



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

July 14, 2016

MEMORANDUM TO: ACRS Members

FROM: Kathy D. Weaver, Senior Staff Engineer
 Reactor Safety Branch A, ACRS

SUBJECT: CERTIFICATION OF THE MINUTES FOR THE ACRS
 FUKUSHIMA SUBCOMMITTEE MEETING ON APRIL 21,
 2016, ROCKVILLE, MARYLAND

The minutes of the subject meeting were certified on June 28, 2016, as the official record of the proceedings of that meeting. A copy of the certified minutes is attached.

Attachment: As stated

cc w/o Attachment: A. Valentin
 M. Banks



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

MEMORANDUM TO: Kathy D. Weaver, Senior Staff Engineer
Reactor Safety Branch A, ACRS

FROM: John Stetkar, Chairman
Fukushima Subcommittee

SUBJECT: CERTIFICATION OF MINUTES FOR THE ACRS
FUKUSHIMA SUBCOMMITTEE MEETING ON APRIL 21,
2016, ROCKVILLE, MARYLAND

I hereby certify, to the best of my knowledge and belief, that the minutes of the subject meeting on April 21, 2016, are an accurate record of the proceedings for that meeting.

/RA/ 06/28/2016
John Stetkar, Date
Chairman, Fukushima Subcommittee

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
MINUTES OF THE ACRS FUKUSHIMA SUBCOMMITTEE MEETING
APRIL 21, 2016

The ACRS Fukushima Subcommittee held a meeting on April 21, 2016 in Room T-2B3, 11545 Rockville Pike, Rockville, Maryland. The purpose of this open public meeting was for the committee to review and discuss with NRC staff, their determination and application of screening criteria to appropriately exclude certain natural hazards from further generic evaluations or exclude some licensees from considering certain hazards. The Commission as documented in SRM/SECY 15-0137 directed the staff to perform these screening determinations as an interim deliverable due no later than May 2016.

ATTENDEES/PRESENTERS

ACRS Members/ Staff

John Stetkar, Chairman
Ron Ballinger, Member
Dennis Bley, Member
Charles Brown, Member
Dana Powers, Member
Harold Ray, Member
Peter Riccardella, Member
Gordon Skillman, Member
Joy Rempe, Member
Stephen Schultz, Consultant
Kathy Weaver, ACRS Staff, DFO

Other Attendees

Stewart Bailey, NRR
Eric Bowman, NRR
Joseph Sebrosky, NRR
William Reckley, NRR
Timothy Reed, NRR
Mohamed Shams, NRR
Brad Harvey, NRO
Gwen Dubois, Physicians for Social Responsibility
Regina Minniss, Private Citizen

SUMMARY

The purpose of this meeting was for the Subcommittee to review the NRC staff's white paper on the updated assessment of Fukushima Tier 2 recommendations related to the evaluation of natural hazards other than seismic and flooding. The Subcommittee gathered information, analyzed relevant issues and facts, and formulated proposed positions and actions for deliberation by the Full Committee during the May 2016 Full Committee meeting. The following table lists the significant issues that were discussed during the meeting with the corresponding pages in the transcript.

Significant Issues	Reference Pages in Transcripts
Chairman Stetkar opened the meeting at 1:05 p.m.	5
<p>The NRC staff provided a brief overview of the actions the staff has taken regarding the treatment of other natural hazards. Mr. Shams of NRR discussed the staff's white paper. He explained that last year the staff put together a plan on how to address these hazards, which was presented in SECY 15-0137. The plan included four steps. Step 1 was identification of the spectrum of hazards to look at. Step 2 was to apply screening criteria to narrow down the field to those that deserve additional review and/or regulatory actions. Step 3 was to do further evaluations of those hazards that are not screened out in Step 2. Step 4 would be to report to the Commission if there's any proposal of regulatory actions. He stated that the staff has completed Step 1 and 2. He stated that the white paper is the foundation of a SECY paper, which is an interim product that the Commission requested. Mr. Shams stated that for most of the hazards and sites, they do not see the potential need for regulatory actions. However, they have identified snow and high wind as two hazards that will receive further review.</p>	7-10
<p>Chairman Stetkar questioned the staff about how the current regulatory process captures issues like high temperatures, which are addressed during original licensing but not updated. He further commented that 30 or 50 years later, more meteorological data have been collected, which may capture extremes in temperature that were not examined in the initial licensing. Plant heat loads may have also changed such that ventilation demands and assumptions regarding exterior temperatures might not necessarily be valid. The staff responded that there are tech specs on ultimate heat sink temperature, tech specs on the containment temperature, and tech specs on the control room temperatures, which address the plant heat sinks. The staff stated that licensees who see ultimate heat sink temperatures increase will come to NRC for a tech spec amendment. There was much discussion regarding how the licensees address these issues using the Technical Specifications, the 10 CFR 50.9 process, and operability determinations.</p>	13-23
<p>ACRS Consultant Steve Schultz commented that in the white paper, the staff states that they also have ongoing international activities with regard to standards development and other related comparative projects. Consultant Schultz commented that he interpreted that going forward, if things come out of those engagements, then changes or adjustments would be made. The staff responded that they believe those activities are not going to reverse the staff's decisions and will in fact support them. The staff also noted that the generic issues program and other programs</p>	23-24

<p>can bring information to the Commission's attention. Consultant Schultz commented that one example is the standards associated with instrumentation and related investigations into instrumentation capability in severe accidents.</p>	
<p>The staff began the discussion on the White Paper Appendix A, which discusses the preliminary results of Step 1 of the assessment. Chairman Stetkar commented that when he reviewed Appendix A, he had questions about the basis for excluding some hazards, such as avalanches and landslides. Chairman Stetkar commented that as he read through the information, he noticed a preponderance of focus on “does it cause an extended loss of AC power and loss of the ultimate heat sink or loss of access to the ultimate heat sink.” Chairman Stetkar commented that the screening/thought process should not have been limited to only combined loss of AC power and loss of the heat sink, because some hazards could, in principle, threaten loss of the heat sink alone. There was much discussion on these examples.</p>	26 – 43
<p>The staff began the discussion about volcanic activity. The staff explained that their evaluation referenced a response to a recent 10 CFR 2.206 petition, which questions what they are doing for plants that could be affected by eruption of the Yellowstone super volcano. The staff white paper concludes that the effects from volcanic ash or volcanic activity would be limited to the Columbia site. All other operating nuclear plant sites are too far away to consider the threat. There was much discussion on the volcanic ash hazard.</p>	44-50
<p>Chairman Stetkar made the comment that he has not seen an evaluation which concludes that the air quality is adequate for operation of equipment such as portable gas turbines, portable diesel generators, or whatever is being used during Phase 2 or Phase 3 of the FLEX response strategy. He further commented that this issue isn't addressed explicitly in NEI 12-06. The staff responded that it's an implicit assumption, given the hazard. Member Powers commented that the air quality problem during the eruption of Mount St. Helens was just disastrous.</p>	49-50
<p>The staff began the discussion on geomagnetic storms. They stated that because geomagnetic storms are being evaluated under a Tier 1 activity, they can close this Tier 2 activity. The staff further stated that the proposed mitigation of beyond-design-basis event rulemaking mentions a separate petition for rulemaking associated with geomagnetic storms. As part of that proposed rule, the staff has received public comments on geomagnetic storms, which they are currently evaluating.</p>	52
<p>Chairman Stetkar stated that these issues have to be resolved by the end of this year. He questioned if the staff was simply passing the issue of geomagnetic storms to someone else. The staff responded that they could not give a timeline for when the issue is going to be resolved in the rule, because some of this</p>	53 - 63

activity is outside the purview of the NRC. For example, FERC has the lead on grid stability issues, and the staff is also involved with a White House initiative to look at geomagnetic storms. There was much discussion on closure of these issues.	
The staff provided a summary of their white paper. Joe Sebrosky stated that four groups of hazards remained after Step 1: wind and missile loads from tornados and hurricanes, snow and ice loads for roof designs, drought and other low-water conditions, and extreme temperatures. These four sets moved on to evaluation Step 2.	67
The staff stated that from their evaluation in Step 2, they believe they have enough information to resolve drought and other low-water conditions, and extreme temperatures.	68
During discussion on low-water conditions due to downstream dam failures, the staff noted that this issue was closed out for all plants except Robinson in March 2016. The staff stated that plants with non-seismically qualified downstream dams are developing mitigating strategies to cope with dam failures. They noted that risk assessments were performed for plants with seismically qualified downstream dams. There was much discussion on this topic.	70-78
Member Ray questioned how seismic qualification of the dams was established. Was it just that they were asserted to have been designed to seismic standards, or was the design reviewed in any way? The staff responded that the risk analysis is non-public. The staff further stated that most of the dams are owned and operated by different federal organizations: the Corps of Engineers, FERC, Bureau of Reclamation. Those organizations have periodic inspections and periodic risk assessments. There was much discussion of NEI 12-06 and other guidance for evaluating robust, seismic and non-seismic dams.	78-85
Chairman Stetkar questioned the staff about whether plants, as part of their flooding re-evaluation, can have a "wall of water" coming down the watershed that is not high enough to inundate the plant, but the water can damage the downstream dam and take away their ultimate heat sink. He wanted to know if there were any sites, susceptible to that phenomenon. There was much discussion regarding this issue.	89-98
The staff began the discussion on low water conditions due to a seiche. There was much discussion regarding the plants on the Great Lakes, the Gulf of Mexico, and the Chesapeake Bay.	98
Chairman Stetkar questioned the staff if any coastal site is located on a body of water that is susceptible to a wind-driven seiche which could affect just that body of water and not the broader ocean. The staff responded they that they would get a response for Chairman Stetkar.	100 - 103

Regarding the evaluation of seiches, the staff stated that they considered FLEX support strategies. They first asked whether the plants have sufficient water supply for 24 hours without relying on the ultimate heat sink. The staff further stated that there are several reasons they picked 24 hours. Seiches are not a day, week, or month kind of phenomenon. Therefore, FLEX equipment should have access to the ultimate heat sink after 24 hours. There was also a fundamental premise that if you can withstand that condition for 24 hours, other outside resources are available under the three phases of FLEX, and they don't have to come from one of the response centers. For example, the susceptible plants are within hours drives of other plants, which can provide portable equipment. The staff stated that the preliminary conclusion is that additional regulatory action is not warranted.	103
The staff began the discussion on wind and missile loads from hurricanes and tornados, and snow loads. These hazards moved to Step 3 of the process. The staff noted that in the 2000 to 2011 timeframe, new guidance in both these areas was issued for new reactors. That guidance did not apply when the majority of operating plants were licensed.	112
During discussion of extreme snow loads, the staff stated that these are evaluated against the structural margin. Their preliminary belief is that the beyond-design-basis snow load is not likely to cause catastrophic failure of a Seismic Category 1 roof. But they still need to do work in that area and are continuing to assess design conservatisms and warning time.	114
The staff began the discussion on wind and missile loads from hurricanes and tornados. The staff discussed Regulatory Guides 1.76 and 1.221. There was much discussion on wind and missile loads.	115 - 149
Dr. Gwen DuBois, a public citizen, commented that information concerning technical problems with plant emergency generators may not be available. If there is a natural event, are we to believe that the generators will provide the intended backup. She also commented that there is an article about climate change in the New England Journal of Medicine that indicated you can expect larger hurricanes, and she questioned if these 100 year events now are 40-year events.	162 - 163
Regina Minniss, a private citizen, commented on the staff's low water level conditions, and that plants with only 24 hours of water onsite seems very low.	163
Chairman Stetkar adjourned the meeting at 4:43 pm	169

DOCUMENTS PROVIDED TO THE SUBCOMMITTEE

The following documents were provided to the members prior to the meeting:

Supporting Documents:

NRC Staff White Paper, "NRC Staff Updated Assessment of Fukushima Tier 2 Recommendations Related to Evaluation of Natural Hazards other than Seismic and Flooding," dated March 24, 2016 (ML16039A054)

Advisory Committee on Reactor Safeguards, "Plans for Resolving the NRC Near-Term Task Force Open Fukushima Tier 2 and 3 Recommendations," dated November 16, 2015 (ML15320A074)

SECY 15-0137, "Proposed Plans for Resolving Open Fukushima Tier 2 and 3 Recommendations," dated October 29, 2015, (ML15069A444)

SECY 15-0137 Enclosure 1 - Proposed Resolution Plan for Tier 2 Additional Recommendation Evaluation of Other External Natural Hazards dated October 29, 2015 (ML15254A009)

SECY 15-0137 Enclosure 2 - Proposed Resolution Plan for Tier 3 Recommendation 2.2 Periodic Reconfirmation of External Hazards, dated October 29, 2015 (ML15254A010)

SRM to SECY 15-0137, "Proposed Plans for Resolving Open Fukushima Tier 2 and 3 Recommendations." dated February 8, 2016, (ML16039A175)

NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," (ML12242A378)

Official Transcript of Proceedings
NUCLEAR REGULATORY COMMISSION

Title: Advisory Committee on Reactor Safeguards
 Fukushima Subcommittee Meeting

Docket Number: (n/a)

Location: Rockville, Maryland

Date: Thursday, April 21, 2016

Work Order No.: NRC-2328

Pages 1-159

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

+ + + + +

FUKUSHIMA SUBCOMMITTEE

+ + + + +

THURSDAY

APRIL 21, 2016

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ROCKVILLE, MARYLAND

+ + + + +

The Subcommittee met at the Nuclear
Regulatory Commission, Two White Flint North, Room
T2B1, 11545 Rockville Pike, at 1:00 p.m., John W.
Stetkar, Chairman, presiding.

COMMITTEE MEMBERS:

JOHN W. STETKAR, Chairman

RONALD G. BALLINGER, Member

DENNIS C. BLEY, Member

CHARLES H. BROWN, JR. Member

DANA A. POWERS, Member

HAROLD B. RAY, Member

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JOY REMPE, Member

PETER RICCARDELLA, Member

GORDON R. SKILLMAN, Member

DESIGNATED FEDERAL OFFICIAL:

KATHY WEAVER

ACRS CONSULTANT:

STEPHEN SCHULTZ

ALSO PRESENT:

STEWART BAILEY, NRR

ERIC BOWMAN, NRR

GWEN DUBOIS, Physicians for Social
Responsibility

BRAD HARVEY, ONR

REGINA MINNISS

WILLIAM RECKLEY, NRR

TIM REED, NRR

MOHAMED SAMS, NRR

JOSEPH SEBROSKY, NRR

*participating via telephone

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AGENDA

Opening Remarks and Objectives.....4
Other Natural Hazards Discussion.....6
Break
Other Natural Hazards Discussion.....65
Public Comments/Committee Discussion.....152
Adjourn

P R O C E E D I N G S

(1:02 p.m.)

1
2
3 CHAIR STETKAR: The meeting will now
4 come to order. This is a meeting of the Advisory
5 Committee on Reactor Safeguards, Subcommittee on
6 Fukushima. I'm John Stetkar, Chairman of the
7 Subcommittee. Members in attendance today are Pete
8 Riccardella, Harold Rey, Dick Skillman, Dana
9 Powers, Dennis Bley, Ron Ballinger, Charlie Brown,
10 and Joy Rempe. We're also joined by former ACRS
11 Member Steve Schultz, who is our consultant on this
12 matter.

13 The purpose of this meeting is for the
14 Subcommittee to review and discuss the NRC staff's
15 white paper on NRC staff updated assessment of
16 Fukushima Tier 2 recommendations related to the
17 evaluation of natural hazards other than seismic
18 and flooding.

19 The Subcommittee will gather
20 information, analyze relevant issues and facts, and
21 formulate proposed positions and actions, as
22 appropriate, for deliberation by the full
23 Committee. This meeting is open to the public.
24 The meeting is being conducted in accordance with
25 provisions of the Federal Advisory Committee Act.

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1 Rules for the conduct of and participation in the
2 meeting have been published in the Federal Register
3 as part of the notice for this meeting.

4 Ms. Kathy Weaver is the designated
5 federal official for this meeting. A transcript of
6 the meeting is being kept and will be made
7 available, as stated in the Federal Register
8 Notice. Therefore, it is requested that all
9 speakers first identify themselves and speak with
10 sufficient clarity and volume so that they can be
11 readily heard.

12 And while I remember, I'll remind you
13 to reach into your pockets, or wherever you keep
14 them, and turn off all of your little beepy
15 devices.

16 (Off record comments)

17 We have received no written comments or
18 requests for time to make oral statements from
19 members of the public regarding today's meeting.
20 Understand that there may be individuals on the
21 bridge line who are listening in on the proceedings
22 and I'll open the bridge line at the end of the
23 meeting so that those participants can provide
24 their comments if they so wish.

25 We'll keep the bridge line on mute in

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1 the interim so that it doesn't disturb the
2 proceedings because it makes a lot of noise on our
3 end.

4 We'll now proceed with the meeting and
5 I call upon Joe -- sure, I made it so far okay, Joe
6 Sebrosky of the NRC staff to open the
7 presentations. Joe?

8 MR. SEBROSKY: Hi. I'm Joe Sebrosky.
9 I'm a senior project manager in the Japan Lessons
10 Learned Division. I work for Mohamed Shams.
11 Mohamed's going to have some opening remarks.

12 MR. SHAMS: Thank you, Joe. Thank you,
13 Mr. Chairman and distinguished members. Thanks for
14 the opportunity to talk to you today. As Mr.
15 Stetkar indicated, we're here today to talk to you
16 about the treatment of other natural hazards in the
17 context of Fukushima. We've put together a white
18 paper that proposes our assessment for these
19 hazards and some recommendations that we're making
20 as far as how to go forward with them.

21 Just by way of background, as you
22 certainly recall, when the agency started its
23 addressing of the Fukushima Lessons Learned, we
24 focused first on the high priority items and we
25 looked for lessons learned from them to implement

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1 into what we designated as the lower priority
2 items.

3 In the area of natural hazard, the
4 agency focused first on flooding in seismic and
5 we've issued 50.54(f) letters to collect
6 information from licensees, and that activity is
7 underway, and in fact, it's nearing completion in
8 terms of the evaluation of the hazards. There are
9 other activities that will continue on in the
10 future.

11 So we're actually going to be talking
12 to you tomorrow about some issues related to
13 guidance in terms of assessing the impact of the
14 natural hazard, the flooding and seismic, on the
15 mitigating strategies. But today, we're looking
16 into the other natural hazard, other than flooding
17 and seismic, and basically, we're trying, in our
18 assessment, to answer the question of whether or
19 not should they be treated similar to what we've
20 done for flooding and seismic in the sense that,
21 should we be issuing 50.54 letters for them, you
22 know, in the same manner.

23 Late last year, we put together a plan
24 on how to address these hazards, that was SECY
25 150137, presented the plan to the Commission, and

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1 plan included four steps, essentially,
2 identification of the spectrum of hazard, or the
3 population of hazards, to look at, applying some
4 screening criteria to narrow down the field to
5 those that deserve additional looks and,
6 potentially, could deserve additional regulatory
7 actions.

8 Third step was to do further
9 evaluations to, again, narrow down the field even
10 further, and then the fourth step would be to
11 report to the Commission on the proposals if
12 there's any proposal of regulatory actions.

13 At this point, we are completed with
14 the first two steps, identification of the hazards
15 and narrowing down, doing the screening, to
16 identify the hazards of any to be moved forward to
17 additional analyses. The white paper that Mr.
18 Stetkar mentioned is really the foundation of a
19 SECY paper that we're writing to send to the
20 Commission by the end of May. That was an interim
21 product that the Commission requested in its SRM
22 for COMSECY 1537.

23 At a high level, we will be reporting
24 to you today that for most of the hazards and the
25 sites, we do not see the potential for the need for

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1 regulatory actions, however, we've identified snow
2 and high wind as two hazards that we would want to
3 take a further look at, not necessarily to say that
4 it would ultimately --

5 CHAIR STETKAR: I was going to say,
6 Mohamed, it isn't -- right now, it's just whether
7 or not something gets moved from Task 2, I think
8 it's called, to Task 3, which is further
9 examination.

10 MR. SHAMS: Correct. Yes.

11 CHAIR STETKAR: It's not yet made any
12 implications on -- if something's screened out,
13 it's gone, but if something's retained, it yet
14 might not merit regulatory attention, right?

15 MR. SHAMS: And that's precisely the
16 idea is, we're in a place where we feel that it
17 merits a further look in some sites, and we'll
18 certainly go through that today and identify these
19 thoughts and what we think we will be doing in the
20 next steps.

21 So we're on track to complete the SECY
22 paper for the Commission by end of May and as we
23 put together our further assessments, we'll prepare
24 another SECY paper by the end of the year
25 forwarding our conclusions and recommendations to

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1 the Commission. With that, we'll walk you through
2 our analyses and conclusions, and look for your
3 insights and feedback on our work.

4 With that, I'll move to Bill to lead
5 us.

6 MR. RECKLEY: Okay. I just have a few
7 background slides. Some of it is duplicative of
8 what Mo just went over, but just very quick
9 summary, we did categorize the Post-Fukushima
10 Lessons Learned in three tiers, with Tier 1 being
11 those actions we did without delays, such as
12 issuance of the orders, issuance of the 50.54(f)
13 letters on seismic and flooding hazards.

14 The Tier 2 and Tier 3 items were
15 deferred based on the availability of staff or the
16 need to get data from the Tier 1 activities, and we
17 have, over the past year or so, been directing
18 attention to those and trying to, where possible,
19 resolve them so that -- and today we're here to
20 talk, as Mo said, about other external hazards,
21 other than seismic and flooding.

22 This is a slide I think you've also
23 seen before, it's a summary of the Mitigation of
24 Beyond-Design-Basis Events rulemaking, and it's a
25 good summary slide of the actions that were taken

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1 in Tier 1 and how they are being rolled into the
2 Mitigation of Beyond-Design-Basis Events
3 rulemaking, which included, basically, the
4 licensees coming up with an all-hazards response
5 plan, and then that'll be important as we go
6 through today's assessment.

