
18 component in your PRA and see whether or not the core
19 damage frequency goes above a certain value that
20 that's fine with us, you know, as long as we're happy
21 with the threshold you're using. If you want to
22 develop a threshold in core damage frequency and then
23 derive an importance measure to stick in your code
24 that's okay too.

25 VICE CHAIRMAN CORRADINI: So can I ask

1 you, I'm not sure if you're at the third bullet or
2 not, but I have a question about the third bullet
3 which intrigues me. So maybe I'm misunderstanding the
4 third bullet.

5 The third bullet leaves me to gather, or
6 when I read the SE I got a different impression than
7 what I'm seeing in the third bullet. So could you
8 explain the third bullet to me about importance
9 measures may be scaled?

10 MR. CARUSO: Yes. So in this scale I'll
11 say, you know, I want to use just the criteria, the 3
12 times 10 to the minus 6, and which I believe, I think
13 they've told me this, you know, that's what they're
14 going to do in their code.

15 I mean, they're going to calculate the
16 change and they're not going to use an importance
17 measure. Now they could do an importance measure, and
18 I think, you know, when they do these calculations it
19 seems to me you put 1.0 to the fairer probability, you
20 actually calculate core damage frequency, that's what
21 these PRA models do, and then they divide it by, you
22 know, the original core damage frequency and look at
23 the relative result.

24 And they say, oh, now I can compare that
25 with my RAW value of 2.0. So it's one and the same

1 thing. So what they're saying is, if I were to use a
2 RAW I should need to derive one that gives me the same
3 amount of risk increase, the same risk increase as I
4 would for operating reactors because I want to be the
5 same as them in terms of actual risk.

6 VICE CHAIRMAN CORRADINI: So, okay.

7 MR. CARUSO: So the scaling part is if
8 you're going to use, you know, the numbers that are in
9 Reg Guide 1.200 are relative numbers, 2.0.005. So if
10 they had come in and said, well, we don't want to use
11 those, we want to use different ones, that would have
12 been fine and they would have said, okay, we're going
13 to scale to the new ones so that what I hold constant
14 is the threshold on risk increase I would get so that
15 operating reactors would, you know, threshold would be
16 the same or almost the same.

17 Actually this scale is proposing something
18 conservative. Operating reactor is saying, my
19 threshold in core damage frequency is 2 times 10 to
20 the minus 5 and so if I'm going to use RAWs and
21 Fussel-Vesselys to do the implementation, I need
22 values of 2 and 0.005.

23 If NuScale is going to do it with a core
24 damage frequency of 10 to the minus 8th, then they
25 need to use different RAWs and Fussell-Veselys to get

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1 to the same place.

2 VICE CHAIRMAN CORRADINI: Okay.

3 MR. CARUSO: That's where the scaling part
4 comes in. But they're saying for RAW, I don't want to
5 use a RAW. And we're saying, you know, that's fine,
6 if you didn't want to use one, you know, you can
7 derive one, you know, with your threshold.

8 VICE CHAIRMAN CORRADINI: So let me try it
9 with numbers just to help me and so you tell me where
10 I'm misinterpreting, because when I read your third
11 bullet, here, and I read the SE, they seem different.
12 So let me try an example and you tell me where I'm
13 misunderstanding.

14 So to put it in relative terms, absolute
15 relative, you're right, it's kind of interchangeable.
16 Right now NuScale is saying, if my total CDF were 10
17 to the minus 7th, then on a component basis I would
18 look at a RAW of 30 before I start getting worried,
19 before it would rise to the level of risk
20 significance.

21 MR. CARUSO: Right.

22 VICE CHAIRMAN CORRADINI: Okay. Now the
23 way I read the third bullet here, and you correct me
24 if I'm wrong, is the staff is all right with some sort
25 of scaling that would scale at 30 at 10 to the minus

1 7th and scale back to 2 at 10 to the minus 5th. Am I
2 misinterpreting?

3 MR. CARUSO: No. Okay. I don't --

4 VICE CHAIRMAN CORRADINI: Okay.

5 MR. CARUSO: Staff, as far as the staff is
6 concerned they're fine with that. And if NuScale were
7 to come in for the application for D-RAP and say,
8 okay, here's our D-RAP stuff and we're referencing our
9 topical report, and guess what, you know, we found out
10 for some odd reason that we were really confused about
11 our design.

12 And or, you know, for some reason they put
13 it on a fault line or whatever that that core damage
14 frequency is back down to the operating reactors, and
15 we would say you probably need to scale back to
16 something and you need to use 3 times 10 to the minus
17 6 not 2 times 10 to the minus 5 to do the scaling
18 because that's what in your report. That's your
19 method. Scale up, scale down.

20 So now what NuScale said it last time at
21 the last meeting was that I wasn't taking their
22 approach. And they were saying I've already thought
23 about going to, already thought about scaling to core
24 damage frequencies that were lower because I know
25 that's where I'm going and I never really thought

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1 about going the other way, and so if I had to go back
2 I would just use what operating reactors do. That's
3 what they said, but that's why you felt it was ad hoc.

4 Go ahead, I'm sorry.

5 MEMBER STETKAR: Yes, I was going to say
6 so let's take, as we've discussed in the subcommittee,
7 the condition where they've reevaluated, they have the
8 final design, they did their complete PRA, and their
9 core damage frequency comes out to be 3 times 10 to
10 the minus 6.

11 And that to me says every piece of
12 equipment in their plant is risk significance because
13 if I fail anything, guaranteed, it will put me above
14 3 times 10 to the minus 6, guaranteed. So every piece
15 of equipment in their plant would be in their D-RAP
16 box according to this.

17 And you're saying no, if they're going to
18 apply a sliding scale that wouldn't be the case, and
19 they certainly wouldn't want that to be the case. So
20 so that's where we get into this notion of
21 arbitrariness of what do people do if, in NuScale's
22 case right now, their core damage frequency is 3 times
23 10 to the minus 6?

24 How do they populate their D-RAP box,
25 because if that's the case every piece of equipment in

1 their plant is in the D-RAP box. If you guarantee --

2 VICE CHAIRMAN CORRADINI: Is that a
3 question for Mark or for NuScale online?

4 MEMBER STETKAR: It is a question for Mark
5 because Mark is saying that this construct is in that
6 third bullet there, I thought he was saying, is
7 consistent with some sort of sliding scale. And that
8 sliding scale would apply at 3 times 10 to the minus
9 6, but not according to the second bullet.

10 MR. CARUSO: Well, isn't that the same for
11 an operating reactor who has a core damage frequency
12 of 2 times 10 to the minus 5?

13 MEMBER STETKAR: Well, in my mind it is,
14 but I'm too simple minded to understand these things,
15 so apparently the operating reactors don't feel that
16 they need to get that sophisticated.

17 MR. CARUSO: I'm not sure what you mean.
18 I mean, it's the same thing. All their stuff would be
19 in the box. And what will we say? We would say,
20 okay, go back and put your hat on and really figure
21 out what's really true here?

22 And maybe we would say, okay, maybe we
23 need to modify this method somehow in terms of these
24 importance measures and how they relate to core
25 damage. Yes, I understand what you're saying.

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1 VICE CHAIRMAN CORRADINI: Are you --

2 (Simultaneous speaking.)

3 MEMBER STETKAR: No, I'm not. But I'm
4 honestly searching for how what we're hearing here and
5 what's written in the SER and what's written in the
6 topical report all give me confidence that I know what
7 NuScale would do if their core damage frequency,
8 calculated core damage frequency were 3 times 10 to
9 the minus 6.

10 VICE CHAIRMAN CORRADINI: So should I ask
11 NuScale to --

12 MEMBER STETKAR: We can do that. I mean,
13 I haven't heard the staff say what they would do.

14 MR. CARUSO: I can tell you what we'll do.

15 MEMBER STETKAR: What would you do?

16 MR. CARUSO: We'll review their proposed
17 D-RAP program when it comes in, which includes a whole
18 lot more than these importance measures in figuring it
19 out, and we would hope to come to in that process
20 something that makes sense.

21 MEMBER STETKAR: But for regulatory
22 stability, if I'm an applicant and I don't know what
23 you're going to do when you review my D-RAP program,
24 you're asking me to come in with a box that's
25 populated according to some algorithm that I'm going

1 to use and then you're going to say, well, you might
2 change that algorithm.

3 MR. CARUSO: Well, we have guidance in the
4 D-RAP SRP that says you can use the whole
5 categorization approach using risk and all these, and
6 other factors. It's all laid out in Reg Guide 1.201
7 which references NEI 00-04, which it's 30 pages long.

8 It's how you do it for seismic, how you do
9 it for fire, how you do it for internal events, when
10 you use sensitivity studies, how you apply
11 deterministic information, what you do when it's a
12 seismic margins analysis, not a seismic PRA.

13 That's our guidance and that's what we're
14 going to use when they come in for their D-RAP. You
15 know, we looked at this in a very narrow way when it
16 came in as this business about our SRP 19.0-7. If you
17 want to do something different than what's in Reg
18 Guide 1.200 you've got to come and talk to us and see
19 if we see it's okay.

20 And so if we look at this as they were
21 asking saying, hey, we're going to do this thing
22 where, you know, we're not going to use 2.0 and 005,
23 we're going to do something else, so we need to come
24 to you and see if that's okay. And we looked at it in
25 terms of just that.

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1 And that's why the SER says that the real
2 application of determining risk significance for D-RAP
3 and the whole D-RAP analysis is going to get looked
4 at, you know, separately.

5 And we didn't dig into all that stuff
6 here. We just looked at these things and said 3 times
7 10 to the minus 6 is fine, and then the other things
8 they said. So --

9 VICE CHAIRMAN CORRADINI: Can I just
10 correct, make sure --

11 MR. CARUSO: Yes.

12 VICE CHAIRMAN CORRADINI: -- because you
13 guys are speaking in much more specifics than I'm
14 capable of on this area. If I just complete the one
15 sentence you said that 3.10 minus 6 is fine given that
16 their estimate of their overall CDF is as low as ten
17 to the minus 7. Isn't that the proviso?

18 MR. CARUSO: No. The 3 times 10 to the
19 minus 6 is a conservative number with respect to what
20 operating reactors use. In effect they use 2 times 10
21 to the minus 5. So they're saying I can have more
22 risk increase before I say it's risk significant.

23 VICE CHAIRMAN CORRADINI: They meaning
24 NuScale?

25 MR. CARUSO: No, operating reactors. In

1 their analysis they would say my threshold is higher
2 than NuScale's, so NuScale's threshold is lower. And
3 the threshold is independent of the baseline CDF.

4 VICE CHAIRMAN CORRADINI: Oh, okay. I
5 think I understand what you're saying.

6 MR. CARUSO: John's saying that's true and
7 when the core damage frequency gets to be equal to the
8 threshold the whole concept kind of has a problem in
9 terms of, you know, because it's -- you know, I mean,
10 they're getting a lot of components.

11 I mean, you know, the threshold if you add
12 everything up for all the hazards and everything you
13 stick, you know, you go into the fire PRA and you fail
14 the component and you get some little delta risk
15 increase. You go to the internal events PRA and if
16 you have a component you get another little delta.

17 Keep adding those deltas up, and when the
18 total gets to be beyond 3 times 10 to the minus 6 then
19 it goes in the box. So I'm not sure that everything
20 that would go in the box for NuScale or for operating
21 reactors, but --

22 VICE CHAIRMAN CORRADINI: Okay. And
23 you're interpreting this, I see, now, I think I see
24 how you're interpreting this, which is not how I
25 interpreted the SE. I thought in a totally different

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1 light. So are you clear now?

2 MR. CARUSO: No.

3 VICE CHAIRMAN CORRADINI: Okay. You'd
4 call 3 times 10 to the minus 6 conservative because
5 you're looking upon it as a delta on top of regardless
6 of what their CDF risk is. So if they're 10 -- so let
7 me say it again just for my own edification.