7 They will specifically, through the
8 rulemaking, address re-evaluated in seismic and
9 flooding hazards, and as Joe will go through,
10 really, today, we're trying to determine, or
11 describe to you, the assessments that we've done of
12 the hazards other than seismic and flooding. But
13 just like seismic and flooding, it's not as if the
14 plants didn't start off already with design and
15 regulatory requirements associated with those
16 hazards.

17 And so that sometimes gets lost on
18 people that when we say, and Joe will get into some
19 of the ones we screened out, but for example, high
20 temperatures, it's not as if the staff is saying,
21 plants don't need to consider high temperatures.
22 The assessments we're doing now is whether the
23 regulatory requirements and plant design features
24 already in place address that hazards and whether
25 we need to do any more than that.

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1 So it's not as if we're excluding
2 hazards from the need to be considered, it's
3 whether additional regulatory actions or additional
4 information needs to be sought from licensees to
5 address a particular hazard.

6 CHAIR STETKAR: Bill, since you brought
7 it up, I might as well get it out now, things like
8 high temperature, which, people did, at one time,
9 address when they originally licensed the plant,
10 and in many cases, used five years' worth of data
11 to justify what high temperatures they used.

12 It's my understanding that that
13 information is not updated, so that, for example,
14 30 years later, 50 years later, despite the fact
15 that we may have collected more meteorological data
16 for the site, and I don't want to get into the
17 issue of climate change, that's not something that
18 I'm broaching here, but just the fact that we have
19 a larger database available, so therefore, we might
20 be able to capture extremes in temperature that
21 might not have been examined in the initial
22 licensing, or that things like the amount of heat
23 loads in the plant may have changed such that the
24 demands on ventilation equipment, and whatever
25 assumptions were made regarding exterior

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1 temperatures, might not necessarily be as valid.

2 How does the current licensing process,
3 the current regulatory process, capture that?

4 MR. RECKLEY: That's --

5 CHAIR STETKAR: You know, you said well
6 --

7 MR. RECKLEY: No, no, I understand.

8 CHAIR STETKAR: -- it takes care of it,
9 but, you know, why don't people go back --

10 MR. RECKLEY: Joe, you want to give it
11 a shot and then I'll --

12 MR. SEBROSKY: Yes, I'll give it a shot
13 and then you can add. So what we say in the paper,
14 and we talk about extreme temperatures, both hot
15 and cold, and if you look at the tech specs that
16 were based on a licensing basis that was put
17 together when they were originally operated the
18 plant, or originally licensed the plant, you have
19 tech specs on ultimate heat sink temperature, you
20 do have tech specs on the containment, you have
21 tech specs on the control room temperatures that
22 get to how well your heat sinks are working.

23 And what we argue is that licensees, in
24 some cases, have identified that they're
25 constrained. They've seen ultimate heat sink

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1 temperatures increase and they'll come in for a
2 tech spec amendment. So there's tech specs in
3 place that recognize those limits.

4 There's another argument that we make
5 in the papers, and that gets to operability
6 determinations. If a licensee sees a heat wave
7 coming its way, we've had cases where we've had to
8 issue Notice of Enforcement discretion, and it's
9 based on a licensee doing an assessment and saying,
10 my licensing basis for this plant assumed an air
11 temperature of 100 degrees. I know that I'm going
12 to see 105 degrees tomorrow.

13 Even though I don't have an explicit
14 tech spec on that air temperature, my operability
15 of key systems, structures, and components is based
16 on design basis calculations that assumed 100
17 degrees and I'm going to see 105. The licensees,
18 what they do in their process, they'll do an
19 operability determination, and if that operability
20 determination result is, I have to declare a piece
21 of equipment inoperable because I'm exceeding its
22 design basis, they have to enter the appropriate
23 tech spec.

24 So what we argue is, in the case that
25 you make, if a licensee is outside its design

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1 basis, they have a process in place to evaluate
2 that, and do we need something in addition to that,
3 and licensees recognize that if they become
4 constrained, they may have to come to us for a
5 license amendment to change either the explicit
6 tech spec.

7 CHAIR STETKAR: What I'm asking though,
8 Joe, is, how do the licensees determine that they
9 are constrained? We've just gone an exercise with
10 AP1000 where they determined, oh, my God, our
11 ventilation stuff for the main control room was
12 underdesigned because we didn't realize that we're
13 going to have all of the loads in there and our
14 capacities are too small; ventilation capacity is
15 too small.

16 People are replacing analog stuff with
17 digital stuff, people are making changes to power
18 plants, people are changing heat loads, they might
19 have evidence of different meteorological --
20 different temperature profiles for the site, is it
21 only this kind of episodic thing that forces them?

22 In other words, you know, they don't
23 have to update their FSAR, they don't have to come
24 in and re-evaluate all of that stuff, do they?

25 MR. SEBROSKY: So I think what you're

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1 talking about, when you look at Chapter 2 of most
2 plants' safety analysis reports, we consider that
3 in our guidance to be historical information, and
4 that licensees aren't obligated to update that
5 continuously, and that's why you see out of the
6 Fukushima Lessons Learned, you see the activity
7 that we're doing right now, and you also see the
8 activity associated with every ten years, you know,
9 look at whether or not, on a periodic basis, you
10 need to re-evaluate some of those Chapter 2
11 assumptions.

12 And what I was trying to convey, and,
13 Bill, correct me if I make any misstatements,
14 there's two backstops on Chapter 2 when it comes to
15 hazards. One is the one that I just talked about,
16 and it's not just for if you see a heat wave
17 coming. Take the scenario that you mentioned where
18 the internal heat loads for which the HVAC system
19 was designed to remove heat, you recognize that you
20 added different components that have produced more
21 heat and you're not going to be able -- the
22 chillers that you have installed aren't going to be
23 able to reject the added heat or you see something
24 else along those lines, you still get back to the
25 operability determination that licensees are

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1 obligated to do if they find problems like that
2 that's subject to inspection.

3 The backstop to some of the more
4 serious challenges that you would see is, there is
5 a requirement in 10 CFR 50.9 that if a licensee is
6 aware of a safety-significant issue that impacts
7 the ability for the plant to safely operate or
8 shutdown, they're obligated to inform us of that
9 and then it would be up to us to review that and
10 make a determination on whether or not we have to
11 take action.

12 CHAIR STETKAR: I'll play the Devil's
13 advocate, so everybody's been doing that throughout
14 the life of their facilities, and yet, oh, my God,
15 they weren't doing it for seismic, and, oh, my God,
16 they weren't doing it for external flooding, and,
17 oh, my God, they didn't realize that I'm in a
18 hurricane area and I can have higher winds than
19 hurricanes.

20 So if they've been doing it for the
21 life of their facilities and they weren't meeting
22 their initial licensing basis in these areas, why
23 do I have assurance that they will continue to
24 meet, or are meeting, their licensing basis for
25 things like high temperature? Because they

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1 apparently weren't in the other areas and something
2 happened that made us look more carefully at those.

3 MR. RECKLEY: And it's a complex
4 arrangement that's evolved over many years and as
5 Joe mentioned, what we try to do in the design
6 aspect is to capture what we think are the most
7 important parameters and those become technical
8 specifications. Then there might be a second tier
9 where licensees proceduralize controls, they're not
10 in the tech specs, but they might recognize that a
11 certain parameter is important enough to the
12 operability of a piece of equipment that it becomes
13 proceduralized themselves, and I think going to Mr.
14 Stetkar's point, we wouldn't rule out the
15 possibility there's other parameters, that don't
16 make either one of those, that they might exceed at
17 some point.

18 And as an additional thing that's in
19 place is operational experience programs, where, if
20 that parameter is exceeded, and the exceedance of
21 that parameter actually caused a problem, then we
22 have, and licensees have, measures to both identify
23 and share that information with other licensees.

24 So I don't want to imply that this is
25 all a perfect system, but we have tried, through

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1 putting in place these hierarchal controls of
2 parameters, and then other backstops like
3 operational programs, to capture things and address
4 it if there's a problem.

5 In terms of Fukushima, I'll just add,
6 that there is one last recommendation that we're
7 still evaluating for the re-evaluation of other
8 hazards on a periodic basis, where, we won't just
9 wait for an event to trigger an evaluation, but we
10 will look periodically to see if additional
11 measures or requests for information should be
12 pursued.

13 CHAIR STETKAR: And that's still out on
14 the table. And I know you can say, I don't know,
15 will that periodic re-evaluation apply to all
16 hazards or only those that are left after the
17 screening process? So for example, you know, high
18 winds or seismic, obviously, flooding.

19 MR. RECKLEY: I think it'll have a
20 heavy focus on seismic and flooding, but I don't
21 believe it is limited to seismic and flooding.

22 CHAIR STETKAR: Okay. Well, I hear
23 what you're saying, and, you know, if everybody had
24 been doing what you say they're doing, I suspect we
25 wouldn't be having the discussion about seismic and

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1 flooding, or at least people wouldn't be going
2 through all of the difficult exercises that they're
3 going through because they would have been going
4 through that in the past.

5 The operational experience is this kind
6 of reactive approach to licensing. You know, until
7 something bad happens, we'll be confident that
8 everybody's doing what they ought to do, and then
9 when something bad happens, like Fukushima, we'll
10 focus on it. And that's the concern, is, Fukushima
11 gave us a wake-up call and the NTF recommendations
12 kind of said, well, wait a minute, maybe it's a
13 point in time where we ought to take a snapshot of
14 where the U.S. industry is on a broader perspective
15 than just --

16 MR. RECKLEY: I would say the other
17 thing, operational programs, or operational
18 experience programs, do is, it highlights if we've
19 mischaracterized a parameter that we thought wasn't
20 very important and it turns out to be more
21 important than we thought it was, and that's a key
22 aspect to it.

23 MR. SHAMS: I had a thought to share
24 with Mr. Stetkar. So looking at the core of why
25 we're doing flooding and seismic, it's rather

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1 because the state of knowledge in this area has
2 evolved, and as such, we're looking at the impact
3 of that evolution on our current knowledge of that
4 hazard compared to what it was that the sites have
5 been licensed to.

6 It's not necessarily because the sites
7 are not meeting their licensing basis, they are, or
8 they ought to be, and there are regulatory controls
9 to, you know, make that case. And also, to add to
10 what Bill said about, you know, our efforts now on
11 the hazard reconfirmation activity, we also have
12 programs in place like the generic issues program
13 that already had in it, GI-199, related to seismic,
14 prior to Fukushima, and we were looking into, what
15 were the impacts of our, at that time, recent
16 knowledge of seismic and knowing that the Central
17 and Eastern United States had higher -- you know,
18 high frequency input, what that would do to the
19 fleet, so we were under that way, but ultimately,
20 we folded that activity into the Fukushima activity
21 anyway.

22 So I just wanted to put the point that,
23 there are other components as well that would add
24 to this framework of making sure people have the
25 most recent understanding of the hazard and

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1 applying that into their facilities.

2 MR. SCHULTZ: Bill, is it clear that
3 the operational history as well as the operability
4 determination sequences, are they going to be tied
5 into this ten-year, or the periodic, review of
6 hazard, specifically, or is it just going to be a
7 periodic thing without much detail?

8 MR. RECKLEY: Right now, the way that
9 program is leaning is that that'll be an NRC
10 assessment, a periodic NRC assessment, as to
11 whether we need to visit regulatory requirements,
12 not a requirement of licensees to do periodic
13 assessments, so I think the short answer would
14 probably be no to your question.

15 MR. SCHULTZ: So it's a periodic
16 generic evaluation by the NRC.

17 MR. RECKLEY: Yes.

18 MR. SHAMS: To add to that, we're just
19 about actually developing the framework for it, we
20 put together a working group, they're piecing it
21 together, a number of components interacting with
22 other federal agencies at knowledge management,
23 looking at operating experience, all these parts,
24 so we don't really have a clear, crisp picture of
25 how it's going to end up, you know, in its

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1 entirety.

2 We have the deliverable to the
3 Commission due by the end of the year on this
4 topic, but that's the direction it's leaning.

5 MR. SCHULTZ: I'm only pushing in that
6 direction because today's examples demonstrate that
7 if you're going to make any progress or many any
8 significance difference, you need to look at it on
9 a plant-specific basis.

10 MR. SHAMS: Well, certainly, that
11 makes, you know, sense, but I think as Bill
12 indicated, our initial efforts are focused on, do
13 we see the hazard changing in a meaningful way in a
14 broad, just in a broad fashion, and then we can, at
15 that point, decide which way to go as far as site-
16 specific application of that.

17 MR. RECKLEY: But I think we'll have an
18 example later on of, it's not always black and
19 white what's generic and what's plant specific, and
20 so I think we'll have an example later on that we
21 can talk about.

22 CHAIR STETKAR: Let's go on. You
23 brought it up, I was going to bring it up later,
24 but go on.

25 MR. RECKLEY: So just some additional

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1 background, we issued SECY 15-0137 to the
2 Commission in October, had the general plans for
3 closing out, or resolving, the remaining Tier 2 and
4 Tier 3 items. Natural hazards other than seismic
5 and flooding were grouped in the third group of
6 those, which are the activities that we plan to
7 complete in 2016.

8 The Commission agreed with us on the
9 closure of the Group 1 items. The Group 2
10 assessment, we were here a month or two ago to talk
11 about the Group 2, which was containments other
12 than Mark I and Mark IIs, hydrogen control and
13 enhanced instrumentation. That SECY paper, SECY
14 2016-41, 0041, was just issued to the Commission at
15 the end of March to closeout those recommendations.

16 And we're here today to talk about
17 other natural hazards, in large part because the
18 SRM, the Staff Requirements Memorandum, for SECY
19 15-00137, included a direction from the Commission
20 to come in with an interim status report by the end
21 of May on how the process is working. Joe's going
22 to go over the process for using, but since we owed
23 the Commission a status report by May, we're here
24 to talk to you about that today.

25 MEMBER RAY: Bill, I take it for

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1 granted that tsunami is included within either
2 seismic or flooding, or both, and therefore, not
3 within --

4 MR. RECKLEY: Yes, it's considered
5 within the flooding hazard.

6 MEMBER RAY: I just wanted to have you
7 affirm to me that you understand tsunami can be
8 caused by things other than seismic.

9 MR. RECKLEY: Landslides, for example,
10 yes.

11 MEMBER RAY: Thank you.

12 MR. RECKLEY: So as Mohamed mentioned,
13 we issued a white paper in order to support public
14 interactions and interactions with the ACRS, that
15 was issued near the end of March, we had a public
16 meeting on April 5th to hear from the public
17 stakeholders, and we're here today to talk to the
18 Subcommittee, and I think we're on the full
19 committee for early May.

20 And we owe, as I mentioned, a status
21 report by the end of May, and then a second SECY
22 paper to the Commission by the end of the year,
23 with the final assessments on whatever hazards are
24 not screened out through this interim status report
25 in May.

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1 And with that, I'll turn it over to Joe
2 to talk about high temperatures and all of the
3 other --

4 MR. SEBROSKY: Thanks, Bill. So this
5 slide shows the four-step process that was embedded
6 in SECY 15-0137 that Mohamed talked about in his
7 opening remarks. SECY 15-0137, as Bill indicated,
8 had categorized all the Tier 2 and Tier 3, and
9 there was a spectrum of where we were as far as our
10 evaluations on Tier 2 and Tier 3 activities from we
11 were essentially complete to we just have a
12 process.

13 And that's where we were. If you look
14 at SECY 15-0137, it's only six pages long and it
15 described the process, and this is the four-step
16 process that it mentions in that SECY paper, so
17 that's why it was grouped in that Group 3 activity.

18 Mohamed already talked about the first
19 two steps, define the natural hazards, don't limit
20 yourself to just the standard review plan,
21 determined and apply screening criteria to see if
22 you can generically exclude licensees from
23 considering those hazards.

24 When you get to Step 3, and just talk
25 about this a little bit, Mohamed mentioned the 10

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1 CFR 50.54(f) letters, which is a portion of the
2 regulation that requires licensees to respond to
3 requests for additional information, and that's the
4 approach that we took for seismic and flooding.

5 And where we're at for snow and also
6 tornados is, we're in Task 3. If we saw something
7 that we thought was an immediate safety concern,
8 we're not going to wait for the evaluation to be
9 completed and we would have made a recommendation
10 to our senior management and to the Commission that
11 we need to take some kind of immediate action
12 because it's a safety significant issue and it
13 meets the backfit criteria.

14 We're not saying that for either snow
15 or the high wind evaluations, and we're not to the
16 point where we meet the requirements that are on
17 the NRC in 10 CFR 50.54(f) before we can even issue
18 the request for information. And if you look at 10
19 CFR 50.54(f), it has a requirement for the NRC that
20 we have to justify that there's enough of a safety
21 significant issue that it justifies the cost that's
22 associated with the licensee responding to that
23 request for information.

24 CHAIR STETKAR: Joe, when I think about
25 generic stuff, what exactly do you mean? It

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1 doesn't necessarily have to affect 99 operating
2 reactors.

3 MR. SEBROSKY: More than one.

4 CHAIR STETKAR: More than one.

5 MR. SEBROSKY: That's the test.

6 CHAIR STETKAR: So it could affect two
7 and only two.

8 MR. SEBROSKY: That's the test in our
9 process.

10 CHAIR STETKAR: Okay. We'll get into
11 that later, obviously, in some of the things, but I
12 just wanted to make sure that we understood that.

13 MR. SEBROSKY: And we are going to see
14 that when we talk about low water level conditions
15 for HB Robinson. If you look at the fourth step in
16 the process, it is, if, based on the information
17 that you get from the licensees, you can make a
18 determination that it warrants backfit or some kind
19 of immediate action for the NRC to take, and
20 obviously, we haven't gotten to Step 4 for any of
21 the hazards we'll be talking about yet. Next
22 slide.

23 MEMBER SKILLMAN: Joe, let me ask this,
24 as these plants have operated for years and years,
25 the operators have become very clever in adapting

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1 to whatever the conditions are that the plant is
2 experiencing. Give you two examples, I worked on a
3 number of sites that were basically on a moat, and
4 so loss of access is a real problem, Three Mile and
5 Prairie Island, both of them in river situations,
6 one is the Mississippi, the other is the
7 Susquehanna.

8 Anything that prevents you from getting
9 to the site has security, has staffing, has EMT,
10 ambulance, supply chain, law enforcement
11 implications. And over the years, the site staffs
12 at both of those sites have found a way to overcome
13 whatever would threaten access, whether it's debris
14 from flooding, whether it's animals, critters --

15 MEMBER POWERS: Come on, Dick, they're
16 wonderful. Get to your point.

17 MEMBER SKILLMAN: My point is, is it
18 likely that there have been natural events that
19 have been overcome by the site staff that you
20 haven't looked at? You're not even aware of it
21 because it's been invisible to you.

22 MR. SEBROSKY: I don't discount that
23 that's a possibility. I used to be an OPs officer.
24 I did that for three and a half years. We have
25 resident inspectors at the site. There's daily

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1 calls between headquarters and the region on any
2 number of activities going on at a site. If it
3 rose to a threshold where it required some kind of
4 regulatory action, I would think we would pick it
5 up through that process.

6 I understand your point, but I can't
7 think of a scenario that, if it met a safety
8 significant threshold, where it wouldn't be
9 elevated through that process.

10 MEMBER SKILLMAN: Okay. Fair enough.
11 Thanks, Joe.

12 MR. SEBROSKY: Slide 7 is the
13 preliminary results of Step 1 of the assessment.
14 So what you see in the white paper in Appendix A is
15 a listing of the sources that we used to collect
16 the hazards. And as I indicated earlier, it wasn't
17 limited to just the standard review plan. There
18 were other sources, EPRI documents, that we looked
19 at, and also international documents that we looked
20 at to make sure we were taking a good hard look,
21 and it gets back to Mr. Stetkar's point, you've
22 been operating for 40 years, but how do you have
23 assurance?

24 If you look at how this issue was
25 identified, it was a combination of the ACRS

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1 identifying it to us and also in an appropriations
2 language from Congress. Take a good hard look at
3 the natural hazards and see if there's anything
4 that causes you pause.

5 So Appendix A describes the sources
6 that we looked at, it provides a high-level
7 discussion of why we excluded man-made hazards from
8 further consideration, including consulting with
9 OGC, getting back to Congressional appropriations
10 language, what it meant, and did they intend for us
11 to look at both natural and man-made.

12 Based on feedback from our
13 Congressional Affairs Office, the intent was
14 natural hazards, but to be -- to make sure we
15 weren't missing something, we put the man-made
16 hazards into our generic issue process and made
17 sure we weren't missing something there. That's
18 discussed in Appendix A.

19 The natural hazards that we came up
20 with are listed in Appendix A. We don't give you a
21 source if it's coming from the SRP, so the names
22 may be slightly different from what you would see
23 in the standard review plan, and we grouped them
24 based on the hazard.

25 This table on Slide 7 provides you a

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1 high level on what natural hazards we excluded as
2 part of Step 1 and what you see here is some
3 asterisks material. You see a single asterisk
4 around external flooding and seismic activity, that
5 goes to the 50.54(f) letters that Mohamed mentioned
6 earlier that we've issued, and because that's being
7 reviewed as part of the Tier 1 activity, we closed
8 it for the purposes of this paper.

9 For the most part, what you find in
10 Appendix A are high-level discussions of why we
11 excluded the hazards that aren't asterisk. There's
12 two exceptions that we're going to talk about the
13 forthcoming slide, and that's volcanic activity and
14 geomagnetic storms. We have additional discussion
15 on those two activities that I'll talk about on the
16 next slide.

17 CHAIR STETKAR: You know I'm a detail
18 guy. You're not going to get away from this one
19 that quick. When I went through Appendix A, and
20 I'll only talk about ones that aren't on the
21 following slide so that we can get through all of
22 this, I had some questions about the basis for
23 excluding things, so I'll bring up some examples.

24 You excluded things like avalanches and
25 landslides, and for avalanches, it says, "The

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1 hazard is highly unlikely to cause coincident loss
2 of all trains of safety-related SSCs and extended
3 loss of AC power."

4 When you did the screening, and as I
5 read through the stuff, I noticed a preponderance
6 of focus on does it cause an extended loss of AC
7 power and loss of the ultimate heat sink or loss of
8 access to the ultimate heat sink. That's a very
9 contrived notion.

10 So for example, suppose I could disable
11 my ultimate heat sink, and only my ultimate heat
12 sink, forever. And you address that under low
13 water level and things like that. Suppose I could
14 have a landslide or an avalanche that comes down
15 the slope next to my plant and fills up my basin
16 with, oh, mud, and rocks, and gook, and trees, and
17 stuff like that.

18 Maybe it takes out offsite power, I
19 don't know, it depends on where my switchyard is.
20 So what criteria -- did you look at only things
21 that could only do both of those damages, in other
22 words, extended loss of AC power and loss of the
23 ultimate heat sink? Because I see a lot of the
24 decisions cast in that notion, this one in
25 particular.

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1 MR. SEBROSKY: That's a good comment.
2 When we looked at the activities, in particular, we
3 were interested in activities that could lead to
4 extended loss of AC power and loss of the ultimate
5 heat sink because --

6 CHAIR STETKAR: What about only loss of
7 the ultimate heat sink? Most of my questions on
8 things that got screened out are going to focus on
9 things that take away the ultimate heat sink
10 irretrievably, or make it so bad that the plant can
11 get into trouble, regardless of the fact that
12 everything has electric power to it. Did you look
13 at that? Did you think about that?

14 MR. SEBROSKY: We did, and I'll talk
15 about that when we talk about the seiche writeup.

16 CHAIR STETKAR: Right.

17 MR. SEBROSKY: But I understand the
18 comment and my response is, I'll have to get back
19 to you on that, but the focus --

20 CHAIR STETKAR: The ones that I saw,
21 just to keep us on track here, I brought up the
22 issue, think about in the terms of avalanche and
23 landslide, because that's the mountain coming down
24 to get you. Think of it in terms of the issues of
25 the upper right-hand corner of this slide, biologic

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1 events, suppose that I make my ultimate heat sink
2 look like Jell-O because it's full of dead aquatic
3 stuff or dead terrestrial stuff that looks like
4 leaves.

5 I know of one site in not this country
6 that had an actual problem with their cooling water
7 intake filling up at a certain time of year under
8 certain storm conditions with something that looked
9 an awful lot like a mat of leaves, and it was the
10 whole, basically, river looked that way. Didn't
11 affect electric power, but certainly could affect
12 their heat removal, so think about that, please.

13 MR. SHAMS: I know Joe promised to
14 respond back, but I would just offer a thought that
15 in the design of mitigating strategies, we've
16 ultimately designed for a more limiting situation,
17 which is the loss of both the ultimate heat sink
18 and the extended loss of AC power, so if we lose
19 one, not the other, I would see that as a less
20 limiting circumstance.

21 CHAIR STETKAR: No, you haven't, and
22 I'll bring this up on the record. You have
23 designed mitigating strategies under the explicit
24 assumption that the bucket of water remains intact.
25 It is designed around the fact that putting water

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1 from the bucket into the plant is not available.
2 And I will point you to endless numbers of
3 references in NEI 12-06 that says a fundamental
4 assumption is that water is in place in my ultimate
5 heat sink and is available to be used for cooling.
6 I just can't get it from that point to the cooling
7 loads in the plant.

8 So you have not designed mitigating
9 strategies for cases that destroy the ultimate heat
10 sink's bucket of water as a capable source of
11 removing water. And what can do that? You can
12 fill it full of gook. You can turn it into
13 something that looks like Jell-O. You can fill it
14 with so much fine sand and stuff that gets through
15 all of your intake screens and gets into your plant
16 and plugs all of your heat exchangers in your plant
17 or scours them, depending on the design of your
18 intake.

19 Okay. The mitigating strategies have
20 not designed against that. They assume that the
21 water is available.

22 MR. RECKLEY: As Joe mentioned, we'll
23 look into maybe clarifying, but I think it is
24 important to distinguish between a couple things,
25 and it's not all inclusive, because some of the

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1 examples, like a landslide, can be fairly quick.
2 U.S. plants have experienced bio-fouling and the
3 clogging of intake structures. I mean, we have
4 experienced that.

5 But you have to distinguish between
6 those things, I think, that can credibly challenge
7 the operability of safety systems, for which you
8 can respond and it doesn't cause an immediate
9 challenge to the plant in terms of leading to a
10 sever accident without other failures occurring,
11 and those things that might, as the tsunami did at
12 Fukushima, or some other event, the external event
13 itself challenges the plant and takes out your
14 safety system.

15 So I think we can sharpen our
16 discussion a little bit to address your point, but,
17 as Joe mentioned, it's a good point and good --

18 CHAIR STETKAR: No, I bring it up more,
19 I'm a detailed guy, you know that, I bring it with
20 specific examples to illustrate the point that the
21 screening process, the thought process, should not
22 necessarily have been limited to only loss of AC
23 power and loss of a heat sink, because some of
24 these things could, in principle, threaten loss of
25 the heat sink alone.

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1 And there may be justifiable reasons
2 for screening them out, but I didn't see that
3 justification in Appendix A, in that table in
4 Appendix A, because it tended to focus on the low
5 likelihood that it could cause both effects.

6 I've got a couple more, I don't have a
7 lot of these, so that was the big picture. In
8 fact, this other one is like that. You screened
9 out, this was just a curiosity, waterspouts because
10 you say that, well, "Based on a review of
11 operational experience, databases, and engineering
12 judgement, these hazards are considered highly
13 unlikely to cause coincident loss of all trains of
14 safety-related SSCs and extended loss of AC power."

15 Same thought process that I just
16 brought up generically, and yet, you know, those
17 darn tornados are really important. Last time I
18 checked, the only difference between a tornado and
19 a waterspout was, a waterspout was over water and a
20 tornado was over land, and indeed, they've migrated
21 between each place, so I don't understand why just
22 a necessity, waterspouts are screened out and
23 tornados are really important.

24 I view them as the same meteorological.
25 If I have evidence of a site along a coastal

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1 location that has had 37 waterspouts in the last
2 100 years, and just none of them happened to touch
3 down and hit land, I don't know that I'd feel real
4 comfortable about that site from having high
5 rotational winds.

6 MR. RECKLEY: We'll take a look at
7 that.

8 CHAIR STETKAR: I mean, it strikes me
9 as you could --

10 MEMBER POWERS: I interpreted it as it
11 doesn't really affect things until it becomes a
12 tornado.

13 CHAIR STETKAR: Okay. Except that my
14 argument is, can you screen out a site that's had
15 37 waterspouts visible from it and just because
16 none of them happened to happen on land, then it's
17 not a problem, because I can say, well, I've never
18 had a tornado near my site.

19 MEMBER POWERS: But I don't think they
20 do that.

21 CHAIR STETKAR: Okay. I don't know
22 what they do. It strikes me as high rotational
23 winds. Anyway, that was more of a curiosity.

24 MR. SEBROSKY: Well, we'll take a look
25 at that.

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1 CHAIR STETKAR: Take a look at that.

2 MR. SEBROSKY: I mean, when we looked
3 at it, I think there was also a thought that
4 waterspouts weren't as energetic as tornados, and I
5 don't know that that's --

6 CHAIR STETKAR: I wouldn't go there.
7 I'd say it's unlikely that your switchyard is
8 floating out there on the water, but in terms of
9 evidence of vulnerability to high, you know, severe
10 rotational winds.

11 MEMBER POWERS: When I looked at your
12 list of things that you don't consider, I said,
13 gee, they kind of systematically don't consider
14 things that put a lot of dust into the plant, you
15 know, volcanoes, I mean, the problem we had at
16 Hanford was it plugged up all of our air intakes.
17 And dust storms put dust into things and lots of
18 things, forest fires put smoke, which is dust and
19 drag.

20 One of the persistent concerns we've
21 had as we move to digital electronics is these
22 dust, and especially the smoke, are corrosive. And
23 that it gets into it, it doesn't cause anything
24 immediate, but six months later all your electrical
25 contacts are corroded out. Does that cross

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1 anybody's mind on these kind of considerations?

2 MR. SEBROSKY: So that's another good
3 question, and I don't have an answer for you. One
4 of the things we did, though, for all these hazards
5 is, we have a gentleman in our group that came from
6 Events Assessment, and for all these hazards, we
7 scoured the different reports that we have access
8 to.

9 MEMBER POWERS: Yes, I have --

10 MR. SEBROSKY: And if we saw an issue
11 that we thought based on the results of that
12 review, we would pick it up. So there was a hard
13 look at our database, our operational experience
14 database, that is quite extensive to look at these
15 kinds of hazards to see if there's an opportunity
16 for us to look at it again with open eyes.

17 MEMBER POWERS: I don't have --

18 MR. SEBROSKY: I don't have an answer
19 for that.

20 MEMBER POWERS: I don't have in mind a
21 particular incident at a nuclear power plant where
22 smoke and dust have corroded contacts. We have
23 encountered it in other digital systems where fire
24 smoke has proved acidic enough to corrode contacts,
25 and I am familiar with some laboratory experiments

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1 that showed, yes, fairly, that that sort of thing
2 does cause corrosion of contact, and it just
3 becomes an issue as we move more and more to these
4 electrical systems that are more delicate.

5 MR. RECKLEY: And normally, the way
6 that would get picked up, and certainly if it's --
7 would be that upon the failure of a component
8 because of that mechanism, a licensee would assess
9 it and look at the extended condition that what
10 other equipment might have been affected by that
11 condition, and that works up until the point that
12 you don't assume everything fails at the same time.

13 MEMBER POWERS: Yes, and I agree with
14 you that you would, undoubtedly, this would not be
15 catastrophically everything at once or is it highly
16 probable that the one critical device failed. That
17 might be a plausible argument, because certainly,
18 these things are slow.

19 MR. SEBROSKY: Just one other note, the
20 operational experience database that we look at
21 isn't limited to the 100 operating plants in the
22 United States. It's international too.

23 MEMBER POWERS: Sure.

24 MR. SEBROSKY: So we did, for all these
25 hazards, look at that database to see if there was

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1 something in it that warranted further review.
2 Next slide. So Slide 8, this is the discussion
3 about the volcanic activity. It is more detailed
4 than some of the other evaluations that we did.
5 And what we reference is a response to a recent 10
6 CFR 2.206 petition that was based -- the premise of
7 the petition was a supervolcano under Yellowstone,
8 and what are we doing for plants that could be
9 affected by the rupture of that supervolcano.

10 And the detailed evaluation is actually
11 within the response to that 2.206 petition. We
12 just summarize it in Appendix A and it argues that
13 our conclusion was that the volcanic ash at the
14 time, or volcanic activity, would be limited to
15 Trojan, which has since been shutdown, and the
16 Columbia sites, and that the other sites are too
17 far away to consider the threat.

18 The Columbia updated Final Safety
19 Analysis Report does, with specificity, look at
20 volcanic activity and mitigating strategies also
21 looked at volcanic activity. And when you look at
22 the mitigation strategy response, there's three
23 phases of the mitigating strategies, as you're
24 aware.

25 Phase 1 is the use of installed

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1 equipment, Phase 2 is the use of onsite equipment,
2 and Phase 3 is resources coming from offsite. The
3 Phase 2 equipment is housed in a structure that was
4 designed to withstand volcanic ash. That's our
5 basis for saying why we think we're okay at Step 1
6 on volcanic activity.

7 CHAIR STETKAR: It's housed in a
8 structure that's designed to withstand volcanic
9 ash, on the other hand, breathing volcanic ash
10 while it's trying to operate is a different issue.
11 Volcanic ash isn't something that just spews up in
12 the air, it falls on the ground, then you're done
13 with it in a couple of hours.

14 So have they evaluated the operability
15 -- and we shouldn't dwell on this because it's only
16 Columbia and, you know, it's outside the purview,
17 can you screen this out from your generic issue?
18 In my opinion, yes. I think you made an argument
19 that it might be a single-site issue in the United
20 States, but we're arguing that, you know, the --

21 MEMBER POWERS: Columbia did their
22 analysis. They had the benefit of the Hanford
23 experience and I think they took a pretty
24 reasonable cognizance, not only of the enduring
25 nature, the resuspension, but also its cutting

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1 capabilities.

2 CHAIR STETKAR: Yes, we shouldn't waste
3 time on Columbia. When I read through the stuff in
4 Appendix A that does talk about Columbia, I'll
5 just, for the record, note that they apparently
6 assumed that it would only cause a two-hour loss of
7 offsite power, which, okay, you could assume
8 whatever you want to assume, but --

9 MEMBER POWERS: I think we were out for
10 three days up at Hanford.

11 CHAIR STETKAR: Yes, I was going to
12 say, if that's what they -- but again, it's a
13 single -- the staff has to deal with that single
14 site. And whatever they assumed, and whatever the
15 basis, and whatever credit they take for mitigating
16 strategies, you know, that's not what we're talking
17 about today because it's only a single site.

18 MR. SEBROSKY: I understand the point,
19 but from our perspective, if we even -- that's part
20 of the process, that if we identify even a single
21 site, that we need additional information, that
22 that would be part of the white paper. So as part
23 of Step 1, we're saying all 100 operating units are
24 okay, including Columbia, so we'll take a look at
25 that.

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1 CHAIR STETKAR: Oh, okay. I didn't
2 understand that. I thought something got passed to
3 Task 3 if and only if there were two or more.

4 MR. SEBROSKY: No. That's the basis
5 for it not being a generic issue. What we're
6 proposing, and if it's not clear, I apologize --

7 CHAIR STETKAR: Yes, that is --

8 MR. SEBROSKY: -- Step 1 and Step 2,
9 we're saying for all hazards, other than snow and
10 high winds, all 100 plants are okay and there's not
11 one plant that we need to show 50.54(f) under.

12 CHAIR STETKAR: Oh, I didn't get that
13 impression. I thought it was strictly, do we pass
14 it through to Task 3 as a potential generic issue,
15 meaning two or more --

16 MR. SEBROSKY: An outcome of this could
17 be one 50.54(f) letter for one hazard to one plant.
18 And that's what we think is within the scope of
19 this.

20 CHAIR STETKAR: So that's why dwelt on
21 Columbia.

22 MR. SEBROSKY: That's why we dwelt on
23 Columbia and that's why we dwell on HB Robinson.

24 CHAIR STETKAR: Well, that explains --
25 yes, because I had a question of why are you going

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1 into those single-unit --

2 MR. SEBROSKY: We take advantage of
3 generic. If we can resolve an issue generically
4 for all 100 sites, or 100 operating units, we take
5 advantage of that, and if the generic activity
6 culls it down to one plant, then we have to look at
7 that one plant.

8 MR. SHAMS: And if we're not satisfied
9 with the justification, it would had to have been
10 moved to Step 3.

11 MR. SEBROSKY: When you talk about
12 Columbia and the volcanic ash, and I understand you
13 may be referencing what's in their updated Final
14 Safety Analysis Report as far as what they assume
15 for the activity, in generally, when it comes to
16 the NEI 12-06 equipment, the guidance that we use
17 and the guidance that we inspect against, and I
18 still have to get you an answer on Columbia, but
19 the guidance that we use and the guidance that we
20 inspect against, if it's a volcano, if it's an
21 avalanche, if it's a landslide, I'll give you an
22 example, in Diablo Canyon, landslide, they have to
23 have a process in place to get the Phase 3
24 equipment onsite assuming that landslide, and how
25 are you doing it?

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1 And they have bulldozers and
2 helicopters, right? So if you get to the volcanic
3 activity, again, I'd have to take a look at it, and
4 what we did or didn't do when it comes to
5 implementing all three phases of that in a volcano,
6 but there is an expectation, a clear expectation,
7 that they would be able to mitigate that beyond
8 design basis of that in all three phases given the
9 condition.

10 CHAIR STETKAR: That may come back,
11 though, to that -- you know, my rant about the
12 bucket of water, that it's clear that the NEI 12-06
13 assumes that the water reservoir is available and
14 it's suitable for whatever cooling purpose is
15 needed, meaning, it's clean enough and all that
16 kind of stuff.

17 There may be an implicit, I haven't
18 read it anywhere, assumption that the air quality
19 is sufficient so that I can run my portable gas
20 turbines, or portable diesel generators, or
21 whatever I'm hooking up, you know, within my Phase
22 2 or Phase 3 response strategy. That isn't stated
23 explicitly in NEI 12-06. I haven't seen the air
24 quality.

25 MR. SEBROSKY: No, it's an implicit

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1 assumption, given the hazard, that you'll be able
2 to -- and I go back to Diablo Canyon and also with
3 avalanches, that if you lose access to the site
4 because of an avalanche, then the mitigating
5 strategies --

6 CHAIR STETKAR: And that's clear.

7 MR. SEBROSKY: So we'll take a look.

8 MEMBER POWERS: Yes, the air quality
9 problem during the Mount St. Helens was just
10 disastrous. I mean, we just couldn't -- I mean,
11 you couldn't drive cars.

12 CHAIR STETKAR: Anyway, so just to be
13 clear, I didn't think any unit that could be
14 affected by any of these things, if you determined
15 it could be, then it would have been tasked to Task
16 3.

17 MR. SEBROSKY: The fundamental premise
18 is that if we could resolve the issue for all 100
19 operating plants in Step 1 or Step 2 --

20 CHAIR STETKAR: It was done.

21 MR. SEBROSKY: -- it was done. And
22 that's what we're saying.

23 CHAIR STETKAR: And if you could not
24 resolve for one and only one, it would pass to Task
25 3.

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1 MR. SEBROSKY: That one plant would
2 pass to the Task 3. And certainly, when we talk
3 about snow loads, we're not worried about the
4 plants in Florida with snow loads, so that's an
5 example of where it would be a more focused review,
6 and the same thing with HB Robinson. That's why we
7 dwell so much on that because of the downstream dam
8 fire.

9 CHAIR STETKAR: We'll get to the dam
10 thing later.

11 MEMBER POWERS: Well, on the other
12 hand, a Florida plant did have a big snow load,
13 you'd worry about it.

14 CHAIR STETKAR: They make an argument
15 that anything south of the 35th parallel, you don't
16 need to worry about snow. I live south of the 35h
17 parallel and we had some damn heavy ice storms and
18 snow storms.

19 MR. SEBROSKY: Well, that's for
20 purposes of the NEI 12-06, but we don't make that
21 argument for snow loads. What we argue is -- and
22 we'll talk about this.

23 CHAIR STETKAR: And it doesn't make any
24 difference because there's enough plants north of
25 the 35th parallel that you've retained it for --

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1 we'll eventually visit Task 3.

2 MR. SEBROSKY: Yes, and it gets to
3 structural margin. So Slide 9 is the geomagnetic
4 storms and this is a different proposal, where,
5 Columbia, we're saying we believe we have enough
6 information to resolve Columbia, the argument for
7 geomagnetic storms is it's being evaluated under a
8 Tier 1 activity, and because it's captured under
9 the Tier 1 activity, we can close it in this Tier 2
10 activity.

11 And our argument is laid out in this
12 slide, but under -- as part of the Tier 1 activity,
13 the mitigation and beyond-design-basis event
14 rulemaking, with specificity, mentions a petition
15 for rulemaking associated with geomagnetic storms.
16 We did, as part of that proposed rule, receive
17 comments on geomagnetic storms that we're looking
18 at right now and we're assessing as part of that
19 process.

20 And the punchline on all this is,
21 because it's being reviewed as part of that process
22 and there is a process for informing the Commission
23 of the results of the staff's review, that we can
24 close the activity as a Tier 2 activity.

25 CHAIR STETKAR: Is that -- there were

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1 two of these things, we'll get to seiche later, but
2 seiche and geomagnetic storms are treated,
3 conceptually, the same way in the white paper that,
4 because something else is dealing with them, we can
5 checkoff the box that they're closed under this
6 thing.

7 MR. SEBROSKY: Yes, we can talk about
8 seiches, and there is a change --

9 CHAIR STETKAR: We will eventually, but
10 conceptually, both of those, right, are dealt with
11 the same way. They're being dealt with under some
12 other issue so we can checkoff the box for this
13 particular activity that, we're done with them.

14 MR. SEBROSKY: Yes, and we may --

15 CHAIR STETKAR: But hand it off to
16 other people. My question is, these thing have to
17 be resolved by the end of this year. When do those
18 other things need to be resolved? Are we just
19 simply passing it to something that's going to go
20 on ad nauseam for decades or centuries and say,
21 well, we're done with it --

22 MR. SEBROSKY: So one of the concerns
23 that we had was to make sure that we weren't
24 missing an immediate safety concern. And there is
25 an argument in the paper that takes advantage of

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1 staff's past work on geomagnetic storms and
2 indicates that, as documented in the staff
3 responses to Congress, we don't see an immediate
4 safety concern right now, but we're still studying
5 the issue.

6 So I can't give you a timeline for when
7 it's going to be resolved in the rule, or if it's
8 going to be completely resolved in the rule,
9 because some of this activity is outside the
10 purview of the Nuclear Regulatory Commission and
11 gets to the stability of the grid and the work that
12 FERC has the lead on, and there is a White House
13 initiative to look at geomagnetic storms that we're
14 involved with.

15 So it would be disingenuous for me to
16 suggest I know how it's going to end up in the
17 MBDBE rule, and also, how it'll eventually be
18 resolved as part of that White House initiative.
19 What we try to argue in the paper is, we're telling
20 the Commission we don't see an immediate safety
21 concern that kicks us right into issuing a 50.54(f)
22 letter or doing a backfit.