8 If it's not 10 to the minus 7th but it
9 turns out to be 10 to the minus 6, you still would
10 hold them to the 3 times 10 to the minus 6. If it's
11 2 times 10 to the minus 6, you still hold them to 3
12 times 10 to the minus 6. If it's 10 to the minus 5,
13 you'd still hold them to 3 times 10 to the minus 6.

14 MR. CARUSO: Okay, I got it. I mean, I
15 think the 2 and 005 were developed, you know, to try
16 to give you something sensible.

17 VICE CHAIRMAN CORRADINI: Understood.

18 MR. CARUSO: And so we would not do
19 something nonsensical from NuScale if they for some,
20 I don't know, odd reason that they would end up there.
21 So I think, you know --

22 VICE CHAIRMAN CORRADINI: I think you
23 don't have to explain it. I get it now.

24 MR. CARUSO: I mean, who says, you know,
25 scale, you know, within a range scalability is there.

1 I mean, there's no question about that. Now it may be
2 that it gets into trouble somewhere and so you want to
3 pick judiciously, you know, I haven't thought about
4 what happens if they get all the way down there.

5 VICE CHAIRMAN CORRADINI: So let me try an
6 example on you, because I think I know the answer but
7 let me try an example. When I read the third bullet
8 and I saw scaled I interpreted it totally differently.
9 I interpreted it as that if my CDF was 10 to the minus
10 7th and the RAW was 30, if it turned out to be 10 to
11 the minus 6 the RAW might be 20. And if it was 10 to
12 the minus 5th the RAW would be 2.

13 In other words the --

14 MR. CARUSO: Yes.

15 VICE CHAIRMAN CORRADINI: -- RAW value
16 would scale with --

17 MR. CARUSO: Right.

18 VICE CHAIRMAN CORRADINI: That isn't how
19 you've explained it to me though. You've said that
20 their baseline is so conservative that regardless of
21 the CDF you would apply that baseline to it.

22 MR. CARUSO: We're talking about two
23 different things. I keep talking about the absolute
24 core damage frequency threshold --

25 VICE CHAIRMAN CORRADINI: Yes.

1 MR. CARUSO: -- and you keep talking about
2 the relative RAW.

3 VICE CHAIRMAN CORRADINI: So in some sense
4 the calculation you could argue with or you could
5 explain it either on an absolute sense or on a
6 relative sense.

7 MR. CARUSO: Yes, yes, yes.

8 VICE CHAIRMAN CORRADINI: Okay.

9 MR. CARUSO: So that didn't come through.

10 VICE CHAIRMAN CORRADINI: No, I think I
11 get it. I think I get it. I used my example of 10 to
12 the minus 7th, 10 to the minus 6th, 10 to the minus
13 5th, at 3 times 10 to the minus 6th you hold them to
14 that regardless of whatever the value is. That's what
15 I'm struggling with.

16 MR. CARUSO: Yes.

17 MEMBER STETKAR: 10 to the minus -- if
18 their core damage frequency were 1 times 10 to the
19 minus 5th, every piece of equipment in their plant,
20 absolutely, would be in their D-RAP program because a
21 plant would have to work better than perfectly to not
22 be in their D-RAP program.

23 If that component was guaranteed to fail,
24 their core damage frequency would become higher than
25 10 to the minus 5th by definition.

1 MR. CARUSO: Well, yes, I mean --

2 MEMBER STETKAR: Right?

3 MR. CARUSO: -- I think, you know, I think
4 what we've said is that scaling in both directions is
5 okay, but, and I think we would agree with NuScale
6 that maybe this is why they said, if I get down to 3
7 times 10 to the minus 6th or down near operating
8 reactors I would use the same thing operating reactors
9 do.

10 But I think if you got to the point where
11 whatever you're doing was not making any sense, they
12 would want to do something different and we would want
13 to do something different. You know, I'm not just
14 going to say here, you know, I don't really care if it
15 doesn't make any sense. They're going to use 3 times
16 10 to the minus 6, by golly. No, that's not the way
17 we operate.

18 MEMBER STETKAR: Well, let me --

19 MR. CARUSO: And I don't think we said
20 that in the SER. I think we said scaling is okay.
21 So, and we -- go ahead.

22 VICE CHAIRMAN CORRADINI: No, I'm fine.
23 I just wanted to make sure, now I'd like to get
24 NuScale into the conversation so we're not
25 misunderstanding.

1 So the folks at NuScale, can you unmute
2 and enter the conversation here? Am I misinterpreting
3 your topical report?

4 MR. GALYEAN: Well, this is Bill Galyean,
5 supervisor here at NuScale, and --

6 VICE CHAIRMAN CORRADINI: Hello, Bill.

7 MR. GALYEAN: Hello. And I think the way
8 Mark characterized it at the end there is we'll use
9 whichever process makes the most sense. And, you
10 know, the point that, you know, John was making that
11 we would do stuff that doesn't make sense is a bit
12 ridiculous, really.

13 And so if we get to the point where our
14 core damage frequency is approaching that of operating
15 reactors, well, then why not just use the same process
16 that operating reactors use? As Mark said, you know,
17 we'll only use this process if it makes sense, and we
18 would reference it in our DCA.

19 VICE CHAIRMAN CORRADINI: Okay. Okay.

20 MR. GALYEAN: And so if we choose not to
21 use this process then we'll say what process we are
22 using that's already been approved by the NRC.

23 VICE CHAIRMAN CORRADINI: Okay.

24 MR. GALYEAN: So this whole discussion
25 about oh, is this a relative, is there an absolute,

1 does it scale, does it not scale, it really overly
2 complicates what we're talking about.

3 We were talking about something very
4 simple and straightforward, absolute threshold. Our
5 core damage frequency is significantly below that.
6 You know, talking about these hypothetical situations,
7 you know, is really off-topic in terms of the
8 licensing topical report.

9 MEMBER STETKAR: And Bill, and for the
10 record, I understand what NuScale is proposing. My
11 personal concern is that the NuScale proposal is being
12 reviewed by the staff in isolation for NuScale and
13 NuScale only, and that then if another applicant comes
14 in with their design and says that their core damage
15 frequency is 3 times 10^{-7} and they want
16 to propose a value of 2.5 times 10^{-6} , the
17 staff will somehow review that as an independent
18 application and conclude that that's also reasonable
19 because 2.5 times 10^{-6} is still -- I hate
20 the word -- conservative compared to what operating
21 reactors are using.

22 And if the third design comes in and their
23 core damage frequency is 1 times 10^{-6} and
24 they propose a 1 times 10^{-5} , well, that's
25 still conservative compared to 2 times 10^{-6}

1 5, but that's only like a factor of 10.

2 And my bigger concern is this notion that
3 the staff is not reviewing these consistently across
4 all of the designs, and that we have a consistent
5 notion of how we determine this significance.

6 And maybe it's time to do that because as
7 new designs come in and people start proposing these
8 very small core damage frequencies and trying to
9 justify why their design reliability assurance box
10 ought to be empty we have common understanding about
11 why we feel comfortable with that.

12 That's my primary reason for taking issue
13 with all of these things, not with the particular
14 numbers or absolute relative anything.

15 VICE CHAIRMAN CORRADINI: Do the folks at
16 NuScale like to have a comment? Otherwise I'm going
17 to turn back to Mark. The folks at NuScale, if they
18 have a comment please do so. Otherwise I'm going to
19 turn back to the staff.

20 MR. GALYEAN: Okay. Yes, I mean, I agree
21 with John's sentiment. You know, if this issue had
22 been addressed generically previously, you know, the
23 need for the NuScale LTR would not exist right now,
24 and so it would have saved us a lot of time and
25 effort.

1 VICE CHAIRMAN CORRADINI: Okay, that's on
2 the record. All right, let me turn back to the staff.
3 Bill, go to mute. I don't mean to be running the show
4 but I'm running the show, so let's go back to staff.

5 MR. CARUSO: Well, yes. I mean, you know,
6 I think we agree with the sentiment too. I mean, and
7 we've talked about, I think you've brought this up at
8 the subcommittee meeting.

9 And so I can't, as the reviewer of this
10 topical report I'm not in the position to say we're
11 going to do that. I think it's a good thing. I think
12 everybody in this room would agree it would probably
13 be a good thing.

14 MEMBER STETKAR: We brought it up in
15 previous letters, oh by the way.

16 MR. CARUSO: We brought it up in previous
17 letters too.

18 VICE CHAIRMAN CORRADINI: Keep on going,
19 go ahead. I'm sorry for taking you off track. Make
20 sure I understood that whole --

21 MR. CARUSO: Oh, okay. So with respect to
22 the Fussell-Vesely importance measure, NuScale has
23 proposed a, I hate to use this term, but scaled value
24 to again to assure that they're looking at an
25 equivalent amount of risk change as operating reactors

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1 are when they use the importance measure.

2 And they found that for their very low
3 core damage frequency or assumed core damage frequency
4 they would have gotten a value of 0.5 that would be on
5 equivalent footing with operating reactors instead.
6 That probably doesn't make any sense.

7 And so they proposed a value of 0.2. 0.2
8 seems reasonable. Personally, I probably would have
9 picked 0.1 myself, but I don't have any basis to nix
10 0.2, and I know that like I said before, in the NEI
11 00-04 there's guidance in there about doing
12 sensitivities on all these numbers.

13 So when the D-RAP comes in for review
14 we'll have expected that they had done a sensitivity
15 on this value too and found it, you know, it was not
16 a optimal choice, but they would account for that in
17 their selection of SSCs that should be in the program.

18 MEMBER STETKAR: Mark, since you brought
19 up most of this and we can get your slides here, one
20 of the things we talked about in the subcommittee
21 meeting is in the topical report they propose applying
22 the Fussell-Vessely importance on a hazard-by-hazard
23 and operating mode-by-operating mode basis.

24 So, for example, I think that means
25 internal events at power, let's say internal fires,

1 internal flooding, you have seismic events, high winds
2 and so forth, and then that same complement for low
3 power shutdown, and also not only for core damage
4 frequency, for large release frequency.

5 In one perspective that sounds prudent, if
6 you will -- I'm trying to stay away from the word that
7 I don't like -- because it says, well, if something is
8 important to any one of these various hazards or
9 operating modes I will put it in my box.

10 On the other hand, you can develop
11 situations depending on the relative contribution from
12 each hazard or operating mode to your total core
13 damage frequency and the relative importance of
14 specific components to each of those piece parts,
15 where indeed you might have something in your box
16 because it's important to one particular contributor
17 that's actually less important to overall core damage
18 frequency than something that is not in your box at
19 all.

20 And people have tried constructs in the
21 past to address that anomaly by applying a two-tiered
22 approach that says, well, if it's greater than, let me
23 just throw out numbers. If it's greater than in this
24 example 20 percent, 0.2, on a hazard-by-hazard,
25 operating mode-by-operating mode basis, that's one

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1 criterion, and I have a different criterion, and again
2 just an arbitrary number, 0.1 for overall core damage
3 frequency such that I catch those anomalous
4 conditions.

5 I don't know whether the staff has thought
6 about that at all. It was one of the things that I
7 thought about, you know, as I looked at thinking about
8 applying this on a part-by-part basis.

9 MR. CARUSO: Yes. Well, the last agenda
10 item we had was to talk about the issues that were
11 raised at the subcommittee meeting.

12 MEMBER STETKAR: Okay.

13 MR. CARUSO: I skipped to Slide 8, and you
14 go to the bottom of Slide 8, I put that together with
15 the other issues that you had raised about, you know,
16 how do you deal with a component that's got a bunch of
17 basic events.