23 CHAIR STETKAR: But at this point of
24 the game, from your --

25 MR. SEBROSKY: That's why we say we can

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1 kick it to the Tier 1 process.

2 CHAIR STETKAR: Yes, but I'll bring you
3 back, and I'm trying not to be too dramatic on
4 this, you're going to tell the Commission you're
5 finished with it from your perspective, so it's not
6 an issue for the MBDBE rulemaking --

7 MR. SEBROSKY: I didn't say that.

8 CHAIR STETKAR: Well, but if it was --

9 MR. SEBROSKY: It's not for this Tier
10 2.

11 CHAIR STETKAR: The accounting on this
12 stuff is starting to boggle me, so let me just get
13 back to, if it's passed on to Task 3, from the
14 purposes of this white paper, it's still in play in
15 terms of, perhaps, issuing generic letters or being
16 included as a requirement in the rule, right?
17 Okay.

18 MR. SEBROSKY: Yes.

19 CHAIR STETKAR: If it's not passed on
20 to Task 3, from the purposes of this particular
21 exercise, it's off the table, is that correct?

22 MR. SEBROSKY: No.

23 CHAIR STETKAR: No. Okay. Why is it
24 not off the table then?

25 MR. RECKLEY: Well, if in the

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1 disposition of the issue under the MBDBE
2 rulemaking, for example, there became -- and Tim's
3 going to rescue us here, but if the staff was
4 unable to say whether -- if we needed information
5 from licensees in order to address a question about
6 whether it should be in the rulemaking, we would,
7 through that process, undertake the same thing we
8 would here, right?

9 We're just trying to say it's already
10 in a Fukushima-related item, keeping it open here
11 wouldn't help in its resolution. It's already been
12 undertaken through the rulemaking. Tim, do you
13 have a --

14 MR. REED: Can you guys hear me?

15 MR. RECKLEY: Yes.

16 MR. REED: This is Tim Reed. I'm the
17 project manager for the Mitigation of Beyond-
18 Design-Basis Events rulemaking, and what the two of
19 them mentioned earlier is correct. We have several
20 efforts going on right now. Obviously, FERC,
21 they're the transmission system reliability people,
22 they regulate that, they are, in fact, they have a
23 proposed rule out, they're trying to adjust the
24 requirements for geomagnetic storms for that, so we
25 have to wait to see what that ends up being,

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1 because that'll address this issue to some extent.

2 There's a White House initiative, of
3 course, we have to be cognizant of that, and of
4 course, what we're putting in place for the Beyond-
5 Design-Basis events rulemaking is, in part, at
6 least a good start, to address this thing too.

7 So what we're looking at here is that
8 there's a petition for rulemaking 1596, which we
9 have accepted, okay? Now, what that means is,
10 we've accepted this PRM, we are going to consider
11 it under rulemaking, but what we have to do is see
12 where end up with our rule, where FERC ends up,
13 where the White House ends up, what delta exists,
14 if any, if that's substantive enough, and then all
15 the comments, we've gotten, frankly, some really
16 good comments on our rule for this issue,
17 geomagnetic storms, we would consider those as part
18 of the PRM to see what, if any, additional
19 requirements would occur.

20 So to get back to what you guys are
21 saying, it's definitely in a process. It's going
22 to be, you know, completely considered under the
23 PRM rulemaking process, so I think that's just a
24 little bit more detail than what you guys were
25 saying, so hopefully that clears it up.

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1 Again, this is what I think we're going
2 to be doing. I got to be careful. This is the way
3 the rule's going right now. I'm not the
4 Commission, the last time I checked, so I guess
5 they can change what I do.

6 MEMBER POWERS: Well, I think what you
7 leave open is John's question that by being
8 considerate of other activities for White House,
9 who knows what all, does that mean this goes on for
10 heroic periods of time or is there a point where
11 you say, look, I can't wait for these people
12 because they have to consider a lot of other things
13 besides nuclear power plants and their impact on
14 those, and whatnot.

15 I mean, do you have a watchdog timer on
16 this?

17 MR. REED: Again, I think that gets
18 back to, you know, I don't have -- Dr. Powers, I do
19 have to wait for our federal partners to at least -
20 - you know, you understand that.

21 MEMBER POWERS: I mean, there's the
22 question, you say you have to wait. No, you don't.

23 MR. REED: Well, actually, I'll correct
24 that, actually Joe mentioned, if we solve an issue
25 right now, I mean, if we solve an issue right now,

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1 we would take action and we are monitoring that
2 right now. I mean, so I guess that's probably the
3 better way of saying it.

4 MEMBER POWERS: Okay. Well, I guess I
5 really am dead serious. Is there a watchdog timer
6 on this?

7 CHAIR STETKAR: Generic issue 199 was
8 crawling along at its snail's pace with everybody
9 doing all of the research and trying to figure out
10 how to plan to figure out how to maybe figure out
11 how to do it for years and the bad news is,
12 Fukushima happened, you know, which, oh, my God,
13 this is really important.

14 Well, the point that I'm trying to
15 make, and that Dana's trying to make, is that, if -
16 - we don't want to have that experience. We don't
17 want to have the Japanese experience of studying
18 the fine structure of precise notions of models for
19 tsunamis. We don't want to have something that
20 goes on in the research community for decades if
21 indeed it might be an issue, if there might be
22 protections that the plants can put into place, or
23 if we, indeed, can draw a conclusive enough
24 argument that it really isn't an issue.

25 And my notion, keeping it alive in this

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1 framework at least pushes an end of 2016 forcing
2 function to that decision.

3 MR. RECKLEY: Keeping it open in two
4 staff activities versus one staff activity, to be
5 honest, is not going to speed things up, but going
6 to your basic point though, and this is brought out
7 by various studies, including the National Academy
8 of Science, where you try to balance the continual
9 evaluation of new data and study, and do due
10 diligence of issues, and taking timely regulatory
11 action, and avoiding what some might say happened
12 at Fukushima where you can get into a paralysis-by-
13 analysis mode, or maybe what your point was for GI
14 199, that we might have been in, although, I would
15 argue a little bit we weren't there, but I can
16 understand the point.

17 And we're trying to do that balance,
18 and I think that's what Joe and Tim have both said,
19 is that, we're comfortable in the initial
20 assessment through both mitigating strategies and
21 other understandings that this isn't an immediate
22 safety issue, and it can be resolved in, what some
23 might say, the longer term through the rulemaking
24 process.

25 CHAIR STETKAR: Okay. Thanks.

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1 MEMBER RAY: Well, wait a minute. Can
2 I ask a question?

3 CHAIR STETKAR: Yes, you may.

4 MEMBER RAY: What Bill last said, he
5 said, I can't repeat it exactly, Bill, but you used
6 the phrase through the mitigating strategies. And
7 I guess, in listening to this for the last God
8 knows how long here, I was trying to ascertain to
9 what extent we were deferring resolving something
10 because we thought we had a mitigating strategy in
11 the event that the resolution came, as John said,
12 after the event, as it did in Fukushima.

13 And, you know, I understand that having
14 mitigating strategies in place may give us more
15 time to decide is this a problem or not, which I
16 think is, basically, what you were saying, but am I
17 misunderstanding what you were saying?

18 MR. RECKLEY: No, I think that's fine.
19 The fact that we have put mitigating strategies in
20 place provides that much more confidence.

21 MEMBER RAY: Okay. Now, you understand
22 from our standpoint though, my standpoint, excuse
23 me, that that's reasonable to a point, but beyond a
24 point, it simple is an excuse for not resolving
25 something that should be resolved.

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1 CHAIR STETKAR: Those mitigating
2 strategies rely on the stuff inside of the plant
3 still working.

4 MR. SHAMS: Phase 1. That's correct.

5 CHAIR STETKAR: No, no, Phase 3 relies
6 on the stuff inside. You have to have electrical
7 and electronics stuff inside the plant that still
8 works.

9 MR. SHAMS: What I meant is, yes, the
10 Phase 1 equipment that you connect to through Phase
11 2 as well, and Phase 3, yes.

12 CHAIR STETKAR: So, you know, I'm not
13 an expert on geomagnetic storms, so I don't know
14 what it can do to sensitive electronic stuff or how
15 long those effects can persist inside the plant.

16 MEMBER RAY: You're questioning whether
17 the mitigating strategies are, in reality, a reason
18 to extend resolving the thing.

19 CHAIR STETKAR: Exactly, because I
20 don't know enough about the problem.

21 MEMBER RAY: I understand.

22 CHAIR STETKAR: That's what I thought
23 the whole issue of kicking this to Task 3 to take a
24 harder technical look at it.

25 MEMBER RAY: I was just commenting on

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1 what Bill had said because he connected mitigating
2 strategies with the time to resolve these things,
3 and I think that that's something that, at least in
4 my view, is understandable to a point, but it goes
5 too far too often.

6 MR. SEBROSKY: So the last bullet on
7 Slide 9, we did have an April 5th Category 3 public
8 meeting on the white paper and we did not receive
9 any substantive comments on this portion of the
10 paper as a result of that, so it's just a report
11 out since this meeting is so close to the April 5th
12 meeting, what we heard, and there are some
13 assessments where we do have substantive comments
14 that we're trying to react to in the version that
15 will go forward to the Commission.

16 CHAIR STETKAR: Joe, just for -- I
17 might as well bring this up now, we are planning to
18 address this as a full committee in our May
19 meeting, roughly two weeks from now. Is the
20 version of the white paper that we received for
21 this Subcommittee meeting what the full committee
22 is going to have for its deliberations or will
23 there be a change?

24 You just mentioned that as a result of
25 the public meeting you were --

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1 MR. SEBROSKY: I understand, and we
2 talk about that, and I think -- do you want to --

3 CHAIR STETKAR: We can wait until the
4 end of the -- or we can address it now.

5 MR. SEBROSKY: I think we should
6 probably --

7 MR. SHAMS: We're prepared to give you
8 an updated white paper or we can give you the draft
9 SECY paper, because it is in concurrence, which
10 would, essentially, constitute --

11 CHAIR STETKAR: That would be good.

12 MR. SHAMS: We can do that.

13 CHAIR STETKAR: Okay. The sooner the
14 better.

15 MR. SEBROSKY: We would have to make
16 that publicly available. Well --

17 CHAIR STETKAR: Yes, I mean, it's --

18 MR. SEBROSKY: And I think we need to -
19 - so there's a couple caveats, right? It would be
20 draft and it's not approved -- it doesn't have
21 management and OGC approval, just like the white
22 paper.

23 CHAIR STETKAR: But if it's
24 substantively improved from the draft white paper,
25 I think that our committee members, and perhaps the

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1 staff, might benefit from our seeing that.

2 MR. SHAMS: Well, there's certain areas
3 that it certainly had more information in it. You
4 had talked about Robinson and the seiche area, so
5 those are areas, and we contemplated giving you
6 just these sections because they're the ones that
7 actually had substantive change, if you would, so
8 that was a third option that we thought of.

9 So why don't we take that and think
10 about, you know --

11 CHAIR STETKAR: It's probably better to
12 have a complete document just so that we can refer
13 to something, you know, that the ACRS' review is
14 linked to a specific document rather than one
15 document with bits and pieces possibly changed.

16 MR. SHAMS: It makes sense and let's
17 work that out --

18 CHAIR STETKAR: Let's do that. Talk to
19 Kathy for the --

20 MR. SHAMS: Thank you.

21 CHAIR STETKAR: I don't want to put too
22 much of a rush on you, but it is, you know, roughly
23 two weeks from now.

24 MR. SCHULTZ: Joe, is there more
25 information in this document related to the

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1 volcanic evaluation for Columbia?

2 MR. SEBROSKY: Yes. The substantive
3 comments --

4 MR. SCHULTZ: Here it says, you know,
5 the staff has done a detailed evaluation which is
6 summarized in the following paragraph, but it
7 doesn't really hit on the issues that we discussed
8 today in terms of whether the equipment -- for
9 example, it depends upon an evaluation related to
10 the equipment protection and indicates that the
11 structure will handle the ash loading, weight
12 loading, but doesn't talk about whether the
13 equipment will operate in the environmental
14 condition of the volcanic ash.

15 MR. SEBROSKY: So there's things
16 between now and beginning of May that we would be
17 able to do as far as giving you an update to the
18 paper. Between now and the full committee meeting,
19 I think the only thing, reasonably, that we can do
20 is let the full committee report back to you on
21 some of the concerns that we heard and what we
22 intend to do.

23 What we can give you between now and
24 the full committee is the additional information
25 that we've put together, the additional arguments

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1 that we've put together, based on the comments that
2 we got as a result of the issuance of that paper.
3 We can do that, and then we can report back to you
4 on where we -- what adjustments, if any, we're
5 considering as a result of comments that we receive
6 today.

7 MR. SCHULTZ: Thank you.

8 MR. SEBROSKY: The next slide. So this
9 is a summary slide. What's in our paper is, there
10 are four groups of hazards that were not
11 disposition as part Step 1, and that's wind and
12 missile loads from tornados and hurricanes, snow
13 and ice loads for roof designs, drought and other
14 low-water conditions, and extreme temperatures.
15 These are the four sets that moved on to Step 2 of
16 the process in the white paper. Next slide.

17 So what Step 2 of the process starts
18 out as in the white paper is, we recognized very
19 early on that we needed to do a more detailed
20 evaluation when it came to wind and missile loads,
21 and also snow loads, and we moved that to Step 3 of
22 the process, so Step 3 of the process of the
23 proposal is we would report to the Commission what
24 the issue is, summarize it at a high level, why we
25 moved it to Step 3, and what we're thinking as far

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1 as being able to address those issues in a timely
2 fashion.

3 What we say in Step 2 is, we believe we
4 have enough information to resolve drought and
5 other low-water conditions, and extreme
6 temperatures as part of Step 2, and that's what the
7 next slide talks about.

8 When you look at the low-water
9 conditions, the three low-water conditions that we
10 evaluated were drought, low-water conditions due to
11 downstream dam failure, and this is a very unique
12 scenario that we'll get into in detail, and then
13 also low-water conditions due to a seiche.

14 One of the things that Mr. Stetkar
15 talked about was being in two processes at the same
16 time. Our management challenged us that if we saw
17 an issue that we believe we could close, that we
18 would close it as part of this activity. Both the
19 low-water conditions due to a downstream dam
20 failure and the low-water conditions due to a
21 seiche were identified by NRC staff as pre-generic
22 issues.

23 What we allude to, and we reference
24 both of these in the document, where we think we're
25 going as far as the SECY is, we are going to, the

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1 thought right now is, attempt to close both those
2 issues with this SECY paper. And if we can
3 demonstrate that we can close the issue in the SECY
4 paper, the generic issue process would reference
5 the SECY paper as the disposition of the issue.
6 That's kind of where we're at.

7 The criteria that we applied for the
8 low-water conditions are conservatism of design,
9 operational limits in place, and the warning time.
10 If you go to Slide 13.

11 CHAIR STETKAR: Joe, before -- I've got
12 some questions about downstream dams, and dams in
13 general, and a couple questions on seiche, but just
14 because of the way your slides were organized, it
15 may be better to take a break now before we get
16 into the dams because you got three or four slides
17 on dams, and I've got a couple of questions, and I
18 don't know if any other members do, so what I
19 propose is we take our break now and then come back
20 and kind of get into the meat of these topics.

21 So let's do that. Let's recess until
22 2:45.

23 (Whereupon, the foregoing matter went off the record at 2:29 p.m. and went
24 back on the record at 2:45 p.m.)

25 CHAIR STETKAR: We are back in session.

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1 Time to talk about low-water level.

2 MR. SEBROSKY: This is Joe Sebrosky
3 again, we're on Slide 13, and there's only one
4 bullet on this slide for drought. There's just a
5 one-paragraph disposition for this in Step 2 that
6 there's a sufficient warning time to allow
7 licensees to take appropriate action. The low-
8 water conditions due to downstream dam failure,
9 there's an extensive discussion on low-water
10 conditions due to downstream dam failure and
11 seiches. There's a summary in the main enclosure,
12 but the more detailed assessment is in Appendix B
13 of the white paper.

14 And what we note is that this issue was
15 identified as a pre-generic issue, the issue was
16 closed out for all but one plant in a March 11,
17 2016 letter, and the basis for closing the issue
18 for all the plants, with the exception of Robinson,
19 was, the plants with non-seismically qualified
20 downstream dams have developed mitigating
21 strategies to cope with it, risk assessments were
22 performed for plants with seismically qualified
23 downstream dams, and we'll talk about the process
24 in the next slide on how this was identified as a
25 pre-generic issue.

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1 And the concern was, the reason it was
2 identified as a pre-generic issue is to make sure
3 that something wasn't falling through the cracks
4 during our assessment of the 50.54(f) flood hazard
5 re-evaluations.

6 There were risk assessments performed
7 with seismically qualified downstream dams and all
8 the sites screened out with the exception of
9 Robinson. And again, we'll talk about that in a
10 second when we get to the next slide.

11 So the conclusion is generic regulatory
12 action to address downstream dam failures are not
13 warranted and what we provided in the assessment
14 was a detailed evaluation of Robinson since it
15 wasn't evaluated as part of the March 11th
16 closeout, and we talk about the capability of the
17 deep well pumps. And what we are adding, a
18 discussion about the reactor coolant pump seals.
19 They have newly installed passive seals that limit
20 the reactor coolant pump leakage.

21 You see a discussion in the paper right
22 now about the capability to provide a source of
23 water to the steam generators. We don't have a
24 discussion of what the primary plant is doing and
25 we intend -- this is part of stakeholder comments

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1 that we are trying to make that discussion more
2 robust and what we think we can provide you some
3 time next week.

4 If you go to the next slide. The last
5 bullet on here, when I say further evaluation as
6 part of the NTTF 2.1 activities, there's a -- well,
7 just keep that thought for a second as we walk
8 through this slide, and this process that's
9 outlined in the March 11th, I'll try to see if I
10 can highlight the important parts, you start out
11 with a generic issue and if it goes to the bottom,
12 it needs to be evaluated. If it screens out up top
13 here, then it's out of the process.

14 So you see new nuclear power plants and
15 other regulated facilities screening out at this
16 step, operating nuclear power plants screening in.
17 This step here, you look at operating nuclear power
18 plants with downstream dams. If it doesn't rely on
19 a downstream dam, then it screens out up here. If
20 it does have a downstream dam for its ultimate heat
21 sink, it does down.

22 So the next step is random events
23 screen in. The reason that is there is there's a
24 fundamental presumption, and this gets back to the
25 issue on why it was looked at as a generic issue,

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1 as part of the mitigating strategies order, if a
2 dam was considered seismically robust, you didn't
3 have to assume that it failed.

4 So the mitigating strategies was
5 designed such that you could rely on that source of
6 water and that was the challenge. The challenge
7 was, what happens if that downstream dam that's
8 seismically robust fails due to a random sunny day
9 failure, which we are not looking at as part of
10 mitigating strategies. You just assume the dam
11 doesn't fail.

12 That is what the generic issue looked
13 at and there were 13 sites, 21 units, that fell
14 within the scope of this generic issue, that
15 whether or not you have a seismically robust dam,
16 fundamentally assume from mitigating strategies
17 perspective that you could rely on it, it would
18 impound the water.

19 What happens if it failed due to a
20 sunny day failure or a piping event? Do you have
21 an issue? That is what the March 11, 2016 letter
22 looked at for those 13 sites, 21 units. And when
23 you look at the next steps in this process, where
24 it talks about the screening risk analysis doesn't
25 demonstrate low risk, it screens in, and risk

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1 assessment doesn't demonstrate low risk, it screens
2 in, and not more than one operating nuclear power
3 plant screens out.

4 So based on the assessments that were
5 done, again, if you look at the March 11, 2016
6 letter, there's a public portion of it, and there's
7 two documents that are non-public that are a
8 detailed PRA, it concludes, they conclude, that
9 based on the risk assessments that were done for
10 all of those sites, 21 units, 13 sites, that all
11 but one of them, they could demonstrate it was low
12 risk.

13 The majority of the risk analysis
14 boiled down to an impoundment within an
15 impoundment, that although they relied on a safety-
16 related ultimate heat sink dam being robust, if
17 that dam failed because of piping failure, there
18 was another impoundment behind that, and in some
19 cases, submerged that you can't see, that would
20 retain enough water to remove decay heat.

21 When you look at the detailed risk
22 assessment, that's the kind of information that
23 they looked at and based their risk analysis on.
24 That is not true at Robinson. Robinson does not
25 have a backup impoundment, but they were able to

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1 say 20 of the 21 units screen out, with the
2 exception of Robinson. Robinson needs to be looked
3 at more closely.

4 If you go back to the previous slide,
5 one of the things I just wanted to talk about real
6 quick, the further evaluation as part of NTTF 2.1
7 activities, there's a statement in the white paper
8 where the seismic hazard at Robinson, the re-
9 evaluated seismic hazard at Robinson, changed, and
10 there's a non-trivial change in seismic hazard.

11 What the concern is for that activity
12 is to ensure that the NTTF 2.1 activity, which is
13 the 50.54(f) letter on seismic, is going to look at
14 the dam as it relates to that new seismic capacity,
15 is that going to be evaluated. So there's a
16 portion of Robinson downstream dam failure that is
17 going to be looked at as part of the seismic PRA
18 under the 50.54(f) process.

19 Because that portion's being looked at,
20 we're saying that's being resolved as part of the
21 Tier 1 activity, and we're closing it in Tier 2
22 because of that, just that portion. That's what
23 that last bullet means. If you go to the next
24 slide.

25 So this slide was meant to capture some

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1 of the information that we believe, based on
2 stakeholder comments, that we need to add to the
3 white paper, or the SECY paper, and as we discussed
4 earlier, we have updated the draft assessment in
5 this area based on these bullets, and that's what
6 we have to get with our management, we have to get
7 with Mo afterwards and figure out, some time next
8 week, giving you an updated version. I think
9 that's our commitment.