18 And I admit, I probably should have done
19 a little bit more research and had this in the
20 original SER. But we, like I said, have gotten so we
21 have to do the D-RAP to actually do the analysis is
22 this NEI 00-04 Reg Guide, and if you go in there it
23 goes to great pains to talk about the issue of masking
24 in a lot of different ways.

25 How what you do for one hazard could mask

1 something from the other one, and why it's important
2 to do that on hazard specific basis if in fact you're
3 looking for, you know, you're looking for something
4 that's driving fire risk.

5 Not so much, you know, as a numerical risk
6 significance of some number, but it may be significant
7 because it's dropping the fire risk, and it may turn
8 out that, well, that value doesn't meet your other
9 criteria but from a design perspective it might tell
10 you something that you want to do to fiddle with your
11 design.

12 So there are reasons, you know, and it
13 talks about doing an integrated analysis too. So
14 there's plenty of guidance in there, I think, to
15 conquer, you know the issue of how you deal with
16 hazards. They have approaches in there for each of
17 the hazards. They have specific techniques to address
18 each of the hazards, and an integrated one at the end.

19 And I have to tell you, I mean, I had not,
20 I was not involved in developing this document. I
21 can't explain it to you right here and now, but I have
22 gone through it.

23 And I feel comfortable that when it comes
24 time to look at their D-RAP analysis, and we, they're
25 on the hook to, I mean that's an acceptable approach

1 and we will use that as our guide as to what they come
2 in with, you know.

3 It also talks about how you deal with, you
4 know, basic events and components. It's got
5 guidelines in there for that, which for using, for
6 risk achievement, you know, you take the worst one.
7 You know, if I've got five different failure modes and
8 I pluck the one in for all them, all the basic events,
9 and I find the one that gives me the worst answer and
10 that's the answer I use.

11 So, I guess, overall, I'm saying, you
12 know, we, like I said we do not view the review of
13 this to be the complete, you know, implementation of
14 a SSC categorization for D-RAP.

15 And I believe that we have guidance in
16 place that staff has endorsed and that's what we say
17 in our SRP that we find this an acceptable approach
18 and so we'll follow that. And, you know, if there's
19 -- that's all I can say about that.

20 MEMBER STETKAR: Okay, thanks. And again
21 I apologize. I didn't realize that last --

22 MR. CARUSO: Well, I --

23 MEMBER STETKAR: -- was going to address
24 it --

25 MR. CARUSO: -- didn't think I --

1 MEMBER STETKAR: -- publicly.

2 MR. CARUSO: -- on the first try. Yes, I
3 think, yes, I admit to like all the issues that we're
4 talking about I sort of save them for the last slide
5 for those issues.

6 MEMBER STETKAR: I'm sorry.

7 MEMBER BROWN: Can I make an observation?
8 I was at the meeting, and I don't know anything at all
9 about Fussell-Veseleys and F- RAWs and all that kind
10 of stuff, although I did understand somewhat the
11 higher level basis, I think, for wanting to do this.

12 They want to reduce the number of things
13 that they have to pay a lot of attention to, and that
14 will be a better approach because they'll be able to
15 focus more resources on the things that have more
16 importance to creating safety for the plant.

17 What I got out of reading the topical
18 report and your SER, I didn't see any connection
19 between his numbers that tells me I don't have to do
20 -- it reduces it by about 25 percent or whatever it
21 was according to the report.

22 I didn't see physical basis does it makes
23 sense relative to how this is applied in the SMRs and
24 now we're not going to look at some things that we
25 would have looked at in a big plant, and is there a

1 physical basis for why we don't have to in this, in an
2 SMR because the numbers showed us we don't have to.
3 That -- just numbers. At least I got the flavor that
4 it was just numbers making the, you know, making the
5 case --

6 MR. CARUSO: Yes.

7 MEMBER BROWN: -- for reducing the number
8 of parts. So if that system is some components that
9 in the bigger plants would say, oh, we've got to look
10 at that and I've got a similar component in a small
11 reactor but, oh, I don't have to look at that because
12 is there a physical basis for why it makes sense that
13 these numbers came out the way they are.

14 I didn't think about, I mean, I just never
15 formulated that until I've been listening to this
16 interchange here today. So that's --

17 MR. CARUSO: Well, this topical is really
18 about a piece of the numbers part of the assessment.

19 MEMBER BROWN: So we can look at it
20 physically --

21 MR. CARUSO: This topical --

22 MEMBER BROWN: -- system wise.

23 MR. CARUSO: It does. But this topical
24 was not talking about, his topical report on a whole
25 complete methodology for doing the analysis of what

1 should be the D-RAP program.

2 And the guidance the staff has out there
3 go to well beyond the PRA numbers. Like, we're not
4 risk based for risk informed, and if you look at the
5 guidance for how you, like I was just saying, how you
6 do that to decide what you're going to really focus on
7 it's not just numbers.

8 All this topical was about was the number,
9 the criteria that they use for the numbers part. They
10 wanted a different approach there and they wanted our
11 blessing on it, and that's all this is about. It's
12 not about --

13 VICE CHAIRMAN CORRADINI: It's not the
14 whole process. It's a piece of the process.

15 MR. CARUSO: It's a piece.

16 MEMBER BROWN: Okay, I just didn't
17 understand. I just saw that the, what is, the F-V
18 went from 0.5 to 0.2, and I just, somewhere along the
19 line I didn't see anything in this overall process
20 that it comes to some conclusions that things don't
21 need to be looked at, and now does it make sense when
22 I finally get to the point where I need to start
23 looking at stuff.

24 This seemed to be more, what's the right
25 word, ephemeral, abstract, and not connected to the

1 hardware and I'm kind of a hardware person. So that
2 was just my observation on looking at it and I don't
3 have any problems with reducing looking at stuff that
4 doesn't matter, but how do you know it doesn't, how do
5 you confirm that it really doesn't matter in these
6 plants as opposed to the bigger plants? And I don't
7 have any connection to that right now --

8 MR. CARUSO: Well, I think --

9 MEMBER BROWN: -- or where in the process
10 that gets evaluated qualitatively, I guess.

11 MR. CARUSO: When they make their
12 submittal for design certification and their proposed
13 D-RAP program will have, you know, a full-blown, a
14 methodology and the list that comes out of it on how
15 they got that list and how they factored in operating
16 experience, how they factored in the fact that some of
17 these components are so new and novel that they don't
18 have any data, they're going to have to deal with
19 that, you know.

20 And, you know, we're very attuned to the
21 fact that NuScale is full of new and novel stuff, and
22 there's, you know, it's not going to be, you know,
23 when it comes to D-RAP review as well as a lot of
24 other reviews, it's not going to be same-old same-old
25 for them or for us.

1 But they are bound to think about these
2 things, operating experience, you know, they have in
3 terms of making decisions, you know, they use the PRA
4 to get some sense of what the PRA says, then they have
5 people from all different disciplines, INC, you know,
6 reactor systems, that sit around and say, now what's
7 your perspective on the importance of this piece of
8 equipment?

9 And they go, well, you know, boron
10 dilution's not a very risk significant issue here, I
11 mean I haven't seen much, but looking here at this and
12 this and this, you know, I'm not sure you couldn't get
13 a big, fat, cold slug of water somehow, and for that
14 reason I think we should watch, you know, we should
15 take care of this.

16 That's probably not a very good example,
17 but the point is is that there are other folks with
18 the hardware perspectives that are officially involved
19 in this process, they're called the expert panel, and
20 that's part of our guidance as to how you do this.
21 It's how everybody, you know, the industry has done
22 it.

23 So I guess I'm trying to reassure you that
24 that aspect is alive and well and will be treated well
25 by us when we get to the review.

1 MEMBER BROWN: Is it possible for them to
2 screen out the reactor trip systems? It would be such
3 a low risk thing that we don't have to review it in
4 the design process?

5 MR. CARUSO: I doubt it.

6 MEMBER BROWN: I offered that up as an
7 extreme example.

8 MEMBER STETKAR: It is very likely that
9 they'll screen out diesel generators.

10 MEMBER BROWN: That seems to be somewhat
11 problematic.

12 VICE CHAIRMAN CORRADINI: Well, it's not
13 an AP-1000.

14 MEMBER BROWN: I understand that.

15 VICE CHAIRMAN CORRADINI: It may be in the
16 D-RAP but it's not safety grade.

17 MEMBER STETKAR: This might now even be in
18 the D-RAP.

19 MEMBER BROWN: Are the diesel generators
20 in the D-RAP in AP-1000?

21 MR. CARUSO: I'm not ready to agree to
22 that.

23 MEMBER STETKAR: I think they are but I
24 don't, I think --

25 MEMBER BROWN: Well, we're talking about

1 D-RAP.

2 MEMBER STETKAR: I think they are because
3 AP-1000, they come in under RTNSS stuff which is
4 required 072 hours.

5 MEMBER BROWN: We're talking about D-RAP
6 here, so I'm saying if --

7 MEMBER STETKAR: Well, it's --

8 MEMBER BROWN: -- system between that and
9 the D-RAP. It's from a D-RAP system, that's all.

10 MEMBER STETKAR: Everything that is in
11 RTNSS by -- RTNSS, again, full disclosure, regulatory
12 treatment of non-safety systems that apply
13 specifically for the passive reactor designs as
14 opposed to active reactor designs, but the definition
15 of everything that is in the RTNSS list is in the D-
16 RAP program.

17 And there may other things in the D-RAP
18 program that are risk significant but don't fall under
19 the specific criteria for RTNSS, so D-RAP is equal to
20 or larger than RTNSS. And if you have an active
21 plant, which is not the case for NuScale, then there
22 is no RTNSS it's only the D-RAP box.

23 VICE CHAIRMAN CORRADINI: I just want to,
24 to move on and I'm going to answer Charlie's question
25 a different way. This is one piece of a big process.

1 We will be back to it. So rest assured you'll have
2 another --

3 MEMBER STETKAR: When we review Chapter 17
4 or 19 or wherever their list shows up in the design
5 certification in the SER we'll be visiting that list.

6 MEMBER BROWN: I'd just like to make sure
7 that the stuff's screened out, at least gets assessed
8 as to why this makes sense. That's all.

9 MR. CARUSO: Part of the process.

10 MEMBER BROWN: Okay, and if that's part of
11 the process I'll walk away happy. So as Mike would
12 like to do he wants you to get on with it.

13 MR. CARUSO: So you're part of the process
14 too so you've got two things going for you. So let's
15 see, where was I?

16 VICE CHAIRMAN CORRADINI: I think you were
17 at limitations.

18 MR. CARUSO: Limitations. So in the SER
19 we have a number of conditions and limitations. The
20 approval of the topical is for NuScale only. Like I
21 said, the determination of risk significance for a
22 specific application like the D-RAP is a separate
23 activity. We're going to review that when it comes
24 in.

25 And as we just discussed, a number of

1 additional factors, deterministic factors are included
2 in that application. In 3 we talk about the adequacy
3 of the PRA. They need to have a technically accurate
4 PRA that addresses all the external and internal
5 hazards and operating modes. This is actually part
6 of, you know, our guidance in the SRP 19.0.

7 They also need to account for the impacts
8 on a module, this assessment is done on a module basis
9 for impacts to the sequences for that module that
10 could arise from effects of the other modules.

11 And I think this, we had a lot of
12 discussion at the subcommittee meeting about this
13 topic, and I think we're committed to come back and
14 have a separate discussion about how we're going to
15 treat and evaluate the impact of module and module in
16 the non-design basis perspective and a design basis
17 perspective.

18 And then the fourth one I added in to --

19 MEMBER SKILLMAN: Mark, before you
20 proceed, it seems to me that this Item 3 is the
21 linchpin to the other topic that we were just
22 discussing relative to risk achievement worth and
23 importance.

24 Here's an example. Let's say this is a
25 NuScale that it's not completely built, only 10 of the

1 12 modules are in place. Two have been operating for
2 a couple of years, two or three are in the middle of
3 their life, and one or two are shut down for refueling
4 or maintenance.

5 And so not all are powered, not all are
6 shut down. A couple are producing DKE. Those that
7 have the longest runtimes have the greatest
8 radioisotopic inventory. They all share some
9 equipment of some sort.

10 And so it seems to me that this PRA needs
11 to account for 12 modules or the number of modules
12 that have fuel in them, the conditions of those
13 modules at the time that PRA or the accident's being
14 assessed, what is being shared among the modules that
15 is important for the operating mode of each of the
16 different modules.

17 So my hunch is that this becomes an
18 extremely complicated riddle of permutations and
19 combinations. And what makes it, at least in my mind,
20 the most challenging is the fact that when we've gone
21 through the screening criteria beginning with an
22 assumed 10 to the minus 7, NuScale is saying, hey, if
23 I'm at a 3 times 10 to the minus 6 or greater then
24 only those components are screened as safety
25 significant, I might have shared components that are

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1 well below that 3 times 10 to the minus 6 that several
2 of these other modules are depending on and they get
3 lost in this fog.

4 So what I'm thinking is we've got to make
5 sure that the analytical tool has a magnifying glass
6 that's thick enough to find these very subtle
7 relationships. And maybe that's part of the process
8 and it will come out in the wash, but it all begins
9 with this notion 10 to the minus 7 is so low we can
10 take a pretty good increase and still be safe.

11 And I would like to hear you speak about
12 that for a minute, please.

13 MR. CARUSO: Well, yes. I think that the
14 10 to the minus 7 was focused on if I focus on one
15 module which assumes that I've somehow decoupled them
16 or made interactions through design very, very
17 unlikely, and I can do that.

18 But I think, you know, that there, the
19 whole issue of interaction between the modules and
20 shared systems is something that is going to have to
21 be a factor in this assessment of systems, like you
22 said.

23 The fact that -- I mean, we have
24 information on it, I don't know if it's changed or
25 not, that the circ-water system is shared among six

1 modules. The component cooling water system is shared
2 among six modules.

3 So anyway, all I would say, I agree with
4 you. I think the information that you get from the
5 PRA is going to be somewhat limited because the PRAs
6 have not been traditionally developed to look at a
7 design like this.

8 And so I think in the future, you know, a
9 better tool for that part of analysis will be good but
10 we're going to have to live with what we have now. I
11 think NuScale is doing some things in their PRA
12 analysis spectrum to look at multi-module. I don't
13 know exactly what.

14 We have tried to focus more on we want to
15 understand from a design perspective that, you know,
16 you have looked hard at these couplings and basically
17 through your design made the likelihood of significant
18 multi-module interactions lean to simultaneous core
19 damages go away, be unlikely. And we have that as
20 review guidance in our SRP and it's going to be a
21 challenge, you're absolutely right. It's going to be
22 a challenge to look at this.

23 But I think the fact, you know, that if
24 they have these systems where, I mean, if I fail the
25 circ-water system and it trips, you know, six units,

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1 the PRA may not say that that should be in the box,
2 but a deterministic perspective, you know, might be
3 different because all of a sudden I have six modules
4 tripping.

5 And so I'm not saying they're right or
6 wrong. I'm not prejudging anything. But I'm agreeing
7 with you that it's going to be complicated and we are
8 in some territory that we haven't been in before.

9 MEMBER REMPE: But to sum up your response
10 to that you're saying that part of the standard review
11 plan will address those issues somewhere is your
12 vision that the NRC will as part of this interaction?

13 MR. CARUSO: Yes. We'll meet with you on
14 the subject of multi-module and we'll go over what's
15 in there, how we got there and how we, you know, will
16 move forward in the review of what we have.

17 You know, it's not 25 pages of guidance,
18 you know, about details of multi-module, but it
19 basically, it's kind of like if you're familiar with
20 the concept that's kind of big in Europe now,
21 practical elimination, you know, you would really like
22 to do things to practically eliminate potentials for
23 big bad accidents like multi-module core damages.

24 We essentially said you should focus on
25 making the multi-module concern with your facility,

1 make it go away as much as you can or as unlikely
2 through design, and show us that you've looked for the
3 things, these vulnerabilities, hard, show that you've
4 done a systematic look for them, and ones that you've
5 found that could be, you know, concerns you're taking
6 some action through design to minimize them. This is
7 the guidance that's in there.

8 So, you know, this is on our plate to look
9 at in the review, and they basically know that they
10 need to address it. We're actually going to NuScale
11 to do an audit of some of their PRA documentation
12 which they've completed and they do have already.
13 They have a report in there on some treatment of
14 multi-module that we'll be looking at next week. So
15 we're very interested in that.

16 But it is going to be hard. It's going to
17 be complicated, like I think we are in kind of new
18 waters here.

19 MEMBER SKILLMAN: But it seems to me that
20 over when we talk about a single reactor, as we've
21 found in reactors that have problems, we always have
22 the ability to focus on that one core as many fuel
23 assemblies are in that core, as are in that core and
24 as many curies are in the core at the time the
25 incident occurs, hence the decay heat generation rate.

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1 It seems to me that maybe one way to
2 approach this is to talk about curies at risk or decay
3 heat quantities at risk. If you have a single core
4 with so much decay heat generation rate available at
5 a certain time you have a pretty good idea of where
6 you're going to have to go to get rid of the heat and
7 what you're going to have to do to bottle up those
8 isotopes.

9 But here you might have 12 machines, 12
10 different decay heat generation rates or production
11 rates, and 12 different isotopic burdens, and so maybe
12 a way to approach this is to approach it from the
13 perspective of curies at risk or heat at risk.

14 And that way you really cut through all
15 the fog and you say this is where my real risk lies,
16 now how can we cool it and how can we contain those
17 curies, because part of this passive design is
18 intended to have passive heat removal and capture
19 those curies.

20 MR. CARUSO: Right.

21 MEMBER SKILLMAN: But it seems to me that
22 those, maybe a way to approach this is, may be a
23 slightly different perspective than we think about it
24 today.

25 MR. CARUSO: Well, I think that's true.

1 I think there's some aspects of the design that give
2 you some margin at the end. The containment design,
3 the cooling of the containment from the pool in terms
4 of, you know, containment failure probabilities, you
5 still have bypasses, but I think you're right.

6 MEMBER SKILLMAN: Thank you.

7 VICE CHAIRMAN CORRADINI: Go ahead.

8 MR. CARUSO: So this last, this fourth
9 limitation was basically because of the discussion we
10 had at the subcommittee meeting about are you
11 approving importance measures or not approving
12 importance measures or what are you doing?

13 And we basically were saying we're happy
14 with the concept of getting an importance measure, a
15 different importance measure for a much lower core
16 damage frequency. And we are in fact saying we're
17 okay with the upper bound value of 0.2 for, you know,
18 NuScale. I mean that, if their core damage frequency
19 was to go down farther then, you know, they're not
20 going to raise it beyond 0.2 because they've already
21 said anything beyond 0.2 doesn't make sense.

22 If the core damage frequency went down,
23 then they would certainly look at scaling back down to
24 a lower Fussell-Veseley. But we're just saying that
25 process of going down, you know, to find it is fine.

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1 I mean, it's basically that's the whole issue of
2 scaling that we talked about.

3 So I think if you go to Slide 8 we just
4 talked about the issue that we've discussed at the
5 subcommittee meeting on approval of importance
6 measures.

7 MEMBER BROWN: Mark, when you say go down
8 I'm trying to get a handle. You mean it can't go
9 below 0.2?

10 MR. CARUSO: No. Yes, it could go below
11 0.2, not above.

12 MEMBER BROWN: But it cannot go above, it
13 can't go back up to 0.5.

14 MR. CARUSO: Right.

15 VICE CHAIRMAN CORRADINI: You're getting
16 percentages and fractions mixed up, so let me try.
17 It's 0.2, which is 20 percent, versus the current
18 plants which is 0.5 percent or 0.005.

19 MEMBER BROWN: Right.

20 VICE CHAIRMAN CORRADINI: I think I've
21 said it correctly.

22 MR. CARUSO: They had originally derived
23 for, if you take the equation, the definition of
24 Fussell-Veseley and you --

25 MEMBER BROWN: That's not what the topical

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1 report says. Fussell-Veseley of 0.5 or 50 percent, or
2 Fussell-Veseley of 0.2 or 20 percent, that's what the
3 topical report says.

4 VICE CHAIRMAN CORRADINI: That's what I
5 just said.

6 MEMBER BROWN: No, you said one was --

7 VICE CHAIRMAN CORRADINI: 0.5 is what --

8 MEMBER BROWN: Is 50.

9 VICE CHAIRMAN CORRADINI: Just let me try.
10 0.5 is what it would be if they directly scaled it
11 from the current plants and they took an additional 2-
12 1/2 times lower value to be conservative. Have I said
13 that correctly?

14 MR. CARUSO: Yes.

15 MEMBER STETKAR: That's taken what you
16 see, Charlie, down by a factor of a hundred because
17 the power level is down by a factor of a hundred. The
18 core damage frequency is down by a factor of a hundred
19 so it's 0.005 at 10 to the minus 5, it would be 0.5 at
20 10 to the minus 7. They're using 0.2 at 10 to the
21 minus 7. Now if anybody reads the transcript they can
22 sort through those numbers.

23 MEMBER BROWN: Let me ask the question
24 another way without those things in there so that my
25 non-quantifiable brain can work with this. If the CDF

1 went from 10 to the minus 7 to 10 to the minus 6, is
2 that up or down?

3 MR. CARUSO: The Fussell-Veseley --

4 MEMBER BROWN: That's --

5 MR. CARUSO: -- we would have to use would
6 be smaller.

7 VICE CHAIRMAN CORRADINI: It would go
8 down.

9 MEMBER BROWN: Would that screen fewer
10 things out?

11 MR. CARUSO: No. That would screen more
12 things in. Well, I don't know. I don't know if --
13 yes, I mean it would --

14 MEMBER BROWN: All I'm trying to do is get
15 consistency. You're saying nothing of what you're
16 going to agree with will not allow it to go one way
17 but you'll allow it to go another way.

18 MR. CARUSO: Core damage frequency goes up
19 and you used 0.2, 20 percent, that would be a mistake.
20 That would be a mistake. That would -- I think you'd
21 have the wrong answer.

22 VICE CHAIRMAN CORRADINI: I think staff
23 quantitatively it all makes sense at least to me. I
24 think the way in which it's described when one thing
25 goes down it actually has the potential of putting

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1 more things into the D-RAP candidate list that you are
2 concerned about.

3 MEMBER BROWN: My wife asked me to
4 increase the air conditioning which means I have to
5 decrease the setting.

6 VICE CHAIRMAN CORRADINI: Well done.

7 MEMBER BROWN: And that's why I'm trying
8 to calibrate myself on those two particular sentences.

9 VICE CHAIRMAN CORRADINI: That's a perfect
10 analogy.

11 MEMBER BROWN: I just wanted to make sure
12 they were going the right way. They're trying to get
13 rid of stuff, and I'm trying to make sure that if goes
14 in the wrong direction then we ought to be making sure
15 that the possibilities exist that more stuff gets put
16 back into the D-RAP as opposed to whereas if it goes
17 any, you go from 10 to the minus 7 to 10 to the minus
18 8 it's going to stay at 0.2. Did I say that right?

19 VICE CHAIRMAN CORRADINI: Yes.

20 MEMBER BROWN: Okay.

21 VICE CHAIRMAN CORRADINI: Right.

22 MR. CARUSO: So I actually think, I think
23 we have covered everything else that's on Slide 8 and
24 I think I went through Slide 9 when I talked about the
25 implementation issues so I would just be repeating

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1 myself.