10 So this is a laundry list of what we're
11 doing. There is a high-level discussion of the
12 deep well pumps that's already in that appendix.
13 There's four of them. We're adding more of a
14 discussion of the capabilities of those pumps. The
15 "D" deep well pump is a well-sized pump. It can
16 pump out 1320 gallons per minute, so it's non-
17 trivial flow, and it can supply -- it's hard-piped
18 to the service water system. It can feed the
19 installed emergency diesel generators to cool it,
20 and it can also supply some of the heat loads on
21 the service water system.

22 When I can say wells can support FLEX
23 long-term cooling, the "D" deep well pump has the
24 capability of being supplied by either safety-
25 related bus. The three other pumps, the A, B, and

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1 C deep well pumps, come off non-safety-related
2 buses, but the FLEX diesel generator can be used to
3 power those three pumps, and they can provide water
4 to the aux feedwater system.

5 The "D" deep well pump has multiple
6 connections to the service water system and it can
7 also, through a FLEX hose, supply, or resupply, AFW
8 water supply tanks. So we also intend to add a
9 discussion on the reactor coolant system inventory
10 control.

11 If you look at what's in Appendix B
12 right now, it concentrates more on demonstrating
13 the capability of the deep well, the "D" deep well,
14 pump to supply the aux feedwater system and then to
15 get water into the steam generators to remove decay
16 heat. We are silent on the reactor coolant system.
17 There was a stakeholder comment that we received
18 that said if you didn't provide cooling to the pump
19 seals you could have a potential for a reactor
20 coolant pump seal leakage.

21 That's not the case at Robinson.
22 They've installed the reactor coolant pump passive
23 seals, the SHIELD seals. We had more of a
24 discussion about that and there's plenty of
25 capability through the refueling water storage tank

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1 to maintain primary pressure control.

2 So those are the additional things that
3 we're adding to the Robinson writeup to bolster the
4 conclusion that no further regulatory action is
5 needed to address the Robinson downstream dam
6 failure.

7 MEMBER RAY: Not to disagree with that
8 conclusion, but just to ask a question, having
9 operated and re-licensed dams quite often, I
10 wondered how the seismic qualification of the dams
11 was established. Was it just what they were
12 asserted to have been designed to or was the design
13 reviewed in any way?

14 MR. SEBROSKY: So I don't know the
15 answer to that off the top of my head. I know that
16 if you go to that March 11, 2016 document and you
17 look at the public version of the document, there's
18 also the risk analysis that's non-public that,
19 obviously, the ACRS folks have access to.

20 There is a discussion about who is the
21 regulatory authority for each one of those dams and
22 I forget if Robinson, who the regulatory authority
23 is, if it's FERC or not, but --

24 MEMBER RAY: Well, as you can imagine,
25 most dams are pretty old and the technology and the

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1 analysis basis for their design --

2 MR. SEBROSKY: So one of the concerns
3 that we had, and it gets back to the NTTF 2.1
4 recommendation, is the non-trivial change in the
5 seismic hazard. The "D" deep well pump is not
6 seismically qualified, right? And for this
7 argument to work, it's a sunny day dam failure,
8 right? You don't assume the dam goes away.

9 But the concern was, with the non-
10 trivial change in the seismic hazard as part of the
11 2.1 activity, is the licensee's intention, they've
12 committed to doing a seismic PRA, and the timeframe
13 for them giving that to us is the 2019 timeframe,
14 is the licensee's seismic PRA going to look at the
15 robustness of that dam given the new seismic
16 hazard?

17 And the answer that we got from the
18 licensee was yes. The concern that they have isn't
19 necessarily related. It's my understanding there's
20 a portion of it that's concrete, but there's also a
21 large portion that's earthen. It's my
22 understanding that they're not necessarily
23 concerned about the earthen part of the dam, but
24 they're looking at the gates, the floodgates, and
25 their capability to handle the new seismic loading.

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1 From our perspective, we just want to
2 make sure that they're looking at that, and they've
3 told us they're not sure, when they do the seismic
4 PRA, if it's going to result in a conclusion to
5 upgrade the "D" deep well pump seismically or
6 upgrade the dam to make sure that it can handle the
7 new seismic hazard.

8 MR. SHAMS: So if I may add, just in a
9 generic fashion, you know, you asked the question
10 of who looks at these dams, you know, in general,
11 and Joe alluded to it. They're owned and operate
12 by different federal organizations, the Corps of
13 Engineers, FERC, Bureau of Reclamation, for the
14 most part, these organizations have periodic
15 inspections and periodic risk assessments.

16 I wouldn't testify to say that I know
17 for a fact they do that, and they take the re-
18 evaluated hazard, but I know they do have regular
19 dam safety programs to look into their dams and
20 inspect them on regular basis and analyze them.

21 MEMBER RAY: Well, that's certainly
22 true, but I just was really focusing on the terms
23 of non-seismically qualified downstream dam versus
24 seismically qualified, and I know how very
25 difficult it is to assert something is seismically

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1 qualified that was designed 100 years ago or even
2 50 years ago.

3 MR. SEBROSKY: Yes, so as part of the
4 mitigating strategies one of the things that we
5 inspect, or audit, is, if a licensee assumes that a
6 dam is robust, we look at that to make sure that we
7 can come to the same conclusion. It's disingenuous
8 to suggest that involves a detailed assessment of
9 the dam.

10 CHAIR STETKAR: I wanted you to get
11 through this before I brought up my, sort of,
12 couple of issues. Let me try this, when I went
13 through the white paper and NEI 12-06, and
14 everything associated with it, I had to create a
15 little table for myself, so I did, and I either
16 have a seismically robust dam or I have a not
17 seismically robust dam.

18 So I figured, okay, well, let's look
19 at, suppose I have a seismically robust dam, how do
20 I dispose of that? If it's seismic failures of a
21 seismically robust dam, those don't occur. If it's
22 an overtopping -- and I thought of three failure
23 modes, by the way, seismic failures, overtopping
24 because of, let's say, a flood-induced overtopping,
25 and just random sunny day failures.

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1 So if I have a seismically robust dam,
2 seismic failures of a seismically robust dam are
3 N/A, overtopping failures of a seismically robust
4 dam are included in the scope of the external
5 flooding hazard assessments, and indeed, I've
6 traced that through, so I got that, random failures
7 of seismically robust dams are addressed by what's
8 documented in Appendix B of the white paper, and
9 we've discussed here, the risk assessments that
10 were addressed as part of the generic issue, right?

11 Okay. So I've taken care of
12 seismically robust dams. I've got a not
13 seismically robust dam, seismic failures of not
14 seismically robust dams are, indeed, included in
15 NEI 12-06. I found statements in there that says,
16 you have to account for seismic failures of not
17 seismically robust dams.

18 Overtopping failures of not seismically
19 robust dams are part of this other issue of the
20 flood wave comes down and takes it out, and I'll
21 get back to that in a second. Where are random
22 failures of not seismically robust dams addressed?

23 MR. BAILEY: So this is Stewart Bailey
24 with the JLD. They're basically addressed
25 implicitly by the fact that the mitigating

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1 strategies are designed to not take credit for the
2 water impounded by that dam and so --

3 CHAIR STETKAR: I'm sorry.

4 MR. BAILEY: And that's even
5 superimposing an ELAP and --

6 CHAIR STETKAR: Stewart?

7 MR. BAILEY: Sure.

8 CHAIR STETKAR: As a matter of fact,
9 they are explicitly designed to take full credit of
10 the water that's impounded by that dam. In NEI 12-
11 06, it is stated explicitly that, this goes back to
12 my ranting about the bucket of water, the bucket is
13 there, the water is in the bucket and it is capable
14 of cooling. The only thing that I've lost is the
15 ability of transferring water from the bucket to
16 the plant.

17 MR. BAILEY: Correct.

18 CHAIR STETKAR: Okay. So how does the
19 mitigating strategies take credit for the fact that
20 the bucket drained due to a random failure, not --

21 MR. BAILEY: So for plants where the
22 dam is not considered robust --

23 CHAIR STETKAR: Okay.

24 MR. BAILEY: -- meaning that it is not
25 seismic, they have other sources of water that they

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1 can access if that water goes away. 12-06 is
2 designed such that I can only credit a water source
3 that is robust. If the downstream dam is not
4 seismic, the impoundment is not robust, and
5 therefore, I have other means, via wells, or other
6 methods of getting water, not full functionality
7 safety-related, but sufficient for the functions of
8 floods.

9 CHAIR STETKAR: Could you do me a favor
10 and point me -- I must have missed it, could you
11 have somebody point me to where in NEI 12-06 it
12 says that?

13 MR. BAILEY: Sure.

14 CHAIR STETKAR: I mean, you don't have
15 to do it now, because that's really important in
16 terms of completeness. Now --

17 MR. SHAMS: Just to add, Mr. Stetkar,
18 I'm sorry, I don't know where that's going to be in
19 12-06, and I know Stew will get us there, but I
20 know that the staff, when we talked to the staff
21 that audited the sites, when they went to a site
22 and the downstream dam was not seismically
23 qualified, they required the licensee to identify
24 an alternate source of water in the strategy.

25 CHAIR STETKAR: And I'm fully happy

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1 with that. I'm just trying to make sure that
2 nothing got lost in --

3 MR. SHAMS: Yes. No, I wanted to
4 provide --

5 CHAIR STETKAR: -- because there's too
6 many documents out there, there's too many sets of
7 guidance, and I wanted to make sure that they all
8 tie together.

9 MR. SHAMS: Sure. We'll provide that.

10 CHAIR STETKAR: Let me make a note here
11 because I'm a slow writer and I don't remember
12 anything. Okay. Now, when I started thinking
13 about this stuff, will the analyses that are done
14 under NEI 12-06, the assessments or whatever's
15 done, account for the following type of condition,
16 I know that they will account for a condition where
17 the flood from an upstream source is severe enough
18 to both flood the site and take away the downstream
19 dam, so flood wave comes through, I get some
20 flooding onsite, downstream dam goes away. That
21 seems pretty clear to me.

22 Will they account for conditions where
23 the flood wave is not severe enough to inundate the
24 site buildings, but could overtop and fail the
25 downstream dam, follow me, such that I now remove

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1 my ultimate heat sink? I may not have destroyed
2 offsite power. This goes back to the type of
3 screening assessment, will they do that?

4 It's not a site flooding event, it's
5 what's called a riverine flooding event, that
6 through the failure mode of overtopping, takes away
7 my ultimate heat sink, and I don't think they will.

8 MR. SEBROSKY: So let's talk about this
9 for a second.

10 MR. BAILEY: So I'll hesitate a little
11 bit because I have not looked at every single
12 plant, but if you look at the more contemporary
13 writeup of Robinson in the paper, and it's
14 represented as --

15 CHAIR STETKAR: I, by the way, read all
16 of the Robinson stuff.

17 MR. BAILEY: Okay.

18 CHAIR STETKAR: It's now public.

19 MR. BAILEY: Well, I don't know if you
20 have the absolute latest, but --

21 MR. SEBROSKY: He does not.

22 MR. BAILEY: Okay. Very good.

23 CHAIR STETKAR: The non-public stuff?

24 MR. SEBROSKY: No, so what we're
25 talking about is, you don't see on this bulleted

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1 list what Stew is about to say.

2 CHAIR STETKAR: Okay.

3 MR. BAILEY: And that is, as part of
4 the flooding re-evaluated hazard, as part of 2.1,
5 the licensees were to look at the re-evaluated
6 flood hazard and implement interim actions as
7 needed. So again, I have not done a full inventory
8 of the plants, but in the Robinson case, they do
9 have actions identified to be taken for the
10 flooding event because it is postulated to overtop
11 the dam.

12 So whether or not it floods the site,
13 the licensees --

14 CHAIR STETKAR: That's a question that
15 --

16 MR. BAILEY: -- as an anecdotal
17 anecdote.

18 CHAIR STETKAR: Let's say the site is
19 perched on, you know, a nice plateau above the
20 river, and therefore, is not subject to whatever
21 additional flood might come down the river, but
22 that flood is severe enough to take out the
23 downstream dam, and therefore, remove the ultimate
24 heat sink.

25 MR. SEBROSKY: So the flood hazard re-

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1 evaluation report for Robinson, what it looks at
2 is, the probable maximum precipitation event, what
3 it does to the site, and what it does the
4 downstream dam, and it asks a simple question on
5 the downstream dam, does it -- do the gates have
6 the capability to handle probable maximum
7 precipitation event? And the answer is no.

8 CHAIR STETKAR: Okay. But does that
9 probable maximum precipitation event also have
10 implications within the footprint of the site?

11 MR. SEBROSKY: It absolutely does.

12 CHAIR STETKAR: See, that's my
13 question. Suppose that it didn't, it had zero
14 impact on the footprint of the site, but it takes
15 away the ultimate heat sink, and only the ultimate
16 heat sink, but it takes it away in a way that's
17 irretrievable. It drains my bucket.

18 MR. SEBROSKY: So the question that you
19 asked that we owe you an answer on is, when they
20 look at the downstream dam failure, and if you look
21 at the random -- the non-robust dam failing, I have
22 to think about that for a second, but for Robinson,
23 the sequence that was looked at in the flood hazard
24 re-evaluation report is the probable maximum
25 precipitation does a couple bad things.

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1 The gates cannot pass that probable
2 maximum precipitation.

3 CHAIR STETKAR: Let me back you up.
4 This is not a question about Robinson. I don't
5 care about Robinson. I know Robinson has a
6 problem. I know that somehow you're going to deal
7 with Robinson. I'm talking about this generically.
8 I'm talking about plants, and I don't know how
9 many, if any, are out there, I'm asking about
10 whether plants, as part of their flooding re-
11 evaluation, part of looking at probable maximum
12 precipitation, other sources for, typically,
13 riverine sites, but other sources of flooding on a
14 watershed that, for lack of a better term, can have
15 a wall of water coming down the watershed that does
16 not affect the footprint of the plant because the
17 plant is up on sufficiently high stilts.

18 The water passes through there, takes
19 out the downstream dam, and takes away their
20 ultimate heat sink, leaving them without water to
21 cool the plant. That's what I'm talking. And I
22 don't know if there are any sites, honestly,
23 whether there are any sites susceptible to that.

24 I know Robinson thought about it, but
25 they probably thought about it because the probable

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1 maximum precipitation also had impact within the
2 footprint of the plant.

3 MR. SHAMS: If I may, and --

4 CHAIR STETKAR: And I don't --

5 MR. SHAMS: Yes, I'm just going to try
6 to share a thought and see if that gets close. So
7 when Joe went through, he sort of divided the
8 downstream dams into two buckets, one that's
9 seismically qualified, one that's seismically not
10 qualified. So for the seismically not qualified,
11 we just assume that they're not there, and that
12 satisfies --

13 CHAIR STETKAR: And that was my first
14 question about where's the pointer in NEI 12-06, or
15 whatever, that takes care of it. That's a
16 different issue. We're past that one.

17 MR. SHAMS: Right. As I shared, we
18 feel good that we've asked the question and the
19 licensees have identified alternate sources of
20 water.

21 CHAIR STETKAR: Right.

22 MR. SHAMS: For the seismically
23 qualified, what we consider the random failure,
24 wouldn't that, essentially, cover hydrological
25 failure as --

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1 CHAIR STETKAR: No. This is not a
2 sunny day failure. This is, I have the biggest dam
3 in the world upstream from my site and that thing
4 decided to fail, for some reason. I'll get to
5 other reasons in a moment.

6 MR. SHAMS: Right.

7 CHAIR STETKAR: And the wall of water
8 came down the river and took out my downstream dam
9 due to overtopping failures. You know, it might be
10 an earthen dam, it might be sluice gates, you know,
11 I don't know what failure mode it is.

12 MR. SHAMS: Okay. I was just --

13 CHAIR STETKAR: But did not inundate
14 the footprint of my plant, such that, I watched the
15 water go through --

16 MR. SHAMS: My thinking is, the loss of
17 the ultimate heat sink is the ultimate result of
18 both, be it the random failure and the hydrological
19 failure, so if I'm able to deal with it and a
20 random failure through alternate means of water --

21 CHAIR STETKAR: That might be a way out
22 of it if people looked at it. That's right. But
23 again, in my little matrix here of seismically
24 robust, not seismically robust, seismic
25 overtopping, random, I had a blank for not

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1 seismically robust random and I had a question
2 about whether or not the scope of what people are
3 looking at for downstream dam overtopping would
4 flag these types of scenarios if the flood was not
5 sufficient to impact the footprint of the plant.

6 MR. SCHULTZ: So you're just looking to
7 see if the discussion has been completed.

8 CHAIR STETKAR: Indeed. That's all.
9 Because I don't know. All I have is the white
10 paper and I know what --

11 MR. SCHULTZ: We've looked at it in
12 terms of seismic and non-seismic. We've looked at
13 it in terms of flooding.

14 CHAIR STETKAR: Flooding meaning
15 inundation of the site with, perhaps, an additional
16 effect.

17 MR. SCHULTZ: But is there a potential
18 hole in-between there that hasn't been --

19 CHAIR STETKAR: That's exactly --

20 MR. SCHULTZ: -- fully addressed
21 because there may have been some confusion.

22 CHAIR STETKAR: There may have been
23 some confusion and I don't know. Now, the other
24 thing that this got me thinking about is the issue
25 of, does, and it's not so much -- I'm between

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1 today's meeting and tomorrow's meeting now, and
2 that is, how does the whole process address seismic
3 failures of upstream dams that cause flooding?

4 Because I see guidance in NEI 12-06
5 that says I need to look at seismic failures of
6 downstream dams. We had a meeting back in June of
7 last year that I raised this and I said, oh, yes,
8 it doesn't really do that because that's considered
9 to be two independent events. It's a flooding
10 event and a seismic event.

11 Well, it's not, it's a seismic event --
12 it's like Fukushima, it's a seismic event that
13 triggered a tsunami, in this case, it would be a
14 seismic event that triggers a flood wave coming
15 down. The reason that I don't know whose meeting
16 it applies to is that, the protections assessments
17 and mitigating strategies assessments seem to be
18 going in the direction of, I will perform an
19 assessment for one and only one hazard and I will
20 justify that I either have adequate protection or
21 adequate mitigation of that hazard, a hazard being
22 a seismic event.

23 And perhaps I have a different
24 protection and a different strategy for a flooding
25 event, like, I can move this stuff because I have

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1 adequate warning time for a flood. I don't think
2 that they address concurrent, or coincident, or
3 dependent events where I have a seismic event that
4 could result in a flood.

5 And I don't know whether they do or
6 they don't, but every time I've asked, I've gotten
7 the answer, no, we'll have to look at that. Well,
8 it's starting to be, we'll have to look at that in
9 the sense of where in the regulatory guidance,
10 whether it's JLD or proposed reg guides, or the
11 guidance that's being developed by the industry
12 under NEI 12-06, primarily, where that is in the
13 sense of completeness in terms of looking at the
14 types of hazards.

15 So I don't know if you guys have an
16 answer for it.

17 MR. SHAMS: I'll venture one and see
18 how far I can go.

19 CHAIR STETKAR: Okay.

20 MR. SHAMS: So that issue, the failure
21 of an upstream dam due to a seismic hazard, is
22 addressed in our dam failure analysis for upstream
23 floods. And I'm pointing to a couple of upstream
24 dam failure that's causing flood. I mean, in my
25 mind, there are a couple of examples that I know of

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1 that we've looked at the dams and we looked at
2 three failure modes, you know, the random failure,
3 the hydrological failure, and the seismic failure,
4 and I can point to Oconee and North Anna for that.

5 And the staff systematically went
6 through which one of these events are the plausible
7 one, the likely one --

8 CHAIR STETKAR: But when you did -- we
9 need to get to all of the topics today, so I don't
10 want to get to specific analyses, which is why I
11 wanted to turn off the Robinson discussion a little
12 bit, did you, when you did that, look at the
13 possible seismic effect onsite?

14 MR. SHAMS: Well, not on the site, but
15 rather, on the dam itself.

16 CHAIR STETKAR: Yes, but I'm talking
17 about now, the whole integrated enchilada,
18 especially if I develop strategies at my site where
19 I have two sets of FLEX equipment, one of which I
20 nominally protect against seismic events and the
21 other which I nominally protect against flooding
22 events, because I'm allowed to do that in the
23 context of my now focused assessments that are
24 going to be done under Appendix G and Appendix H of
25 NEI 12-06 for the sites that have problems.

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1 And I just don't know whether there's a
2 gap here. I honestly don't know. And I don't want
3 to talk about it in a sense of you looked at, you
4 know, Oconee, or you looked at, you know, some
5 other sites. I just don't know if there's a gap.

6 MR. SHAMS: It was just, rather,
7 examples I wanted to provide that we've looked at
8 the dam itself. I can't say with certainty that
9 we've looked at the dam concurrent with the site.

10 CHAIR STETKAR: That's the concern that
11 I have because I see the process moving toward,
12 rather than kind of a generic now in the whole
13 context of FLEX, and again, this is between today's
14 and tomorrow's meetings, in terms of how people are
15 starting to address this going from something that
16 we're trying to develop flexible strategies that
17 are capable of coping with anything to, well, we
18 have this for this particular one, and we have that
19 for that particular one, and we're allowed not to
20 consider some combination of things because we
21 didn't think about them or we're allowed not to
22 think about them.

23 So that's the concern that I have and
24 it -- I'll just leave it there. I'll bring it up
25 tomorrow. It's tomorrow -- one of tomorrow's

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1 meetings.

2 MR. SHAMS: The issue of, you know,
3 seismically-induced fire and flooding have been --
4 so I want to make sure that we're not getting back
5 to that.

6 CHAIR STETKAR: The issue of
7 seismically-induced fire and flooding has been
8 addressed, but I will tell you that it was
9 addressed in the context of seismically-induced
10 internal flooding.