2 VICE CHAIRMAN CORRADINI: Okay. If I may,
3 at this point I'd like to ask the NuScale people to
4 come back online, or unmute, and make sure I've not
5 misconstrued anything and have properly represented
6 their topical report. So, Bill?

7 MR. GALYEAN: Yes, I think the discussion
8 has been on target. I don't have anything additional
9 to add. I mean, we can go off kind of on a tangent on
10 multi-module issues, but I don't think that's what
11 you're looking for here now.

12 VICE CHAIRMAN CORRADINI: Okay. So if you
13 please stay unmuted, can I go around the table with
14 our members and see if there's any comments either to
15 NuScale or to staff?

16 Okay. All right, so why don't we now see
17 if anybody's in the room that wants to make a public
18 comment. Seeing none --

19 MS. MROWCA: I'll make a comment.

20 VICE CHAIRMAN CORRADINI: Oh, I'm sorry.
21 Lynn.

22 MS. MROWCA: Hi. This is Lynn Mrowca from
23 NRO, and I just want to make a comment about the
24 discussion on generic risk significant guidance,
25 because we have been listening and we have been

1 discussing but we have a few questions that we need to
2 answer, for instance, what we would put in where and
3 when.

4 So we haven't come to a decision or not,
5 but I just wanted to let you know that we are
6 listening and we understand the point that it would
7 make our reviews more efficient, it would give future
8 applicants an idea of what we're looking for, so we
9 understand all the benefits, it's just a matter of
10 answering those questions before we do anything.

11 VICE CHAIRMAN CORRADINI: Okay. All
12 right, thank you very much. I appreciate that. Can
13 we turn on the public, or unmute the public line and
14 see if there's comments from folks on the phone
15 please?

16 So if somebody's on the public line could
17 you please just speak up and just let us know you're
18 there.

19 MR. LEWIS: Marvin Lewis, member of the
20 public.

21 VICE CHAIRMAN CORRADINI: Marvin.

22 MR. LEWIS: No comment.

23 VICE CHAIRMAN CORRADINI: No comment?

24 CHAIRMAN BLEY: Thank you for answering.

25 VICE CHAIRMAN CORRADINI: Thank you,

1 Marvin, very much for answering. Okay, we can --
2 anybody else on the public line that wants to make a
3 comment? Okay, we can close the public line and I'll
4 turn it back to the chairman. Dr. Bley.

5 CHAIRMAN BLEY: Thank you very much. I
6 better look before I make another faux pas. We'll be
7 going off the record now for the day, or for the
8 meeting, and we'll come back at 2:30 to start on the
9 letters. Your letters ready?

10 VICE CHAIRMAN CORRADINI: Yes.

11 CHAIRMAN BLEY: You have two letters
12 ready? 2:30, we'll recess until then and we're off
13 the record for the week.

14 (Whereupon, the above-entitled matter went
15 off the record at 2:14 p.m.)
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JLD-ISG-2016-01

Guidance for Flooding Hazard Focused Evaluation and Integrated Assessment

ACRS Full Committee

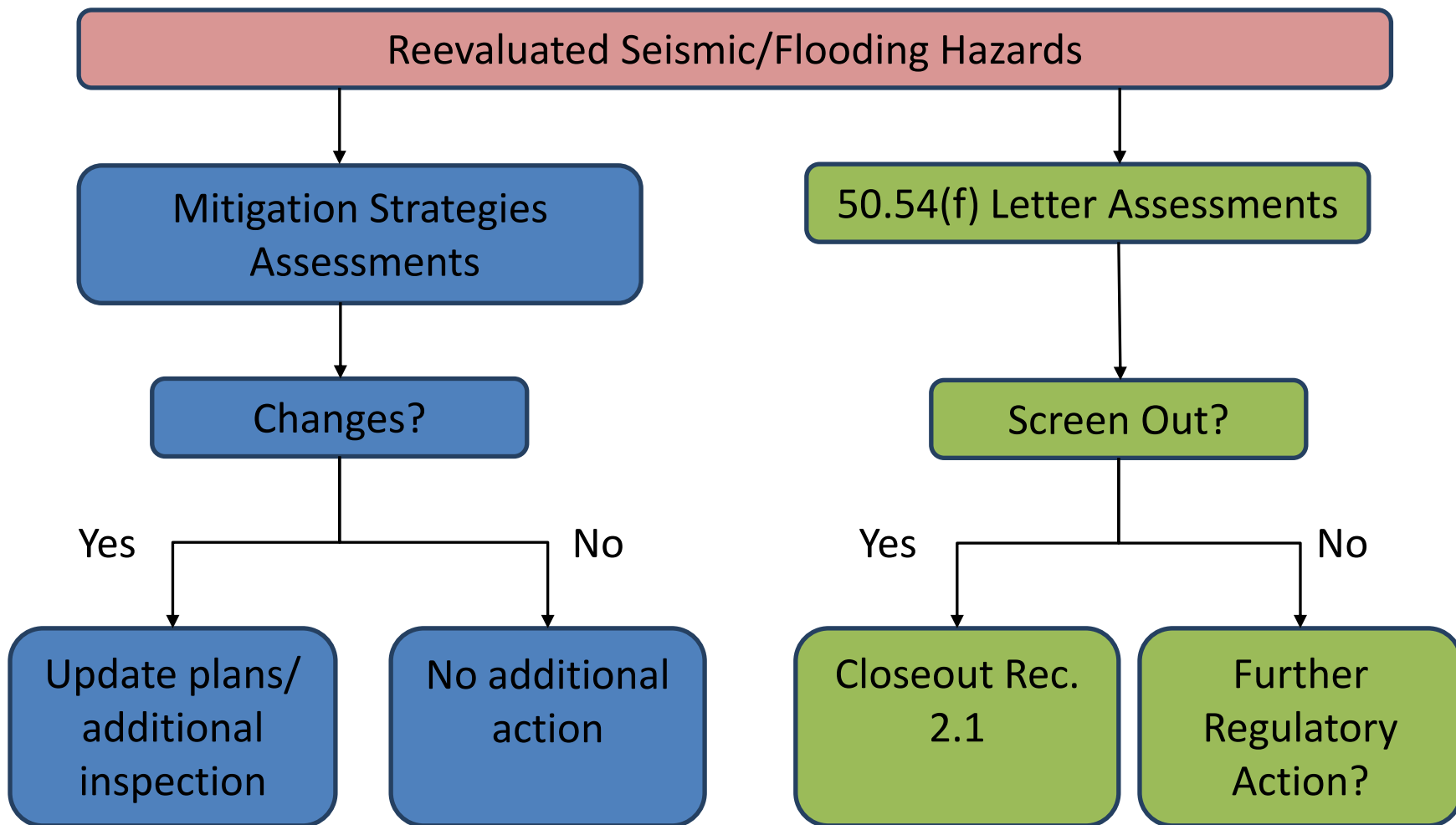
Eric E. Bowman

May 5, 2016

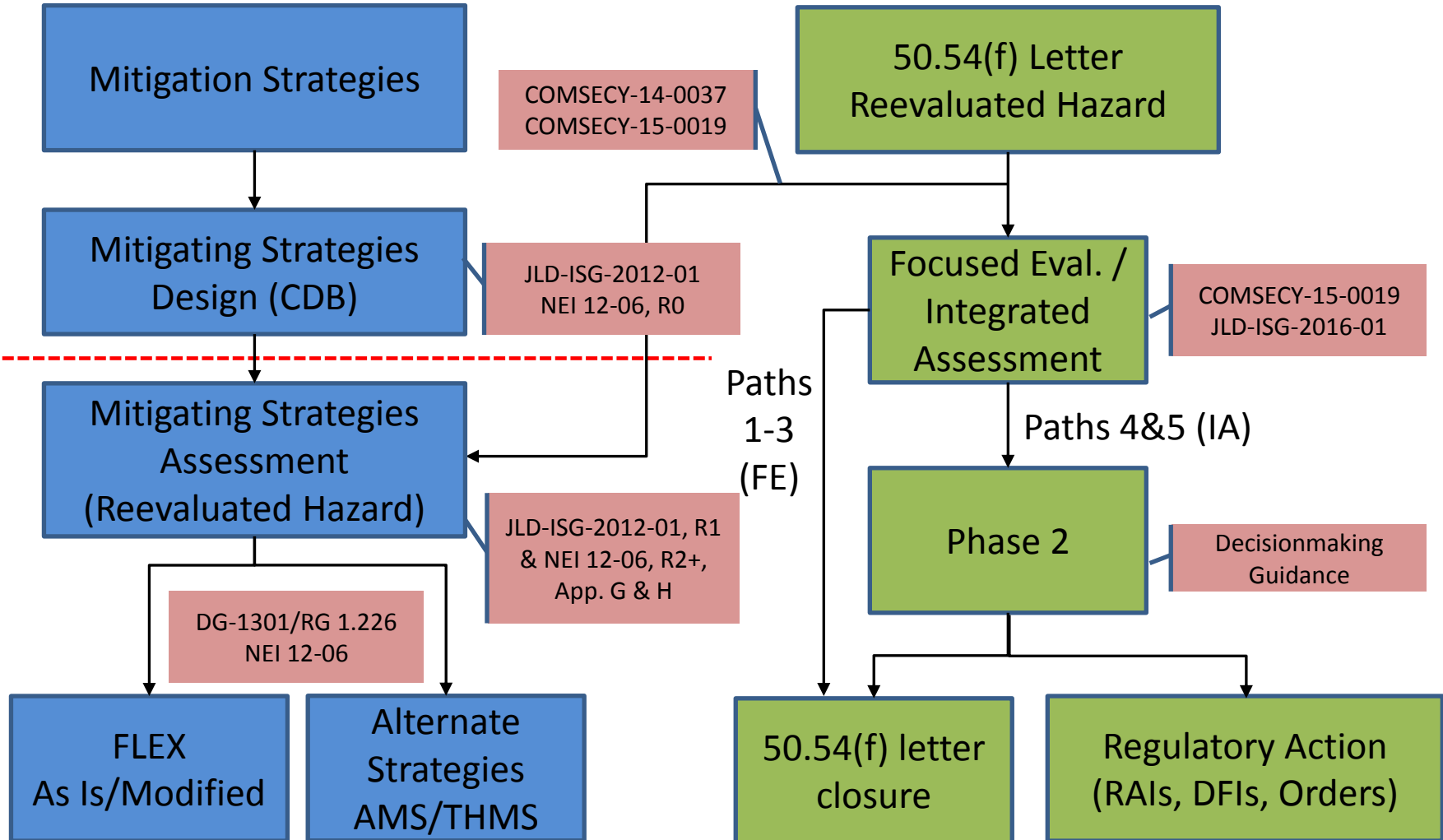
Purpose

- To provide guidance for closure of flooding hazard reevaluations by:
 - Endorsing NEI 16-05 with clarifications in order to provide a graded approach to identify the need for, prioritization, and scope of, integrated assessments.
- Guidance for making regulatory decisions for integrated assessments will be issued separately.

Closure of Seismic and Flooding Hazard Reviews



MBDBE Rule § 50.155



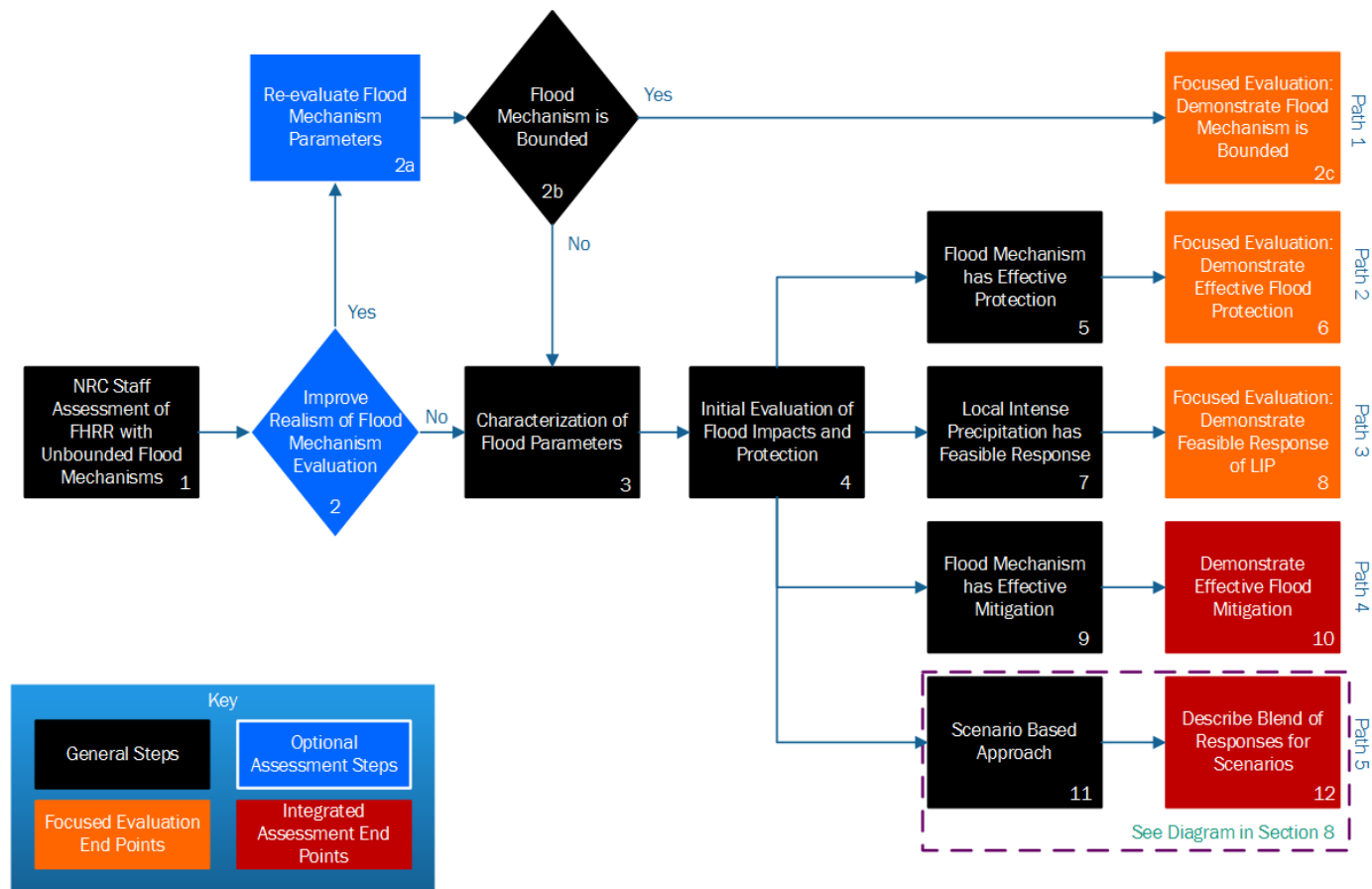
Anticipated Regulatory Outcomes

- Under 50.54(f) Letter:
 - Interim actions addressing hazard
 - Commitments to justify improved realism:
 - Plant modifications
 - Programs and Procedures
 - Phase 2 Regulatory decisions
- Under MBDBE Rule:
 - Mitigating strategies for hazard without change to improve realism

Industry Proposed Guidance: NEI 16-05

- JLD-ISG-2016-01 issued in draft form by Federal Register Notice dated April 22, 2016 (81 FR 23758)
- Comment period runs through May 23, 2016
- Docket Number: NRC-2016-0084

NEI 16-05 Flood Impact Assessment Process



Reductions of Conservatism

- SRM-COMSECY-15-0019: “[S]taff should continue to look for additional opportunities to address any over conservatism.”
- Method: NUREG/CR-7046 HHA Process
- Catalog of potential sources of conservatism in NEI 16-05, App. A to consider in HHA
 - Site-specific consideration of changes

Initial Evaluation of Impact and Protection

- NEI 16-05, Section 6.3.1 is acceptable

Determination of Available Physical Margin

- NEI 16-05, Section 6.3.2 and Appendix B are acceptable with clarifications
 - The considerations of the December 23, 2013 RAI (ML13325A891) should account for the reevaluated flood parameters rather than the current licensing basis flood height
 - Reliability of temporary features should consider operating experience

Path 1 – Bounded by Design Basis

- Licensees may use bounding sets of flood parameters to disposition groups of flood mechanisms, leaving others to be dispositioned by other paths

Path 2 – Effective Flood Protection

- NEI 16-05, Section 7.2 and App. B & C are acceptable with clarifications:
 - Resulting qualitative evaluation of site response will be reviewed using engineering judgment (See COMSECY-15-0019)
 - The considerations of the December 23, 2013 RAI (ML13325A891) should account for the reevaluated flood parameters rather than the current licensing basis flood height

NEI 16-05, Appendix C, Evaluation of Overall Site Response

- Relies on Feasibility Determination using NEI 12-06, Appendix E, Validation Guidance
- Consistent with Commission Policy and Regulation on Fire Protection Operator Manual Actions as Expressed in 10 CFR 50.48(c); NFPA 805-2001, § 4.2.4.1.6; and NFPA 805-2001, § B.5.2 as endorsed by the Standard Review Plan NUREG-0800, Chapter 9.5.1.2, Section III.3.2.2.
- NRC staff intent is to balance the burden imposed in evaluating site response with the state of the art in determination of flooding frequencies in order to allow exercising qualitative engineering judgment as described in COMSECY-15-0019 and its associated SRM in the absence of fully developed quantitative information on flooding risk.

Path 3 – Local Intense Precipitation

- NEI 16-05, Section 7.3

As discussed in COMSECY-15-0019, “licensees [with LIP hazards exceeding their current design-basis flood should] assess the impact of the LIP hazard on their sites and then evaluate and implement any necessary programmatic, procedural or plant modifications to address this hazard exceedance. This assessment includes evaluation and justification for: crediting systems that were assumed clogged during the hazard reevaluations; and considering available warning time and flood protection measures, both permanent and temporary, as well as associated manual actions.” Licensees may use the process described in the NEI White Paper, “Warning Time for Maximum Precipitation Events,” dated April 8, 2015 (ADAMS Accession No. ML15104A157), and the related NRC letter dated April 23, 2015 (ADAMS Accession No. ML15110A080) in order to take advantage of warning time for LIP.

Path 3 – Local Intense Precipitation

- Licensees should assess protection of key SSCs as defined in NEI 16-05 with the considerations described above. Protection should include considerations described in Appendix B. If the key SSCs cannot be protected from the LIP hazards, licensees should attempt to mitigate the impact of the LIP on key SSCs. Demonstration of mitigation capability could include reliance on the mitigating strategies assessment LIP evaluation.
- NRC staff reviewing the plant response evaluation for LIP should apply engineering and operational judgment.

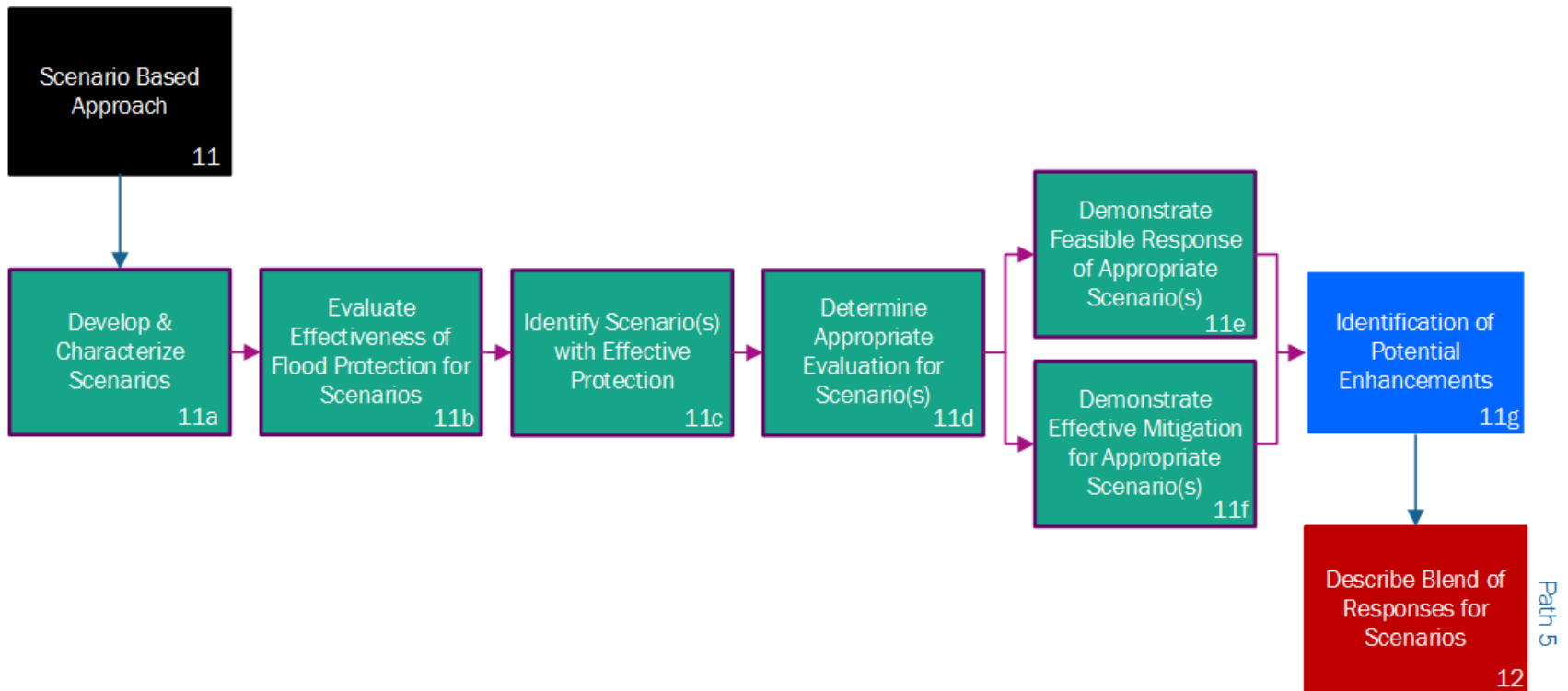
Path 4 – Demonstrate Effective Mitigation

- NEI 16-05, Section 8.1
- Licensees should provide corresponding information to address critical flood elevations from NEI 16-05, Section 6.3.1, including frequencies of exceedance

Path 4 and Path 5 Frequency Determinations

- a. Appendix D, Section D.2, compiles selected methods and references related to developing a probabilistic characterization of flooding hazards that have been used primarily in applications not related to nuclear power plants. When applying methods and references provided in Section D.2, licensees should assess the methods and references to:
 - Verify that that references have not been superseded or rescinded due to identified technical inadequacies or shortcomings. Limitations on rescinded references do not apply to documents that have been administratively withdrawn for reasons not related to technical adequacy (e.g., due to administrative schedules associated with Standards).
 - Ensure context and caveats related to the numerical values in Table D-1 (as described in USBR, 2004) and Figure D-1 as well as the methods and references described in Table D-2 are addressed.
- b. To establish the frequency of exceeding a given measure of flood severity, the licensee should aggregate the contributions from a range of potential flooding mechanisms and relevant contributing events and should not limit the assessment to development of frequencies associated with deterministic event combinations (e.g., combinations identified in NUREG/CR-7046) shown in Section D.3.