11 MR. SHAMS: Okay.

12 CHAIR STETKAR: There's a lot of
13 discussion about pipe breaks, tank failures, and
14 things, but we're not talking about a dam failure
15 that brings a wall of water down through the site.

16 MR. SHAMS: We'll take that back.

17 MR. RECKLEY: We just decided, that's
18 tomorrow's meeting.

19 CHAIR STETKAR: That's fine. No, it is
20 -- in some serious, but it's a bit of the
21 frustration that I've had in terms of things are
22 parsed up among different activities, and sometimes
23 you have to step back from all of it, and I can't
24 figure out what bin it goes into, so I'm trying to
25 raise it in different bins and see what sort of

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1 feedback I get from it. It'll be brought up
2 tomorrow. At least they'll have time to prepare
3 for it.

4 CHAIR STETKAR: So the next two slides
5 are, again, high level summary of what you can find
6 in Appendix B. Low water conditions due to a
7 seiche, prior to this paper, the staff was
8 addressing this issue as a pre-generic issue and if
9 you look at the March 18, 2015 letter that's
10 referenced here, it is several pages long and it
11 goes into detail on why Region III, the regional
12 administrator, believes that there's an issue here
13 that is a possible generic issue.

14 And what it argues is, we understand
15 what you're doing for flood hazard re-evaluations
16 and you look at seiches from a high-level
17 perspective. You're looking at that as part of the
18 2.1 activity. The concern that the Region III
19 regional administrator expressed was particularly
20 associated with plants along Lake Michigan because
21 it had recently, within the past five years,
22 experienced drought conditions.

23 So the water level in Lake Michigan was
24 lower than normal and the concern that was
25 expressed in the Region III regional administrator

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1 letter is not the high level from a seiche, but as
2 the water oscillates, the low level from a seiche,
3 possibly air binding the safety-related pumps,
4 ultimate heat sink pumps, or damaging the impeller
5 because of the low water level conditions.

6 The Region III letter talks about the
7 three plants along Lake Michigan in particular. It
8 notes that it does not believe the phenomenon is
9 just associated with those plants. It talks about
10 the possibility for other Great Lakes being
11 affected by the same phenomenon. And also, plants
12 along the Gulf of Mexico, potentially.

13 We've looked at the Gulf of Mexico
14 plants and we determined that because of their
15 ultimate heat sink configurations, low levels due
16 to a seiche was not a concern. We did identify,
17 though, that Calvert Cliffs was a potential concern
18 for the same reason that the plants along the Great
19 Lakes were, so that's why the evaluation that you
20 see is for Great Lakes and maybe Chesapeake Bay.
21 We also mention, very briefly, the Gulf of Mexico
22 plants.

23 CHAIR STETKAR: Joe, are there any --
24 and I know nothing about these types of analyses or
25 what causes the phenomenon, I read what you wrote

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1 about the Gulf, I read what, you know, why
2 Chesapeake Bay is part of the population, could it
3 apply, and I don't know, to any other coastal sites
4 that have a fairly well-protected bay for their
5 cooling water intake?

6 MR. SEBROSKY: There weren't --

7 CHAIR STETKAR: You know, follow me,
8 you know, some sort of mostly enclosed, but
9 communicating with the larger water body.

10 MR. SEBROSKY: And I'm not a
11 hydrologist, we can take a look at that, but there
12 was the fundamental presumption is bodies, if it
13 was along the Atlantic Coast, or for that matter,
14 Diablo Canyon, that we did not believe that that
15 was a phenomenon that was of concern. I understand
16 what you're asking is if you could have a body of
17 water big enough that you could have a wind-driven
18 seiche just affecting that body of water and not
19 the broader ocean.

20 CHAIR STETKAR: Right.

21 MR. SEBROSKY: And I don't have an
22 answer for that question, but we did, like I said,
23 what you see in the evaluation is a discussion of
24 the phenomenon. There's a much more detailed
25 discussion in the Region III letter on the

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1 phenomenon and what they were concerned about, and
2 with specificity, they talk about seiches that they
3 actually experienced on Lake Michigan and what it
4 did to the water levels in the four bays for DC
5 Cook and also for Palisades. Go ahead.

6 MR. SHAMS: One thing, my understanding
7 is, in our reviews of flooding scenarios, we looked
8 at seiches on sites on Atlantic as well as the
9 Pacific, so I'll confirm, you know, whether or not
10 we got those.

11 CHAIR STETKAR: But just a question --

12 MR. SHAMS: We're looking at seiches in
13 general --

14 CHAIR STETKAR: I don't have any
15 examples of things that I can point to, you know,
16 as counter examples or any particular sites because
17 I just don't know.

18 MR. SHAMS: I was told we did, but I'll
19 confirm.

20 CHAIR STETKAR: Okay. Good.

21 MR. BAILEY: Yes, so they did look at
22 that, and I guess the seiche drawdown would be
23 comparable to a seiche runup, and our experts
24 focused right in on certain bodies of water, so I'm
25 not sure that we can answer that in much greater --

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1 MEMBER POWERS: What you're asking is
2 if you have a sheltered bay --

3 CHAIR STETKAR: Yes, but --

4 MEMBER POWERS: -- but it feeds into a
5 larger body.

6 CHAIR STETKAR: Right.

7 MEMBER POWERS: Okay. So that you have
8 a feed-in that's resisting the drawdown.

9 CHAIR STETKAR: Yes. That's right.
10 And how big is it. I mean, you know, I can draw
11 things that look like a little neck and something
12 that, for all practical purposes, looks like a lake
13 and it just happens to be that above this little
14 neck is the ocean.

15 MEMBER POWERS: There's some point at
16 which the opening is so small that it can't reverse
17 the effect of the seiche.

18 CHAIR STETKAR: That's right. Of the
19 seiche, that's right, and I don't know if there are
20 any sites that even look like that or whether the
21 folks who walked their way down the coast --

22 MEMBER POWERS: But it seems like a
23 back-of-the-envelope analysis that would be useful
24 to have.

25 CHAIR STETKAR: Somewhere.

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1 MR. SHAMS: So my understanding is, we
2 have -- and to your point, Dr. Powers, the issue
3 was raised about the gradual drop in water in the
4 lakes and that would not happen in the condition
5 you described, because the bigger body of water
6 would feed that smaller body of water.

7 MEMBER POWERS: That's right. I mean,
8 there's a point where it's so big that the in-rush
9 of water compensates and there must be a point at
10 which it's so small that the in-rush doesn't. We
11 just don't know what that is.

12 MR. SHAMS: We'll take a look at that.

13 MR. SEBROSKY: So if you go to the
14 second sub-bullet here where it talks about the
15 site evaluation of sites that could be impacted,
16 the evaluation that's in Appendix B looks at the
17 sites using FLEX support strategies that, can they
18 withstand 24 hours? Is there enough water supply
19 without relying on the ultimate heat sink that
20 they'd be okay? The reason that we picked 24
21 hours, there's several reasons, one is that seiches
22 in our kind of thing, it's not day, week, month
23 kind of thing, so by the time you go to put the
24 FLEX equipment in the ultimate heat sink, after 24
25 hours you should be able to use it.

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1 The other -- so that was a fundamental
2 premise, but there was also a fundamental premise
3 that if you can withstand that condition for 24
4 hours, you would have the capability of other
5 sources outside coming in to help you under the
6 three phases of FLEX, and it doesn't have to come
7 from one of the response centers.

8 The plants that we looked at are within
9 hours drives of other plants. We're not talking
10 about Columbia or Power, so the Phase 3 of FLEX
11 isn't just getting something from the centrally
12 located response centers. The expectation is,
13 utilities will help each other out. That was
14 another basis for the 24 hours.

15 The preliminary conclusion is that
16 additional regulatory action is not warranted. The
17 one bullet, there are three sites that don't have
18 the 24-hour water supply that you see in the
19 discussion, and their disposition using a
20 combination of whether or not the hazard is
21 applicable to their site and then site-specific
22 conditions.

23 So for example, for Point Beach, the
24 intake structure goes out into the water 1/4 of a
25 mile and it's, 18-feet of water is on top of it.

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1 There's an argument for Point Beach that it is not
2 as susceptible to a seiche as some of the other
3 plants along Lake Michigan. There is some
4 qualitative data to support that. The Region III
5 letter, when it mentions seiches, noted that
6 Palisades and DC Cook experience fluctuations.
7 That same event did not cause perturbations at
8 Point Beach. That's Slide 16.

9 Slide 17, what is not in Appendix B
10 right now is some additional information that we're
11 adding as a result of stakeholder comments. And
12 similar to the HB Robinson, we're silent when you
13 talk about PWRs about the reactor cooling system
14 inventory control and how we have confidence that
15 that will be maintained for at least 24 hours, so
16 we're adding a discussion about that.

17 The majority of the PWRs, the vast
18 majority of the PWRs, that are listed in that table
19 either have installed low-leakage reactor cooling
20 pump seals or are committed to do that. And there
21 is a specific discussion, like I said, of plants
22 that do not have a 24-hour water supply onsite that
23 we're bolstering.

24 So that's what we're adjusting Appendix
25 B to do now that's not in your white paper. That's

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1 all I have on seiches.

2 MR. SHAMS: If I may, I just want to
3 take this opportunity here to point back to the
4 discussion we had earlier about the geomagnetic
5 storms and how we're, if I may use the term,
6 deferring that to another process, regulatory
7 process, to take care of. Those two activities,
8 the low-water condition due to dam failure and
9 seiche, we'll actually be making every effort to
10 close them in the paper.

11 The challenge is the other regulatory
12 activities, being the pre-GDI activity. They have
13 their own processes, concurrences, with the
14 appropriate senior management, so we will continue
15 to put the logic that we have in the paper itself
16 and just see if we can close it ahead of time, if
17 not, we would point that there are other activities
18 going on that might shed additional light, but
19 nonetheless, we believe no regulatory action would
20 be needed based on what we've done, so I just
21 wanted to mention that.

22 MR. SEBROSKY: Next slide. So we
23 talked about extreme temperatures earlier on in the
24 -- to address Mr. Stetkar's question, so this is
25 another issue that we're proposing to disposition

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1 as part of Step 2, both extreme high temperatures
2 and extreme low temperatures.

3 We had this discussion earlier about
4 there is either an explicit technical specification
5 that covers it or there's an implicit technical
6 specification that if you start seeing temperatures
7 outside your design basis, licensees are expected
8 to take actions and have done that in the past.

9 It is subject to NRC inspection and
10 oversight. The last bullet on here indicates that
11 the mitigating strategies equipment, if you look at
12 NEI 12-06, the expectation is they consider the
13 potential impacts of high temperature for
14 procurement and operation of the equipment, but
15 they're also expected, if you have the equipment
16 stored in a bunkered facility, you have a high
17 temperature day that you'll be able to open the
18 door. It won't be because of expansion you won't
19 have a challenge there, expansion due to the high
20 temperature.

21 Extreme low temperatures, again, the
22 logic for extreme low temperatures --

23 MEMBER SKILLMAN: Joe, please go back
24 one. This is an example of what I tried to raise a
25 couple of hours ago. When you introduced the topic

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1 of some of these phenomenon, you said, for example,
2 sites designed for 100 degrees Fahrenheit, they
3 know they're getting a weather of 105 Fahrenheit,
4 and so they do some form of an assessment, and they
5 communicate with region, and they go to an NOED.

6 MR. SEBROSKY: Well, that's an outcome.

7 MEMBER SKILLMAN: Yes.

8 MR. SEBROSKY: That's a possible
9 outcome.

10 MEMBER SKILLMAN: That's very, very
11 commonly done, by the way. So here we are talking
12 about whether or not there needs to be more
13 regulation, and I just want to observe that this is
14 an example where we acknowledge the plant is not in
15 its design base, and we're also acknowledging that
16 it is acceptable for the plant to request
17 permission to operate outside of that design base.

18 So it just seems to be, in my mind, a
19 peculiarity. The real topic of John's Subcommittee
20 is, are there natural phenomenon for which there
21 needs to be more regulation? Believe me, I'm not
22 advocating more regulation. What I am trying to
23 point out is, there are events that have been going
24 on since some of these plants were built, including
25 pre-GDC plants, where the plant staffs have been

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1 clever in adapting to the conditions that the plant
2 is experiencing because of where the plant is
3 located, whether it's on an oceanfront, or it's in
4 a river basin, or it's high and dry in the middle
5 of someplace where it gets mighty cold or mighty
6 windy, and the way those are being handled is with
7 NOEDs; Notice of Enforcement Discretion.

8 A call to region, an explanation,
9 here's what we think is going to happen, here's
10 where we're vulnerable, I'm thinking particularly
11 of changes in the heat sink temperature, where you
12 know you're going to go outside of your design
13 basis for your ultimate heat sink.

14 I'm just observing a way this is being
15 handled is, instead of making new regulations,
16 there is the option to go to enforcement discretion
17 when you find yourself moving out of your license
18 basis.

19 MR. SEBROSKY: And my response to that
20 is, an acknowledgment that that absolutely does
21 occur, but when you look at the NOED process, in
22 order for us to grant a Notice of Enforcement
23 Discretion, there's a test to make sure that you're
24 not abusing the process.

25 MEMBER SKILLMAN: Oh, yes.

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1 MR. SEBROSKY: And if you could have
2 reasonably foreseen the event or you have time to
3 put in an exigent license amendment, that you use
4 that process. And I understand the assertion that
5 licensees are pretty clever. Our procedures
6 recognize that and that's one of the checkboxes
7 that you got to check that the licensee is not,
8 essentially, these are my words, it's not in the
9 NOED process, that they're abusing NOEDs.

10 MEMBER SKILLMAN: I don't think I'm
11 communicating what I'm thinking very well, and I
12 apologize here, that what I'm suggesting is, we're
13 here talking about, does there need to be more
14 regulation over natural events, and all I'm trying
15 to do is to observe that this has been going on for
16 a long time, and the body of regulation has allowed
17 reasonable individuals to navigate through this,
18 but I'm wondering if this isn't even a part of what
19 we ought to be talking about. I guess that's what
20 I'm trying to say and thanks.

21 MR. SEBROSKY: I understand.

22 MR. SHAMS: I mean, we do acknowledge
23 that, that is true, and I would say to the way
24 we're looking at it from our end, has it risen
25 enough to limit or a risk level that would compel

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1 us to take action? We discuss in the paper that
2 there are notices that we're sending out related to
3 some of these topics and, you know, what licensees
4 need to do for it, but, you know, I would like to
5 believe that as it gets to a level where we believe
6 that the operation of the plants are impacted, we
7 will take action.

8 MEMBER SKILLMAN: Thank you.

9 MR. SEBROSKY: So Slide 19 is the low
10 temperatures. We use similar arguments for low
11 temperatures that we use for high temperatures. We
12 do add additional insights based on information
13 notices that were issued back in the '90s;
14 degradation of cooling water systems due to icing
15 and issues with cold water protection measures.

16 One of these issues, if you look at the
17 information notice, and it's discussed in detail in
18 the Appendix B, talks about frazil ice and the
19 problems that Wolf Creek experienced with that. So
20 it was meant -- the discussion on the information
21 notices was meant to go back to a point that we
22 were trying to make earlier that the operational
23 experience that we have for these plants is
24 something that is continually done and continually
25 assessed.

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1 And that is certainly part of our
2 argument for why we have confidence that we don't
3 need additional regulatory action for items that
4 fall out in Step 1 and Step 2. Again, you see the
5 subject to NRC inspection and that the mitigation
6 strategies equipment, NEI 12-06 specifically
7 mentions ice blockage and frazil ice.

8 The preliminary conclusion for extreme
9 temperatures is additional actions are not
10 warranted. We have not received any substantive
11 comments from stakeholders on this portion of the
12 assessment. Next slide.

13 Step 3 of the process, as we discussed
14 earlier, wind and missile loads from hurricanes and
15 tornados, and snow loads, moved to Step 3 of the
16 process. The fundamental reason that we were
17 taking a hard look at these hazards is from the
18 2007 to 2011 timeframe, or 2000 to 2011 timeframe,
19 there's new guidance that was promulgated for new
20 reactors in both these areas that was issued after
21 the majority, the 99 out of the 100 operating
22 plants, were given operating licenses.

23 The preliminary assessment includes a
24 discussion of the issue and the staff's preliminary
25 process for evaluating the issue. So we are not

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1 intending to inform the Commission that we're done
2 with Step 3. We're intending to outline what we
3 see as the issue of concern and what we're doing to
4 address that. The complete assessment, we intend
5 to provide to the Commission by the end of
6 December, so we believe we're going to be coming
7 back here to talk to you about Step 3. Next slide.

8 Snow loads, the guidance that was
9 updated for snow loads can be found in this DC/COL
10 Interim Staff Guidance 007, and it talks about the
11 assessment of loads on seismic Category 1
12 structures from extreme precipitation events.

13 And with the sub-bullets, what you see
14 is a 100-year snow load event and then an extreme
15 snow load event. The extreme snow load event is a
16 combination of the 100-year snow event plus a 48-
17 hour probable maximum precipitation event occurring
18 while the 100-year snow is on the roof.

19 The theory is that the 48-hour probable
20 maximum precipitation event, the snow acts like a
21 sponge, the water doesn't come off the roof, and
22 you have to be able to show that your roof
23 capacities can handle that combination event. The
24 next slide.

25 So our preliminary assessment, when you

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1 look at the -- for both snow and for tornados, you
2 see a discussion in the white paper that bifurcates
3 the plants; the 1975 version of the SRP and then
4 the pre-1975 -- plants that were licensed prior to
5 that 1975 version of the SRP.

6 The 1975 version of the SRP, when you
7 look at the guidance in ISG-007 and you compare it
8 to the 1975 version of the SRP that was
9 supplemented with the branch technical position,
10 they look pretty close. And the 100-year snow load
11 is typically, what we found with this version of
12 the plants, typically found by the plant design or
13 their structural margin associated with it.

14 When extreme snow loads are evaluated
15 against the structural margin, we believe,
16 preliminarily, that the beyond-design-basis snow
17 load is not likely to cause a catastrophic failure
18 of the seismic roof, Seismic Category 1 roof. We
19 still need to do work in that area. We're
20 continuing to assess the design conservatisms and
21 also warning time.

22 The combination, when you look at the
23 100-year snow load, it is over a period of days,
24 48-hour PMP on top of that would add time to that,
25 so this is not something that has no warning time

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1 associated with it. We believe we can take
2 advantage of talking to the plants that are along
3 the Great Lakes that have to deal with lake effect
4 snow on a yearly basis; what they do that can help
5 inform our assessment. To date, there's no
6 substantive comments that we've received on the
7 snow load evaluation.

8 The wind and missile loads from
9 hurricanes and tornados, there's a couple slides on
10 this. I'll try to walk through the nuances and the
11 changes to the guidance. There's Reg Guide 1.76
12 Rev 1 that was issued in March 2007 and there's a
13 brand new reg guide, Reg Guide 1.221 on Design
14 Basis Hurricanes.

15 Reg Guide 1.221 did not exist. There
16 is not a 1975 version of the SRP that talks about
17 design basis hurricane missiles. The fundamental
18 presumption of the 1975 version of the SRP and the
19 reg guide was that a tornado missile will bound a
20 hurricane generated missile, and we didn't need to
21 -- if you design to the tornado missile, you didn't
22 have to worry about hurricane generated missiles,
23 and in a couple slides I'll tell you why that's
24 changed.

25 If you look at Reg Guide 1.76 Rev 1 and

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1 compare it to the previous reg guide, there are
2 different missile spectrums. There's different
3 missiles. You'll see three missiles in the 1976
4 version of the reg guide. If you go back to the
5 1975 version of the Standard Review Plan, that's
6 where you find up to six different missiles.

7 And although the tornado wind speeds
8 generally went down, if you look at the automobile
9 missile speed in the 1975 version of the SRP and
10 compare it to Reg Guide 1.76, the missile speed
11 went up slightly, in some cases, for the
12 automobile. That's the difference there. If you
13 go to the next slide.

14 MR. SCHULTZ: Joe, before we leave this
15 one. The white paper also talks about work that's
16 being performed at NIST with regard to tornado wind
17 speed risk and evaluations that are being done
18 there, or plan to be done. It wasn't clear to me
19 how that was, or if it would be, integrated into
20 what's being evaluated between now and the end of
21 the year. It sounded like it was a project that
22 was ongoing at NIST and might take some time to
23 develop an ample result, even though it sounded
24 like a good approach and work.

25 MR. SEBROSKY: So one of the challenges

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1 that we have, and that we continue to have, is
2 there's research activities that are going on, and
3 it's not just for natural hazards. We mention this
4 when we were talking to you about the containment
5 designs and the SOARCA work. So the issue, do we
6 have enough information right now with confidence
7 that we can say, we believe we have enough
8 information to close this issue out, but please
9 recognize that there's additional research going on
10 that has the possibility to inform --

11 MR. SHAMS: Provide new information.

12 MR. SEBROSKY: Yes, provide new
13 information and inform a different decision.

14 MR. SCHULTZ: It would be good to cast
15 the discussion that way in the SECY document.

16 MR. SEBROSKY: I understand. So that's
17 a challenge that we're going to have with tornados
18 because there's certainly work that's going on, and
19 research, and at NIST that is going to continue
20 past the end of this year.

21 MR. SHAMS: If I may, Joe, just give a
22 little bit further. So as we were writing the
23 paper, and the logic we were trying to drive to you
24 is, we're looking at the design basis for different
25 facilities and what different things, you know, has

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1 been done, or have been done, and is going to be
2 done, so as Joe is going to get into, for tornado,
3 for example, we point to a risk study that the
4 staff have done and identified the risk from a
5 tornado and a missile heading from a tornado is low
6 risk.

7 So we wanted to balance, you know, and
8 say, well, here's studies that are pointing to
9 this, but we recognize that it's a dynamic process
10 and there's new information, so as we see things
11 right now, we don't particularly see concerns, but
12 nonetheless, if we learn from these other ongoing
13 activities, we would certainly use our standard
14 processes, generic issues, or what have you, and we
15 would inform the Commission and do what we need to
16 do, so that's kind of how we were balancing the
17 multitude of pieces of information we have.

18 But we'll cast the paper to make sure
19 that it balances that way.

20 This slide, Slide 24, talks about the
21 Reg Guide 1.221 and the changes there. The first
22 bullet, when you look at the hurricane wind speeds,
23 in general, there's only two sites where the
24 tornado wind speed does not bound the hurricane
25 wind speed, and that's the Florida sites. In

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1 general, the hurricane wind speed is bound by the
2 tornado wind speed.

3 However, the next slide, or the next
4 bullet, the hurricane missile speeds are higher for
5 a comparable tornado wind speed for sites that are
6 susceptible to hurricane. And the reason for that
7 is captured in the sub-bullet. The theory is that
8 if you have a missile that was generated by a
9 hurricane, it has a longer time in the hurricane
10 wind field and it can come up closer to the speed
11 of the hurricane.

12 The tornado, it doesn't spend as much
13 time, it gets spit out, for lack of a better term,
14 and does not, when you look at the delta between
15 the tornado wind speed and the tornado missile
16 speed, there is a bigger delta there than there is
17 for hurricane.

18 MR. SCHULTZ: You mentioned that as a
19 theory, is there data to back that up?

20 MR. SEBROSKY: So Reg Guide 1.221 is
21 based on NUREG and we reference the NUREG, I think
22 it's NUREG 7005. There is an extensive discussion
23 in there that suggests that's why -- one of the
24 issues was, and it was a New Reactor Office
25 activity, with the tornado wind speeds going down,

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1 can you stick by the conclusion that hurricane wind
2 speed is always going to be bounded by the tornado
3 wind speed?

4 And it was that presumption that led
5 them to start looking at that and come to the
6 conclusion that that was no longer the case, that
7 even though the hurricane wind speed went down, the
8 reason that they pursued the reg guide is because
9 they showed in that NUREG that the missile speeds
10 could go up.

11 There is some discussion that we're
12 going to talk about as we go forward about
13 automobile missiles. You know, when you look at
14 that NUREG, there are non-trivial changes in the
15 automobile missile speed. NUREG 7005 has a
16 discussion in it that they haven't really seen, in
17 hurricanes, automobiles being lifted up in the air.

18 MR. SCHULTZ: That's why I asked if
19 there was data to backup what they had proposed.

20 MR. SEBROSKY: Well, they caution it.
21 They basically say, these are the new automobile
22 missile speeds, but recognize we haven't seen
23 physical evidence that, although an automobile will
24 tumble along the ground, because a hurricane does
25 not have a lifting component, like a tornado, we

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1 haven't seen automobiles elevated.

2 MR. HARVEY: This is Brad.

3 CHAIR STETKAR: No, it was on at first,
4 Brad.

5 MR. HARVEY: Okay. I can hear myself.
6 Hello. This is Brad Harvey. I'm the acting team
7 lead for Meteorology and Oceanography. First,
8 slight correction, it's NUREG CR-7004 that
9 discusses the missiles. And the other point I
10 wanted to make, that the automobile is really a
11 surrogate for any large missile that might be prone
12 to travel in a hurricane wind field.

13 And the way that the -- to answer your
14 question, Dr. Schultz, is that, it was a
15 mathematical formulation that came up with these
16 wind fields, and what we assumed is that there
17 would be some sort of object the size and weight of
18 an automobile that would start at about 120 feet
19 off the ground, and we would put that into a
20 hurricane wind field, and through the equations of
21 motion and everything, watch it fall.

22 And the reason why we wouldn't
23 necessarily expect it to be an automobile at 120
24 feet above ground, but there are other plant
25 structures that might have equipment on their roofs

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1 that are not safety related and not tied down that
2 could become airborne objects in a hurricane.

3 And so that's -- the whole idea of
4 lifting a car off the ground, I agree, is not,
5 during a hurricane, particularly realistic, but
6 there are other structures of that height that
7 necessarily are not safety related that you could
8 see bits and pieces of building possibly become
9 airborne at that elevation, if you've got HVAC
10 units that sit on top of structures. It's a
11 surrogate for that type of missile.

12 CHAIR STETKAR: Brad, stay there
13 because they're only going to call you back up
14 again. I was going to wait, but as long as you're
15 standing there, this is an interesting exercise
16 because it makes you think about things, which is
17 part of why we're going through this. All of the
18 winds are always cast in the context of hurricanes
19 and tornados.

20 Has anyone looked at derechos? Those
21 are, you know, high intensity, straight line winds
22 that are not generated by something that's called a
23 hurricane, and they happen -- we had a set come
24 through Maryland a couple years ago. I mean, they
25 happen all over. It doesn't have to be a coastal

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1 zone, and they can generate hurricane force winds.

2 Now, again, I'm not a meteorologist, so
3 I don't know the persistence, but I understand they
4 can be pretty damaging. I know I was looking at a
5 site, different part of the world, and they were
6 not prone to hurricanes, but they were prone to
7 damage from things that they called, they didn't
8 use the term derecho, but severe straight line wind
9 storms. Have you looked at that?

10 MR. HARVEY: I think, off the -- is
11 this on again?

12 CHAIR STETKAR: Yes, it's on.

13 MR. HARVEY: Okay. I'm sorry. Brad
14 Harvey once more. I think that the fall 50-year
15 return period with wind speed, off the top of my
16 head, for most of the United States is like 90
17 miles an hour, and then you multiply that by a
18 factor of, again, off the top of my head, 1.22 to
19 come up with a 100-year, so you're looking at
20 design for 100-year return periods of over 100
21 miles an hour, which I think is going to bound most
22 of the phenomenon, and it's also safety factors
23 that are built in at that 100-year return period
24 wind speed like a 1.5, 1.62 safety factor when you
25 actually go into the resulting load.

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1 So I do --

2 CHAIR STETKAR: I'm sorry, but for
3 hurricanes and missiles we're looking at -- I'm
4 sorry, for hurricanes and tornados, we're looking
5 at return periods that are much longer than 100
6 years, aren't we, for the extreme winds?

7 MR. HARVEY: There are two design basis
8 when it comes to winds, one is a 100-year return
9 period, which uses a load factor, I think, of
10 around 1.6, and then we look at the hurricane and
11 tornados, and those have a load factor of merely
12 1.0.

13 CHAIR STETKAR: Okay.

14 MR. HARVEY: And 10 to the minus 7, so
15 you get 10 to the minus 2 with a load factor of 1.6
16 and 10 to the minus 7 with a load factor of 1.0.

17 MR. SHAMS: Said differently, a
18 straight wind generally maxes out around 110, 120,
19 as Brad indicated, for tornado, a good portion of
20 the United States is designed for 320 miles per
21 hour.

22 CHAIR STETKAR: That's true, but we
23 found hurricane force winds along coasts. The
24 whole reason that we're having this discussion is
25 that there's some coastal sites that are prone to

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1 missiles because of the, for lack of a better term,
2 because I don't know anything about it, energy
3 imparted to something by a persistent straight-line
4 wind compared to a rotational tornadic wind that
5 can cause a concern.

6 And I don't know whether 120-mile-an-
7 hour straight-line wind across, you know, some flat
8 thing that looks like a cornfield can generate that
9 type of energy. I just don't know.

10 MR. SHAMS: On the next slide, we'll
11 show you the comparison between tornado back then,
12 tornado today, and hurricane today, and the
13 difference where you indicated that there are
14 differences by some Atlantic Coast sites is small.
15 It's not particularly large, but we'll show you
16 that.

17 CHAIR STETKAR: Okay. Thank you.

18 MR. SEBROSKY: Similar to snow loads,
19 what we see is different capability with pre-GDC
20 plants, the 1975 version, the plants that were
21 reviewed against the 1975 version of the standard
22 review plan in plants that are earlier vintage,
23 there are different capabilities, depending on the
24 vintage of the plant. Next slide.

25 What we reference in the white paper

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1 are insights from a recently issued regulatory
2 issue summary on tornados, 201506, and enforcement
3 guidance memorandum that went along with it. If
4 you look at the enforcement guidance memorandum, it
5 also references risk evaluation that was done. And
6 essentially, what the risks and the EGM conclude,
7 we've seen issues with plants that may not meet
8 their current licensing basis.

9 Give an example, the exhaust stack for
10 the diesel generators. The diesel generator is
11 protected, but the exhaust stack for the diesel
12 generator, it was noted, is not protected against
13 tornado missiles.

14 What this risks and what this EGM
15 argues that if you meet the going in conditions for
16 the enforcement guidance memorandum, you can, if
17 you're in an area of the country that's susceptible
18 to tornados, you have three years to avail yourself
19 of this enforcement guidance memorandum, if you're
20 in a lower risk portion of the country when it
21 comes to tornadoes, you have up to five years.

22 And the basis for that, and the reason
23 that we thought it was germane is, if we thought
24 that there was a high risk from tornados, we
25 wouldn't be granting three years of enforcement

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1 discretion. So it reasserts that when you look at
2 the tornado missile protection design basis
3 requirements, the conservative, the staff's using
4 existing processes to ensure licensees meet their
5 current licensing basis and the enforcement
6 guidance memorandum provides a basis for
7 enforcement discretion, noting that tornado missile
8 scenarios that lead to core damage are low
9 probability events. That's why it's referenced in
10 the document.

11 If you go to the next slide. This
12 slide, I understand, is kind of busy, but I'll try
13 to walk you through what's on this. We don't think
14 wind loads are an issue. That's our preliminary
15 assessment, and the reason we don't think wind
16 loads are an issue is, this blue represents what
17 plants' current licensing basis are.

18 The majority of plants have a 360-mile-
19 an-hour design basis tornado. It's 300-mile-an-
20 hour tornado moving at 60 miles per hour. So the
21 wind that hits the site is 360 miles per hour. The
22 majority of the sites have that.

23 If you look at Reg Guide 1.76, what Reg
24 Guide 1.76 Rev 1 does, it's this purple line. This
25 purple line is what the wind speed would be based

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1 on Reg Guide 1.76. And what you actually see is
2 there are three wind speeds. There's a Region I
3 wind speed that's higher, a Region II wind speed
4 that's a little lower, and way over here you see a
5 Region III wind speed. The Region III wind speeds
6 are for Diablo Canyon at Columbia.

7 And the argument is, for the vast
8 majority of the sites, the tornado wind speeds are
9 less than the design basis wind speeds. There are
10 some pre-GDC plants that we're taking a closer look
11 at to make sure we don't have an issue with those.

12 When you look at the hurricane wind
13 speeds, those are the bar graphs, and the first
14 thing you notice is not every plant has a hurricane
15 wind speed. That's because of the inland plants.
16 If you're far enough inland, you don't have an
17 issue.

18 There are some plants that you wouldn't
19 consider coastal plants that actually show up on
20 this data, and it's important when we get to the
21 next slide that a plant like Farley and Hatch,
22 which you think are pretty far inland, actually
23 have automobile missile speeds that, from the
24 hurricane winds, are pretty close to the tornado
25 Reg Guide 1.76, so it's not just coastal plants.

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1 MEMBER BLEY: The bars for each plant,
2 is that a calculation or is it the highest?

3 MR. SEBROSKY: No, this is from the Reg
4 Guide 1.221.

5 MEMBER BLEY: Oh, this is from the reg
6 guide, but so is the wiggle line on top.

7 MR. SEBROSKY: This wiggle line is from
8 Reg Guide 1.76 Rev 1.

9 MEMBER BLEY: 1.76, okay.

10 MR. SEBROSKY: Rev 1. It's tornado
11 wind speeds.

12 MEMBER BLEY: Oh, okay.

13 MR. SEBROSKY: This bar is Reg Guide
14 1.221, and it's hurricane wind speeds. And what
15 you see, what I said, in general, the tornado wind
16 speeds bound the hurricane wind speeds. If you
17 look at this unit, and we don't name the units,
18 we're still doing evaluation, and this, these are
19 the Florida sites, Turkey Point and St. Lucie,
20 where the hurricane wind speed is suggested to be
21 higher than the tornado wind speed.

22 In general, though, the argument is,
23 for wind speeds and wind loading, based on this
24 graph, in general, we don't think we have a concern
25 with wind speeds. We're still looking at some of

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1 the pre-GDC plants that don't have this delta. If
2 you look over here, you see the tornado wind speed
3 higher than what the design basis is for the plant.

4 CHAIR STETKAR: It's basically, it took
5 me a while to figure this thing out, but if you
6 stare at it long enough, tells me that there are
7 four sites. If I look at the purple laying right
8 coincident with the blue.

9 MR. SEBROSKY: And so we don't -- we
10 did not, because it's preliminary, name the sites.

11 CHAIR STETKAR: No, no, and I don't
12 care what they are, but it's correct interpretation
13 that there's two where the purple is right at the
14 blue, if you will --

15 MR. SEBROSKY: You have the ballpark,
16 correct.

17 CHAIR STETKAR: -- there's one that the
18 orange is above the blue, and there's one that the
19 purple is measurably above the blue.

20 MR. SHAMS: Yes.

21 CHAIR STETKAR: Okay.

22 MR. SHAMS: And the purple measurably
23 above the blue is because we don't have the blue.

24 CHAIR STETKAR: Right. Yes.

25 MR. SHAMS: So that's the one we're

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1 going to, you know, change. Yes, and the bar
2 extending above the blue is the one I was
3 commenting a little earlier, the difference, we
4 view it as small.

5 MR. SEBROSKY: There's a caution. If
6 you added up the tick marks on this, you would get
7 100, right, and there's a 100 operating plants.
8 There's two plants that don't show up on this
9 because they don't have a design basis wind speed
10 in their USAR at all. There is no design basis
11 wind speed. So what they have is an evaluation
12 that was done as part of the IPEEE, that we can
13 take advantage of that.

14 So, Mr. Stetkar, you're correct,
15 there's 100 tick marks, and the reason there's 100
16 tick marks is not every plant has the same design
17 basis wind speed for the containment that it does
18 for the aux build. So you see some plants on here
19 twice where the containment is designed to one wind
20 speed and the aux building, and some of the other
21 safety-related structures, are designed to a
22 separate wind speed.

23 CHAIR STETKAR: It's too bad I filed my
24 taxes already. I got to get you guys to do my
25 taxes for me.

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1 MR. SHAMS: There's a reason we're
2 taking this forward. It wasn't really
3 straightforward.

4 MR. SEBROSKY: But you're correct, when
5 it comes to wind speeds, there's a handful of
6 sites, four, five sites, that we're looking at
7 closer. You see two of them down here and then the
8 two that don't have anything in the USAR, but have
9 information in the IPEEE, we're looking at closer
10 from a wind speed perspective. You go to the next
11 slide.

12 MR. SHAMS: Before we go to the next
13 slide, if I just may make a couple of thoughts. So
14 this slide really captures how we're viewing the
15 problem, or where we think the strong points are,
16 where we think the areas that we're going to need
17 to do further work on to identify that we're
18 missing some information, but in general, as we
19 look at the slide, we see that the wind speed, the
20 original design basis wind speed, is sufficiently
21 large that, ultimately, when we combine it with how
22 the missiles have changed and picked up additional
23 speed, the combination of the higher wind and the
24 lower missile versus today, the lower wind with the
25 higher missile, they ultimately come together to

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1 almost the same amount of force, if you would,
2 that's kind of imposed on the structure.

3 So that's why Joe, earlier, put the
4 bullet of we believe that tornado missile
5 protections as they are, are adequate in general.
6 Also, the Tornado Risk Study itself gives us the
7 understanding that the phenomenon of tornado in
8 general is of a low risk to decide in terms of core
9 damage frequency, so the fact that the missiles
10 have increased in the upper portion of the wind,
11 not the 70 mile per hour, but rather in the 200 and
12 230 miles per hour, that's an area that's of low
13 contribution to the risk to begin with, because the
14 risk is dominated by the 70, 75-mile-per-hour where
15 offsite power is lost.

16 So we believe that the changes in the
17 area, that it's not particularly significant in
18 terms of risk or dominant. So we see out of this
19 and where we're going to end up going forward in
20 our analysis is, we see that the tornado is not
21 challenging, overall, hurricane would not be
22 challenging, except for how we deal with the larger
23 missile, be it the vehicle or the object that it
24 represents in a hurricane, because that missile
25 picked up two to three times speed, so that's the

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1 area we'll be focused on going forward.

2 MR. SEBROSKY: So what Mohamed just
3 said is kind of captured in this slide, and just
4 walk through the bullets. When you look at the Reg
5 Guide 1.76 Rev 1 and also Reg Guide 1.221, there
6 are three missiles that are representative
7 missiles. There is a rigid missile, it's a pipe,
8 it has certain attributes, and it is, the reason
9 that that missile was picked is to demonstrate that
10 you have enough concrete or steel to protect a
11 safety-related structure or component that's on the
12 inside.

13 And it's the missile won't either
14 penetrate the concrete or it won't cause spalling
15 on the inside wall of the concrete that could
16 damage the equipment. So that's the reason that
17 that missile was chosen.

18 The second sub-bullet here, the impact
19 loading, is the automobile, it's a representative
20 missile, and you're looking at gross structural
21 impacts from that. And then lastly, in the NUREG
22 guides, there is a small steel sphere. That small
23 steel sphere is meant to show that you have
24 protection against small missiles and doors,
25 ventilation, inlets, that kind of thing, that you

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1 don't have a susceptibility there. That's the
2 reason those were picked.

3 If you look at the next bullet, the one
4 that talks about the ability of wind-borne missiles
5 to penetrate concrete, this is what Mohamed was
6 talking about, and we can say, when you look at
7 both the hurricane rigid missile and the missile
8 from a tornado, and you compare it to the majority
9 of the plants, their licensing basis, and you go
10 back to the 1975 version of the SRP, there are six
11 different missiles in that 1975 version of the SRP
12 that actually are discussed.

13 One of them is a telephone pole that is
14 a substantial weight, it is a relatively small
15 cross-section, but it is substantial weight and
16 substantial velocity. When you look at what plants
17 are designed against and look at the missile
18 spectrums, we've done comparisons to look at trying
19 to look at the penetration capability of the
20 missiles using a rigid pipe and comparing it to
21 what's in the licensing basis. We think for the
22 vast majority of the sites, they're okay.

23 What Mohamed was talking about is the
24 impact loads from the automobile. The automobile
25 missile is, again, these are 10e minus 7 events for

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1 both hurricane and missiles, I mean for both for
2 hurricane and tornados, and I think I told you that
3 the Reg Guide for hurricanes, it goes up from 50
4 miles per hour at a site to maybe 75 miles per
5 hour.

6 The real issue is with hurricanes. You
7 see some sites going from a 50-mile-per-hour design
8 basis automobile to an automobile that's going
9 close to 200 miles per hour. So it's 4 times 1/2
10 MV squared. It's not a linear rel.

11 So it is a substantial change in the
12 amount of energy that would be represented in the
13 impact load, and that's the challenge that we try
14 to layout when taking the new guidance and
15 comparing it to the existing plants. If you go to
16 the next slide.

17 So what we try to do as part of Task 3
18 is inform the Commission on what we're thinking and
19 where we're possibly going between now and end of
20 December. And as part of Task 3, we do think we
21 can gain insights from the past IPEEEs and current
22 wind studies. And what we see, and Mohamed alluded
23 to this about, there's certainly structural margin
24 in the plants when you look at impact loads, but
25 also, the current insights from these high wind

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1 studies are not suggesting that it's the 10 to the
2 E minus 7 winds that you have to be concerned
3 about.

4 It's the 100-mile-per-hour winds that
5 take out offsite power and that you just have
6 random failures on top of that that lead to core
7 damage. So we're not just looking at the 10 to the
8 E minus 7, we're also looking at what the high wind
9 studies are telling us.

10 The other thing that we intend to do
11 with industry is to gain further insights about
12 what licensees do in anticipating the approaching
13 hurricane. So unlike tornados where you don't have
14 a long warning time, a hurricane, we have
15 experience with this, both licensees and the NRC go
16 into a mode where we see a hurricane coming,
17 potentially impacting a site, or multiple sites,
18 and we staff up.

19 Licensees take actions and we know they
20 take actions that will the plant shutdown before
21 onsite winds get to 75 miles per hour. They
22 typically, if it's a couple days, they'll take
23 their operators into the facility and run them
24 through scenarios for loss of offsite power and
25 what they're going to do. They also prepare the

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1 site.

2 If you go back to Hurricane Andrew that
3 happened in the '90s, while one of the units was
4 getting prepared to go into an outage, it had a lot
5 of equipment staged to support that outage, the
6 licensee had enough warning time that it could move
7 that equipment away. That's the kind of thing that
8 we're going to look at or the kind of actions that
9 we're going to look at to engage with licensees to
10 see if that can be credited, the long warning time
11 can be credited.

12 This last bullet where we intend by the
13 end of December 2016 to provide the final
14 assessment to the Commission, which means we would
15 be coming to you in the fall timeframe to support
16 that. We had not received any substantive comments
17 on this portion of the paper.

18 MEMBER BLEY: Joe? I hadn't thought
19 about this enough before, but looking at the figure
20 you just showed us and thinking about a couple of
21 the things you've told us, like missiles and
22 hurricanes get much closer to the actual wind speed
23 of the hurricane than they do in tornados, and
24 thinking about missiles, just looking at the wind
25 speed, if the tornado wind speed is higher than the

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1 hurricane, that really doesn't say the tornado's
2 the greater threat.