NEI 16-05 Path 5 Detail



Path 5 – Scenario-Based Approach

- NEI 16-05, Section 8.2 and App. D
- Scenarios developed should include critical flood elevations
- Identification of scenarios with effective flood protection should include path 2 considerations of NEI 16-05 and ISG
- Frequencies of exceedance should be developed with a methodology that conforms to App D, taking into account PFHA attributes and clarifications of ISG

Backup

Coupled Seismic and Flooding

- Seismic dam failure addressed in NTTF 2.1 Flooding
- Seismic dam failure to be further addressed in NTTF 2.1 Seismic for SPRA plants
- Plant equipment (SSCs) addressed in both NTTF 2.1 Flooding and Seismic
- Plants with dams in proximity typically examined seismically induced flooding although not an explicit part of mitigating strategies guidance

Comments on JLD-ISG-2012-01 endorsement of NEI 16-05

NEI Fukushima Flooding Task Force

ACRS Meeting

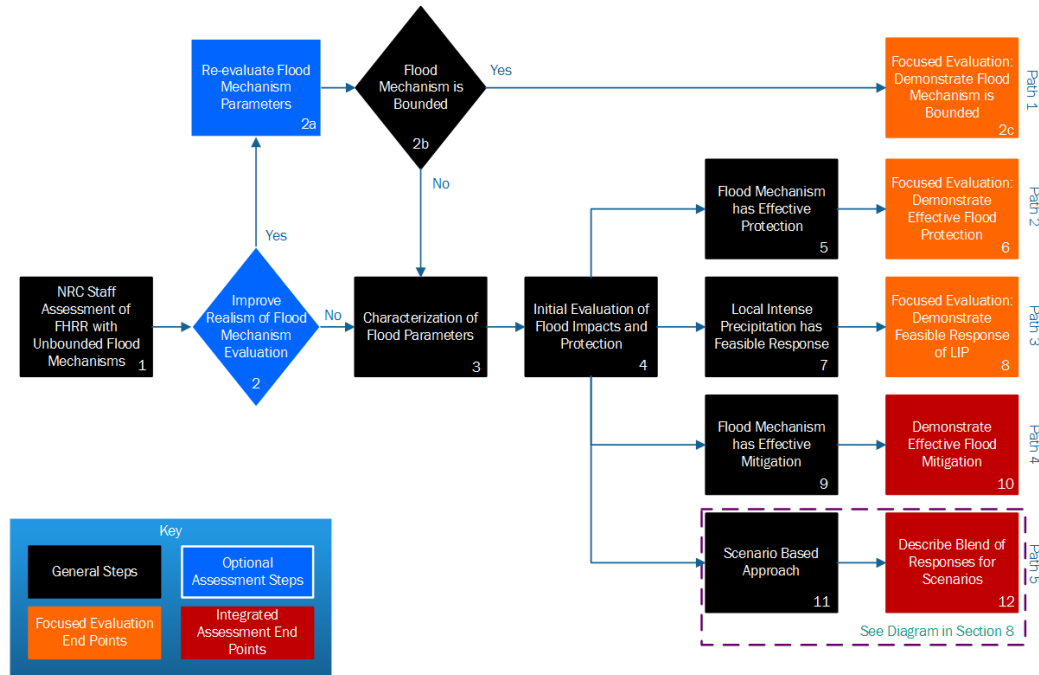
May 5, 2016 • NRC Headquarters White Flint



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Flooding Impact Assessment Process



Flooding Impact Assessment Process

Path	Required level of Evaluation	Elements to be Evaluated	Relevant Guidance
Path 1 (Section 7.1)	Flood Hazard Evaluation	Flood Mechanism Parameters	NEI 16-05 Appendix A
Path 2 (Section 7.2)	Effective Flood Protection	Available Physical Margin	NEI 16-05 Appendix B
		Reliability of Protection Features	NEI 16-05 Appendix B
		Overall Site Response	NEI 16-05 Appendix C
Path 3 (Section 7.3)	Feasible Flood Response for LIP (Protection and/or Mitigation)	Reliability of Protection Features and Mitigation Equipment	NEI 12-06
		Feasibility of Manual Actions	
Path 4 (Section 8.1)	Effective Flood Mitigation	Reliability of Mitigation Equipment	NEI 16-05 Appendix B
		Overall Site Response	NEI 16-05 Appendix C
Path 5 (Section 8.2)	Scenario Based Approach (Blend of Responses)	Various	Various

IA Path 4: Effective Flood Mitigation

- Process steps for each mechanism:
 - Demonstrate that the mitigation equipment is reliable (Appendix B)
 - Demonstrate overall site response is adequate (Appendix C)
- Intended to be utilized for sites with mechanisms where site-specific frequency development would be challenging (e.g. dam failure)

ISG Clarification on Path 4

- *Information submitted to the NRC should include the frequency of exceedance for the critical flood elevations or (if appropriate) should identify that the frequency of exceedance for the critical flood elevations is estimated to be less than 1E-4/year.*

Level of Complexity for Frequency Development

- Lower Complexity – Precipitation and river type mechanisms should be able to apply Bulletin 17B with possible validation using another distribution function
- Higher Complexity – Situations where upstream dam failure is the governing flood mechanism
 - Very large effort for frequency development
 - Lack of accepted methodology
 - Lack of access to dam information from USACE
- Requiring Likelihood makes Path 4 and 5 the same

ISG Clarification for Frequency Development

- *NEI 16-05, Appendix D provides available methods for estimating frequencies greater than 10^{-4} /year. When applying these methods, the licensees should consider the attributes described in Enclosure 2*

Comments on ISG Enclosure 2

- Enclosure 2 provides high level overview guidance for PFHA which is not needed for the flooding assessment
- Including Enclosure 2 in the ISG causes confusion as specific attributes needed and how to address are not identified
- Implementation of peer reviews will prove very difficult due to:
 - Limited flooding expert resources
 - Lack of peer review process

NRC Staff Preliminary Assessment of Natural Hazards other than Flooding and Seismic

ACRS Full Committee Meeting
May 5, 2016



Background

- Resolution plan for remaining Tier 2 and 3 activities provided in SECY 15-0137, “Proposed Plans For Resolving Open Fukushima Tier 2 and 3 Recommendations”
- Natural Hazards other than Seismic and Flooding binned as Group #3 activity in SECY 15-0137
 - More detailed assessment and/or justification for resolution being prepared; ACRS/external stakeholder interactions would inform resolution of the recommendation; work to be completed in 2016
- Commission decision on SECY-15-0137
 - Other Natural Hazards interim status to be provided end of May 2016
 - Commission directed that the interim status include the results of the staff’s assessment through step 2 of the process outlined in SECY-15-0137



Background

- Staff plans to meet Commission direction for assessment of natural hazards other than seismic and flooding
 - White paper providing the staff's preliminary assessment publicly issued on March 24, 2016 (ADAMS Accession No. ML16039A054)
 - Category 3 public meeting held on April 5, 2016, to solicit comments on white paper
 - ACRS Fukushima Subcommittee briefed on April 21, 2016, action items from the meeting include:
 - Provide updated assessment reflecting additional changes the staff is considering as a result of stakeholder comments (completed via transmittal of updated draft assessment in memorandum dated April 26, 2016 (ADAMS Accession No. ML16117A041))
 - Provide discussion of status of NRC geomagnetic storm activities during May 5, 2016, ACRS Full Committee meeting
 - Several items provided by ACRS members for NRC Staff consideration (to be discussed in following slides)
 - Staff plans to provide an updated interim assessment by end of May 2016 in accordance with Commission direction
 - Staff targeting providing final assessment to the Commission by end of December 2016



Background

- Based on ACRS and other stakeholder comments, staff considering adding an appendix to describe comment and staff's resolution of comment. Issues identified to date include the following:

Item #	Issue
1	Hurricane evaluation should consider warning time, and attributes of a hurricane that make it unlikely to lift an automobile. Staff should also consider that automobile missiles represent surrogate missiles.
2	Staff should identify plants by names that are the subject of the snow load and high wind evaluations
3	Document should include updated Electric Power Research Institute (EPRI) guidance for natural hazards
4	Low water evaluation for Robinson should address Reactor Coolant System (RCS) inventory control strategies
5	Low water evaluation for seiche should address RCS inventory control strategies
6*	The staff should also consider the possibility of the natural hazard alone creating a loss of access to the ultimate heat sink (UHS).

* Indicates ACRS member comment from April 21, 2016, Fukushima Subcommittee meeting



Background

- Stakeholder comments continued

Item #	Issue
7*	Columbia volcanic ash assessment should address plant's capabilities to respond to byproducts of a volcano.
8*	The staff should consider addressing the nexus between the waterspout evaluation and the tornado evaluation.
9*	The staff should consider whether the mitigation strategies guidance addresses the possibility of a seismically qualified dam overtopping and failing.
10*	The staff should consider whether the mitigation strategies addresses the possibility of seismic failure of an upstream dam coincident with the seismic event affecting the power plant.
11*	The staff should consider for its low water seiche assessment whether coastal plants are susceptible to this condition because of the arrangement of their ultimate heat sink.
12*	The staff should consider whether the dust storm evaluation should consider the potential of the plant being affected by small particles that could interfere with the operation of the plant.

* Indicates ACRS member comment from April 21, 2016, Fukushima Subcommittee meeting



Overview of 4 Step Process for Evaluation of Other Natural Hazards

Four Step Process

- 1) Define natural hazard other than seismic and flooding to determine those hazards that could pose a threat to nuclear power plants
- 2) Determine and apply screening criteria to exclude certain natural hazards from further generic evaluations, or exclude some licensees from considering certain hazards
- 3) Perform a technical evaluation to assess the need for additional actions if the hazard or licensee was not screened out generically in Task 2
 - Consider whether a request for information in accordance with 10 CFR 50.54(f) is appropriate (approach taken for seismic and flooding)
 - Enough information at this stage to require action in accordance with 10 CFR 50.109 (backfit process)
- 4) Based on results of Task 3, determine if additional regulatory actions are needed



Preliminary Results of Step 1 Assessment

- Hazards identified for consideration found in Appendix A of white paper
- Man-made hazards excluded from further consideration
- Natural hazards listed in Appendix A Table A-1
- Natural hazards excluded from further consideration (basis provided in Appendix A) include:

Animals	Avalanche	Biological Events, coastal erosion, ice barrier, ice cover, biological plugging of intakes
Corrosion	External flooding*	Extreme air pressure
Fog/mist, frost, hail, landslide	Dust storms, forest fire, grass fire, ice storm/freezing rain, sleet, lightening, sandstorms, salt storm	Land rise, sink holes, soil shrink-swell, underwater landslide (impact on soil, that is not a tsunami)
Meteorite	Seismic activity*	Geomagnetic storms**
Waterspout	Volcanic activity**	

*Seismic and Flooding being evaluated in accordance with Recommendation 2.1

** Additional discussion regarding geomagnetic storms and volcanic activity on next slide



Geomagnetic Disturbances

- Mitigation of Beyond Design Basis Event (MBDBE) Rulemaking
 - Discusses geomagnetic disturbances
 - References petition for rulemaking (PRM) 50-96
 - NRC received comments on geomagnetic disturbances in response to MBDBE proposed rule and is in the process of assessing comments
- PRM 50-96 – in addition to being referenced in MBDBE proposed rule, the NRC staff will follow the PRM process for resolving the concern
- Other Federal Activities
 - Federal Energy Regulatory Commission (FERC) geomagnetic disturbances rulemaking
 - Proposed rule published in Federal Register on May 26, 2015 (80 FR 29990)
 - NRC staff members part of space weather operations, research, and mitigation (SWORM) task force
 - White House Office of Science and Technology Policy (OSTP) leading effort to implement National Space Weather Strategy (NSWS) and National Space Weather Action Plan that were issued October 2016:
https://www.whitehouse.gov/sites/default/files/microsites/ostp/final_nationalspaceweatherstrategy_20151028.pdf
https://www.whitehouse.gov/sites/default/files/microsites/ostp/final_nationalspaceweatheractionplan_20151028.pdf



Preliminary Results of Step 1 Assessment

- Natural Hazards reviewed in accordance with Step 1 (continued)
 - Hazards proposed to proceed to Step 2 of the process
 - Wind and missile loads from tornadoes and hurricanes
 - Snow and ice loads for roof designs
 - Drought and other low water conditions
 - Extreme temperatures



Preliminary Results of Step 2 Assessment

- Wind and missile loads from hurricanes and tornadoes and snow loads move to Step 3 of the process
- Drought and other low water conditions and extreme temperatures evaluated as part of Step 2



Preliminary Assessment of Low Water Conditions

- Three low water conditions evaluated
 - Drought
 - Low water conditions due to downstream dam failure
 - Low water conditions due to a seiche
- Criteria applied include
 - Conservatism of design
 - Operational limits
 - Warning time



Preliminary Assessment of Low Water Conditions

- Drought
 - Warning time would allow licensees to take appropriate actions
- Low water conditions due to downstream dam failure
 - Staff addressed as pre-generic issue (next slide)
 - Pre-generic issue closed by March 11, 2016, letter based on:
 - Plants with non-seismically qualified downstream dam developed mitigating strategies to cope
 - Risk assessment performed for plants with seismically qualified downstream dams
 - All sites screen out except Robinson
 - Conclusion:
 - Generic regulatory action to address downstream dam failures not warranted
 - Robinson has been evaluated separately considering:
 - Capabilities of deepwell pumps
 - Newly-installed SHIELD seals
 - Further evaluation as part of NTTF 2.1 activities



Preliminary Assessment of Low Water Conditions

- Low water conditions due to a seiche
 - Staff addressing as part of pre-generic issue
 - March 18, 2015, Region III letter identified possible generic issues (ADAMS Accession No. ML15078A284)
 - One concern is storm can cause low water level conditions that result in damage to safety related ultimate heat sink pumps
 - Plants along the Great Lakes and Chesapeake Bay evaluated
 - Staff evaluation of sites that could be impacted
 - Majority of sites do not rely on UHS for FLEX or have at least a 24 hour water supply (outlasts seiche) before UHS is needed to provide decay heat removal capabilities via FLEX
 - FLEX can provide cooling when UHS water level recovers
 - Units that do not have 24 hour water supply are dispositioned using a combination of hazard and site-specific conditions
 - Preliminary Conclusion
 - Additional regulatory action to address seiche not warranted



Preliminary Assessment of Low Water Conditions

Low water conditions due to a seiche (continued)

- Changes that the staff is considering to the assessment as a result of stakeholder comments:
 - Adding a discussion of how reactor coolant system inventory control could be maintained in the event of the loss of the safety-related ultimate heat sink
 - Use of low leakage reactor coolant pump seals
 - Specific discussion of plants that do not have 24 hours of water on-site
 - Based on ACRS member comment during April 21, 2016, Fukushima Subcommittee meeting staff evaluating coastal sites that could be susceptible to a seiche



Preliminary Assessment of Extreme Temperatures

- Extreme Temperature Assessment considered high and low extreme temperatures
 - Extreme high-temperature
 - Evaluation considered technical specification requirements
 - Example technical specifications includes ultimate heat sink, containment air temperature and control room emergency air temperature
 - If air temperatures outside of design-basis temperature are expected, licensees are expected to take actions
 - Subject to NRC inspection
 - Mitigation strategies equipment consider potential impacts of high temperature (both procurement and operation (e.g., consideration of expansion of sheet metal))



Preliminary Assessment of Extreme Temperatures (continued)

- Extreme low-temperature
 - If air temperatures outside of design-basis temperature are expected, licensees are expected to take actions
 - Information notices associated with cold temperatures
 - IN 96-06 on degradation of cooling water systems due to icing
 - IN 98-02 on cold weather protective measures
 - Subject to NRC inspection
 - Mitigation strategies equipment consider potential impacts of low temperature (both procurement and operation (e.g., consideration of ice blockage and frazil ice))
- Preliminary Conclusion
 - Additional regulatory action to address extreme temperatures not warranted



Preliminary Results of Step 3 Assessment

- Wind and missile loads from hurricanes and tornadoes and snow loads move to Step 3 of the process
- Staff identified issues
 - New guidance provided in both areas after current operating fleet began operation
 - Preliminary assessment includes a discussion of the issue and staff's preliminary process for evaluating issues
 - Staff to provide complete assessment to the Commission by end of December 2016



Preliminary Results of Step 3 Assessment

- Snow loads
 - DC/COL Interim Staff Guidance 007, “Assessment of Normal and Extreme Winter Precipitation Loads on Roofs of Seismic Category I Structures,” issued July 1, 2009, provides guidance for:
 - Calculating 100 year snow loads
 - Calculating extreme snow loads
 - Combination of 100 year snow load and 48 hour probable maximum precipitation event
 - As part of Task 3 the staff will continue to assess design conservatism and warning time (including actions licensees take in the event of an extreme snow event) to determine if additional regulatory actions are warranted



Preliminary Results of Step 3 Assessment

- Wind and missile loads from hurricanes and tornadoes
 - New guidance documents recently issued
 - Regulatory Guide 1.76 Revision 1 on design-basis tornadoes and tornado missiles issued in March 2007
 - Regulatory Guide 1.221 on design-basis hurricanes and hurricane missiles issued in October 2011
 - RG 1.76 Rev 1 tornado wind speeds generally went down
 - Different missile spectrum from 1975 version of standard review plan
 - Automobile missile speeds for same weight automobile went up in some areas



Preliminary Results of Step 3 Assessment

- Wind and missile loads from hurricanes and tornadoes (continued)
 - RG 1.221 hurricane
 - Hurricane wind speeds generally bound by tornado wind speeds for a given site
 - Hurricane missile speeds higher than comparable tornado for sites susceptible to hurricanes
 - Hurricane-generated missile has longer time in hurricane wind field than tornado wind field
 - Staff assessment consists of:
 - Evaluation of Pre-General Design Criteria Plants
 - Plants evaluated against 1975 version of the standard review plan



Preliminary Results of Step 3 Assessment

- Wind and missile loads from hurricanes and tornadoes (continued)
 - Staff Assessment continuing as part of Task 3
 - Consider insights gained from past IPEEEs and current high wind studies
 - Gain further understanding of licensees anticipatory actions in preparation for approaching hurricanes
 - Updated assessment to be completed by December 2016



Next Steps

- Make adjustments to assessment based on ACRS feedback
- Provide updated assessment to Commission by end of May 2016
- Completed assessment due to Commission by end of December 2016
 - Staff envisions public meeting(s) in the summer to discuss snow load and wind load assessments
 - Assessment will be updated based on stakeholder interactions and the results of additional analysis that the staff is considering
 - Engage ACRS in the fall of 2016 based on updated assessment



Acronyms

- ACRS – Advisory Committee on Reactor Safeguards
- ADAMS – Agencywide Documents Access and Management System
- CFR – *Code of Federal Regulations*
- COL – Combined License
- DC – Design Certification
- EPRI – Electric Power Research Institute
- FERC – Federal Energy Regulatory Commission
- FLEX – diverse and flexible coping capability
- IPEEE– Individual Plant Examination of External Events
- ISG – Interim Staff Guidance
- MBDDBE – Mitigation of Beyond-Design-Basis Events
- NRC – Nuclear Regulatory Commission
- NSWs – National Space Weather Strategy
- NTTF – Near-Term Task Force
- OSTP – Office of Science and Technology Policy
- RCS – reactor coolant system
- RG – Regulatory Guide
- SECY – Office of the Secretary of the Commission
- SWORM – Space Weather Operations, Research and Mitigation Task Force
- UHS - ultimate heat sink





NuScale Topical Report: Risk Significance Determination

Mark Caruso

PRA and Severe Accident Branch

Office of New Reactors

Presented to ACRS

May 5, 2016

Overview of Presentation

- Summary of Topical Report
- Staff Evaluation
 - Bases for acceptance
 - conditions and limitations placed on use of topical report
- Discussion of issues raised at Subcommittee meeting

- **Proposes NuScale specific criteria for assessing risk significance**
 - component risk-significant if conditional CDF (CCDF) $> 3 \times 10^{-6}/\text{yr}$ or LRF (CLRF) $> 3 \times 10^{-7}/\text{yr}$
 - system risk-significant if CCDF $> 1 \times 10^{-5}/\text{yr}$ or CLRF $> 1 \times 10^{-6}/\text{yr}$
 - Risk-significant if total FV > 0.20
 - CDF and LRF

Reasons for NuScale Specific Criteria

- Current criteria endorsed by staff based on level of risk in operating reactors and not valid for designs showing very little risk
- For low risk plants the traditional relative criteria identify as important structures, systems, and components (SSCs) that don't really impact the risk results

Technical Bases for Criteria

- Consistent with RG 1.174 criteria for permanent licensing basis changes: ΔCDF between $10^{-5}/\text{yr}$ and $10^{-6}/\text{yr}$ considered if $\text{CDF} < 1 \times 10^{-4}/\text{yr}$
- Component level versus system level adjustment in-line with industry practice (NEI 00-04)

Staff's Findings

- Using risk metrics based on absolute changes in risk in conjunction with base CDF and base LRF is OK because it's consistent with guidance in RG 1.174
- Threshold of 3×10^{-6} per year is OK because it's consistent with threshold used in RG 1.174 and NRC regulatory analysis guidelines
- Importance measures (e.g., RAW, FV) may be scaled based on consequence metrics (CDF, LRF) and conditional risk thresholds
- Selection of .2 as upper bound on FV is reasonable
- Allowance for uncertainty in PRA is reasonable
- Selection of threshold for system level basic events consistent with industry practice accepted by NRC
- LRF threshold an order of magnitude below the threshold for CDF is consistent with the approach taken in RG 1.174 and NRC's goal for conditional containment failure in advanced reactors (< 0.1)

Conditions and Limitations on Approval

1. Approval is specific to the NuScale design.
2. Applicant or licensee may compare criteria with PRA results to identify candidate risk-significant SSCs; determination of risk-significance for specific applications will consider additional factors and is reviewed independently.
3. Applicant or licensee must use technically adequate PRA for single module that addresses internal hazards and external hazards, and all operating modes, including low-power and shutdown; PRA must account for contribution to single module CDF and LRF from events or conditions in other modules.
4. Approval is for method of deriving values for importance measures, not specific values of importance measures themselves.

Issues Raised at Subcommittee Meeting

- Approval of importance measures or not?
 - RAW – no
 - F-V – upper bound only
- Ad hoc approach to scale-able criteria
 - Risk Achievement
 - Thresholds proposed for CDF and LRF independent of base values (no RAW needed)
 - F-V
 - Will scale as CDF and LRF go up
 - Not if CDF and LRF go down
- Implementation of SSC categorization
 - Criteria apply at component level or basic event level?
 - Fussell-Vesely importance measures applied on a hazard specific basis

Implementation Issues

- SER says implementation for specific applications done case-by-case
 - SSC categorization for D-RAP reviewed as part of design certification review
- Industry techniques for using importance measures to risk-rank SSCs in NEI 00-04 (rev 0)
- Staff endorsed use of NEI 00-04(rev 0) in guidance (Regulatory Guide (RG) 1.201) for implementation of 10 CFR 50.69, “Risk-Informed Categorization and Treatment of SSCs for Nuclear Power Reactors”
- Staff specifies RG 1.201 as acceptable approach for D-RAP categorization in Standard Review Plan Section 17.4, “Reliability Assurance Program”