3 MR. SEBROSKY: From a missile
4 perspective, you can't make that. We would have to
5 plot, and we've done the plots --

6 MEMBER BLEY: Oh, you have? You played
7 with that a little bit.

8 MR. SEBROSKY: Well, so based on very
9 preliminary data, what we've plotted --

10 MEMBER BLEY: Kind of hard to integrate
11 this in your head and think about it. Yes.

12 MR. SEBROSKY: So we tried to collect
13 information that's in the licensing basis for all
14 100 plants, right, what's their design licensing
15 basis, including the missile. What's the weight?
16 What's the diameter? How fast is it going? And
17 what we've done for the penetration is, we plotted,
18 so we're comparing apples to apples, the
19 penetration depth that you would get from that,
20 using current calculational methods. Not the
21 calculational methods that they use.

22 We take the missile and we say, this is
23 calculational method, this is how much it would go
24 into the concrete, their limiting missile, and then
25 you compare it with either the tornado missile or

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1 the hurricane missile for the site. And in
2 general, what you see is, when you do that plot,
3 the vast majority of sites are bounded by their
4 design basis penetration missile, and that's
5 because they have things like telephone poles.

6 When you try to do the same plot with
7 automobiles, it comes with vastly different
8 results. The majority of sites are not bounded
9 when it comes to automobile missile impact loading.
10 We weren't looking at, it's questionable missile,
11 an automobile is considered to be a questionable
12 missile, so it's not a concern from a penetration
13 capability and causing damage inside the plant,
14 it's gross impact, gross damage, to the facility
15 such that you damage the structure.

16 And when you do that plot, that's what
17 Mohamed was talking about, the impact loading when
18 you look at -- and it's not just hurricanes,
19 there's a big delta on hurricanes, there's a non-
20 trivial delta on tornado automobile missiles. We
21 believe it's a pretty straightforward, when you
22 look at the tornado automobile missile, we think
23 that, pretty straightforward, we can show there's
24 plenty of structural margin.

25 MEMBER BLEY: That kind of makes sense.

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1 MR. SEBROSKY: But it's the hurricane
2 automobile that's going four times faster than the
3 design basis automobile that --

4 MEMBER RICCARDELLA: What do you mean
5 by structural margin? I mean, you mean the whole
6 structure being loaded and moving like that?

7 MR. SHAMS: Well, it depends on what
8 missile, if I may answer.

9 MEMBER RICCARDELLA: The automobile
10 missile.

11 MR. SHAMS: Yes, it depends on which
12 missile we're looking at. Certainly, if it's the
13 small missile that's actually going to go through
14 and penetration, it would be a margin related to
15 that mechanism. If it's one that's sort of pushing
16 the structure to lean over, so it would be that
17 type of a behavior, leaning over or a structure
18 panel that's deforming, you know, in response to
19 that load.

20 MEMBER RICCARDELLA: And that's for
21 both the containment and the auxiliary buildings?

22 MR. SHAMS: Cat 1 structures in
23 general; Category 1 structures in general.

24 MEMBER BLEY: Can that lead to a
25 collapse of the building?

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1 MR. SHAMS: Yes, I mean, I would see
2 that as, really, a remote -- it could be. That's
3 not, you know, an unlikely scenario. I'm sorry,
4 it's not a possibility, but it's unlikely because
5 what controls in that type of behavior is seismic,
6 far larger, you know, load than in a hurricane. We
7 control that mode.

8 MR. RECKLEY: And the other thing to
9 keep in mind, if I can, is this is largely a
10 deterministic screening, right? Because even if
11 you find a plant that you're uncomfortable with
12 from this deterministic screening process, doesn't
13 mean that you automatically go to the fact that
14 that missile is going to lead to a severe accident
15 condition in the plant.

16 MR. SHAMS: That was precisely what I
17 was going to go with, you know, when Joe was
18 indicating that. When we looked at the automobile,
19 and basically we just did a first plush, let's look
20 at what first order type equations give us, you
21 know, comparison, apples to apples, and the numbers
22 were not particularly favorable because of, if the
23 speed went up three, four times, you know, thank
24 God to the telephone pole that that gave us a lot
25 of capacity for many plants, but nonetheless, it

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1 wasn't able to observe the three times automobile
2 increase.

3 So we felt like, okay, well, a brute
4 force for this particular problem may not be the
5 easiest, because we know if you get into a more
6 sophisticated type analysis and non-linear type
7 response to the structure, you'll pickup a lot more
8 capacity, two, three times more.

9 But also, we're looking at it
10 pragmatically, you know, more in the sense that as
11 Joe indicated, there's a lot of prep that goes on
12 at the sites such that a missile of that nature is
13 probably, you know, non-existent if, you know, that
14 -- for vehicles, we thought about, after 9/11, all
15 vehicles are parked away from Cat 1 structures
16 where their barriers are --

17 MEMBER BLEY: Well, yes, but it was
18 pointed out, it's a surrogate --

19 MR. SHAMS: Well, that's why I'm saying
20 --

21 MEMBER BLEY: -- stuck up on top of --

22 MR. SHAMS: -- it's a number thing, so
23 if we can eliminate a vehicle and say that they
24 walked the site, they make sure everything is, you
25 know, where it needs to be, bolted, nothing loose,

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1 we can build the argument that maybe this is not as
2 plausible as it seems.

3 MEMBER BLEY: Inside the plant, years
4 ago, we started looking at seismic two over one and
5 making sure we didn't have stuff that would fall on
6 a Category 1. I don't know if we've gone around
7 sites looking for masses at elevated heights
8 worrying about, oh, we ought to tie this one down
9 because of the hurricane possibility. I don't know
10 if anybody's done that.

11 MR. SHAMS: I would venture we did in a
12 walk-down early on with this, again, related to
13 seismic.

14 MEMBER BLEY: Okay. During the walk-
15 downs for this.

16 MR. SHAMS: Absolutely. Related to
17 seismic early on with Fukushima. That was done to
18 ensure that any two over one issues or other --

19 MEMBER BLEY: For wind as well as
20 seismic.

21 MR. SHAMS: Well, it was for seismic in
22 particular.

23 MEMBER RICCARDELLA: I guess I missed
24 it. What causes the automobile wind speed to
25 triple?

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1 MR. SHAMS: From what Brad indicated,
2 that the newer mathematical models for how a
3 hurricane picks up an automobile is such that the
4 automobile is in the wind field for the longest
5 time, so it picks up an increasing amount of speed.
6 That's what ultimately -- did I capture that right?
7 Half right.

8 MEMBER BLEY: Brad, you're not on.

9 CHAIR STETKAR: Leave it on. Don't
10 touch the mic.

11 MR. HARVEY: Brad Harvey again once
12 more. If you look at a tornado wind field, it's
13 circular, and the highest wind speeds occur when
14 the tornado is moving, so we assume, let's say, in
15 the old days, original Rev 0, which most of these
16 plants are designed to, is 360 miles an hour. That
17 assumes that a radial speed of 300 and 60 miles an
18 hour traveling forward.

19 If you assume that the missile remains
20 embedded in the highest part of the circular, it's
21 going 360, but when it comes around, now you're
22 going to subtract 360, so it's going only like 240.
23 Okay. But that doesn't happen in a hurricane. In
24 a hurricane you assume that the field is constant
25 throughout the duration of the flight of the

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1 missile. Does that help?

2 MR. SHAMS: Well, also, the tornado is
3 of a finite size, if you would, so it picks up --

4 CHAIR STETKAR: Don't talk to people
5 who live in tornado areas about the -- it is finite
6 in the sense that it's not infinite. They're
7 pretty darn big.

8 MR. SHAMS: Fair enough. I'll take
9 that.

10 CHAIR STETKAR: They can be a half-mile
11 wide in terms of damaging, you know --

12 MR. SHAMS: But compared to a hurricane
13 that's, you know, covering half the state.

14 CHAIR STETKAR: That's true, but it's
15 not a point source.

16 MR. SHAMS: That's true.

17 MEMBER REMPE: So I'm struggling with
18 this thing about the surrogate, but yet the
19 evaluation with the car, if you only -- we're
20 always considering the car has a certain shape,
21 right, and so does the analysis consider other
22 objects that it's a surrogate for, but then I did
23 hear you say, well, we walked the sites after
24 Fukushima, so there aren't any other objects.
25 Could you clarify that disconnect that appears in

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1 mind, at least?

2 You should be evaluating other shapes
3 and masses besides just a car, it puts an
4 uncertainty, if there are such things, but if there
5 aren't any, then perhaps you don't need to be doing
6 that.

7 MR. SHAMS: Sure. In terms of the
8 shape of the vehicle, when we analyze a vehicle as
9 a missile for a client, it's rather just the weight
10 of it and overall dimension. It's not the
11 specific, you know --

12 MEMBER REMPE: And that weight and
13 dimension you assume does cover other --

14 MR. SHAMS: Right. Would cover --

15 MEMBER REMPE: -- objects that
16 apparently don't exist, because you've walked the
17 site and there aren't any other objects, but you've
18 covered those possible objects?

19 MR. SHAMS: No, thinking about the
20 other -- you know, walking the site is to see if
21 loose items are there. I'm saying in terms of --

22 MEMBER REMPE: So there are objects that
23 --

24 MEMBER REMPE: There are.

25 MEMBER REMPE: And you think that the

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1 analysis with the specific weight and dimensions
2 has covered those other objects that might be --

3 MR. SHAMS: That was the premise in the
4 selection of that object of being 4000 pounds with
5 the given dimension, is to cover that spectrum of
6 missiles. Yes.

7 MR. SEBROSKY: So one of the things,
8 just to add on to the discussion, if you look at
9 the IPEEEs, you have the surrogate missiles that
10 were representative missiles, and if you could
11 demonstrate -- the theory was that if you can
12 demonstrate that your plant can handle those
13 missiles, it can handle a broader range. So --

14 MR. SHAMS: One -- go ahead. I'm
15 sorry.

16 MR. SEBROSKY: -- the point I was
17 trying to make is that when you go look at the
18 IPEEEs in plants that did high-wind PRAs, you see
19 other things like chimneys from fossil fire plants
20 that aren't designed to handle a hurricane, and
21 what would that do, and you do see plants that made
22 physical design changes to non-safety-related
23 equipment so that it didn't present a hazard.

24 So when you talk about surrogates, you
25 have the surrogates for the missiles, but you also,

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1 when they did the PRAs, they didn't limit it to
2 just those missiles.

3 MR. SHAMS: That's true, and one of the
4 interesting aspects of selecting the missiles
5 spectrums is written in the Reg Guide, be it 1.76
6 and 1.221, is, they sort of explained the logic for
7 picking just the three missiles walking through the
8 concept of, because you're dealing with a very rare
9 event, that's 10 to the minus 7, it was fair
10 enough just to pick a few that are common objects
11 around a site without particularly getting terribly
12 --

13 MEMBER REMPE: I understand it's being
14 simplified, but as long as it --

15 MR. SHAMS: Sure.

16 MR. SEBROSKY: So this is the last
17 slide, other than the acronym slide, and it just
18 reiterates the next steps that we talked about,
19 that we do intend to make adjustments to the
20 assessment based on the feedback that we receive
21 today. I think you heard that -- I heard we have
22 two action items, to try to give you the updated
23 assessment that we have that, again, is draft,
24 preliminary, that has some additional information
25 when it comes to low water level.

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1 We also have an action to report back
2 to you at the full committee meeting, what we plan
3 to do based on some of the comments we receive
4 today.

5 CHAIR STETKAR: That, you can handle
6 orally, obviously, because that's not -- but we
7 would appreciate, as I mentioned earlier,
8 recognizing it's a draft, it could change from the
9 time we see it until the time it goes up to the
10 Commission, but a standalone document, beginning to
11 end, so that we can read it over.

12 MR. SEBROSKY: And we'll get with
13 Kathy. It'll probably be Tuesday or Wednesday of
14 next week. And again, our thought is that it would
15 have the appropriate caveats on it and that we
16 would make it public. The other thing, there are
17 items that we believe are publicly available, and
18 if we can get you the reference to some of the
19 things that you mentioned that we thought that we
20 had available to us, were dam failure treatment
21 within NEI 12-06 or our guidance that helps to
22 address some of the concerns, we can get you those
23 documents. We'll try to do that.

24 CHAIR STETKAR: I've got the documents,
25 just point me to where in the document --

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1 MR. SEBROSKY: I understand that. The
2 point I'm trying to make -- you know, so --

3 MR. BOWMAN: Yes. This is Eric Bowman.
4 The point of the document for NEI 12-06, Section
5 322 has the guidelines for the development of the
6 baseline mitigating strategies, Number 5 includes
7 the provision that limits the assumption of
8 availability of cooling and makeup water for the
9 mitigating strategies to cooling and makeup water
10 that's retained by structures or systems that are
11 robust with respect to the seismic flooding or high
12 winds hazard as well as their associated missiles.

13 The staff, as well as all of the
14 licensees, have interpreted the wording of that set
15 of guidelines to apply to structures such as dams
16 and levees that retain water as part of the
17 ultimate heat sink or impoundments that are as
18 backups to the downstream dams that were looked at
19 the in the resolution that limited that downstream
20 dam failure action item to Robinson.

21 CHAIR STETKAR: Okay. Thanks, Eric.
22 I'll go back and reread that.

23 MR. BOWMAN: Yes, as far as the
24 potential for assessment failure of a dam
25 associated with a seismic event, we didn't have

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1 explicit guidance on that. I'm aware of two sites
2 where that's a potential issue. One of them, South
3 Texas has a levee that impounds a great deal of
4 water that's above the site itself. Their approach
5 to the mitigating strategies was to install
6 generators and pumps in a seismic Class 1 structure
7 on top of the building where it wouldn't be
8 impacted by the flooding.

9 And the other site was Diablo Canyon,
10 where they've got the water ponds that are up the
11 hill from the site, and the flow path from there,
12 even though they're seismic, if they were to fail,
13 doesn't go over where their storage site for the
14 FLEX equipment is.

15 There are a few others -- there could
16 be a few others.

17 CHAIR STETKAR: Yes, I was going to
18 say, I was not trying to focus on individual sites,
19 because I don't know all the sites and I don't
20 care, actually, I was more focusing on areas where
21 the combinations of what everybody is up to in this
22 effort might have missed something, and in
23 particular, whether there was something in this
24 notion of seismic events that could result in a
25 flood.

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1 This is not necessarily downstream dam
2 issues, but seismic events that could result in a
3 flood that as we progress toward more focused
4 analyses, let me call it that, that start to talk
5 about either protecting or mitigating a particular
6 known hazard in the context of that single hazard
7 alone, so a particular seismic acceleration or a
8 particular flood scenario which may or may not have
9 some warning time associated with it, that we
10 weren't somehow walking into a situation where if I
11 have two sets of FLEX equipment and I decide to
12 protect one against seismic, but it's not protected
13 against flood, the other against flood, but it's
14 not protected against seismic, that I can have an
15 event that doesn't leave me with anything, because
16 I have a seismic event that fails the thing that
17 I'm protected against flood, but I got to get the
18 thing that's protected against seismic out of the
19 way of the flood and I can't use it.

20 MR. BOWMAN: That makes a great deal of
21 sense, but to explain where we are with the
22 guidance, in 2012, when we put together the initial
23 set of guidance for the order, we had the ongoing
24 separate action item that was the seismically-
25 induced fires and flooding, so we did not include

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1 seismic failures of dams causing it or failures
2 internal.

3 CHAIR STETKAR: Okay.

4 MR. BOWMAN: Despite that, we looked at
5 it, and the vast majority of the plants that have a
6 potential for a seismic failure of a dam that could
7 lead to the flooding, the distance between the dam
8 and the facility is typically large enough so that
9 you would not anticipate that you'd have the same
10 level of effect simultaneously at both spots.

11 CHAIR STETKAR: Good. That's a better
12 answer than the seismic-induced fire and flooding.
13 I would caution you to rethink that because I
14 looked at a lot of the seismic-induced fire and
15 flooding, and it, in terms of flooding, looked at
16 focusing on pipe failures and tank failures within
17 the footprint of the plant.

18 MR. BOWMAN: No, no, I am well aware of
19 that. That is included in the industry guidance
20 and I thought it was a great idea, but we endorsed
21 the guidance without exception. I was not going to
22 take an exception for them looking at something
23 beyond the task that we had at hand.

24 MR. SCHULTZ: If we rewind to where the
25 information that Eric provided when he first came

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1 to the microphone, I think that level of detail
2 would be useful to add to the SECY document here to
3 demonstrate that there is a full circle of
4 information that's been provided and evaluated.

5 CHAIR STETKAR: Yes, I agree, Steve,
6 that as I brought my little matrix out that I
7 started out with, I literally had a hole where I
8 couldn't see where anything that I could point to
9 addressed --

10 MR. SCHULTZ: And that was the level of
11 detail that helps to do that rather than just to
12 refer to the NEI document. It's in there. That
13 additional detail would be helpful.

14 MR. SHAMS: We'll get with Eric and
15 make sure that that makes it into the paper. And I
16 just wanted to add to what Eric's saying. I'm
17 comforted by what he said. I happen to see my own,
18 a couple of sites that I mentioned the name early on
19 that I know the nearby dams were looked at from a
20 seismic failure as well as the --

21 CHAIR STETKAR: Yes, see, we don't have
22 -- I read this as somebody who can look at the
23 stuff that I can look at, which is what's publicly
24 available, and I looked at some of the non-publicly
25 available analyses that were done, that I can

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1 access through ADAMS, I don't know what you've
2 looked at, you know, each individual site. I don't
3 even know where that's documented.

4 MR. BAILEY: Well, so our stuff is all
5 being documented in the safety evaluation. And in
6 the South Texas, I don't believe there's any
7 difference between the seismic and flooding
8 analysis, so a seismic-induced flooding would all
9 be the same equipment, you've heard it's all in
10 seismic Category 1 structures up on the roof
11 because of the quick flood inundation at that
12 plant.

13 Typically, your difference, when you
14 get into the mitigating strategies, for the plants
15 that have a different strategy for seismic and
16 flooding, it's usually because the flooding is such
17 an extent that they are taking credit for the
18 warning time to move equipment around.

19 If it was seismic-induced dam failure,
20 you would likely have a similar warning time for
21 them to credit. There are sometimes differences in
22 the credited water sources, you know, that they may
23 take credit for some non-seismic water sources in a
24 flooding event, so we would need to go back and
25 look on a plant-specific basis to confirm that

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1 that's covered for all plants, but I would suspect
2 that, generally speaking, that's adequately covered
3 in the plans that are already put in place.

4 (Simultaneous speaking)

5 MR. BAILEY: It's by the negative,
6 right, so we say you can only credit it if it's
7 robust. We don't explicitly say --

8 MR. BOWMAN: And that phraseology in
9 the 322 has to be understood with respect to the
10 definition of robust in Appendix --

11 CHAIR STETKAR: Yes, no, no, I -- yes,
12 we'll talk more about what that means tomorrow, but
13 --

14 MR. BOWMAN: That's why I waited until
15 the end.

16 CHAIR STETKAR: No, that's fine. Okay.
17 Thank you.

18 MR. SEBROSKY: So to finish Slide 29 to
19 make adjustments to the assessment based on ACRS
20 feedback, we mentioned the action items that we'll
21 try to give you an updated assessment for low water
22 level some time next week. We'll look at the
23 action items. If there are additional documents
24 that we can provide to address some of those
25 concerns that are publicly available, we'll include

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1 that when we send the information to Kathy.

2 Otherwise, we'll report back to the
3 full committee in early May.

4 CHAIR STETKAR: One last question
5 before we try to close up here. You're sending a
6 SECY paper up to the Commission that's just an
7 information paper, correct? It's not a -- you're
8 not expecting a vote.

9 MR. SHAMS: They can turn into a vote
10 paper if they wish, but the request was to inform
11 the Commission of --

12 CHAIR STETKAR: You have no inclination
13 that it may be a vote paper or anything -- the only
14 reason I raise this is things have morphed in the
15 past.

16 MR. SHAMS: And they can.

17 CHAIR STETKAR: And they can.

18 MR. SHAMS: But the intel that we have
19 is not suggesting --

20 CHAIR STETKAR: So it's strictly an
21 information paper on the path forward.

22 MR. SHAMS: Yes, send the information
23 paper.

24 CHAIR STETKAR: Okay.

25 MR. SEBROSKY: But what Mohamed said

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1 is, any one of the Commissioners can change it.

2 CHAIR STETKAR: Sure, we're aware of
3 that, but just --

4 MR. SEBROSKY: I understand. So
5 there's things that are in our control, then
6 there's things that are not.

7 CHAIR STETKAR: That's right.

8 MEMBER SKILLMAN: Joe, I'd like to ask
9 a question before we get to what John's going to
10 anoint as the end here. On Page 3 of your white
11 paper, you write, "To complete the Tier 2
12 activities", so on and so forth, we looked at a lot
13 of information, "this included consideration of
14 previously submitted licensee information on
15 external hazards, such as", and the first bullet
16 is, "Information associated with plants licensed in
17 the late '60s and early '70s that were reviewed as
18 part of the systematic evaluation program."

19 Do you see that sentence?

20 MR. SEBROSKY: Yes, you're in Page 3 of
21 the enclosure.

22 MEMBER SKILLMAN: Yes. So here's my
23 question. Back in that time period, there was no
24 information, there was very little, what I'm going
25 to call, communal information gathering, and most

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1 of this information, in all candor, was tribal
2 knowledge from the small number of plants that were
3 licensed at that point in time. What confidence do
4 you have that the early lessons learned on natural
5 hazards have been swept up into your evaluation
6 matrix?

7 MR. SEBROSKY: So our assessment is
8 based on, there was a process in the early '80s
9 that was called the systematic evaluation process,
10 SEP, it looked at, at the time, I think it was 51
11 units that had been licensed using the pre-1975
12 version of the SRP, sometimes referred to as pre-
13 GDC plants, and it did a detailed evaluation of 10
14 of those 51 sites.

15 There were non-trivial changes that
16 were made to plants as part of that SEP process, so
17 if you look at the generic issue program for
18 tornados, if you look at the generic issue program
19 for snow loads, there's a discussion in there, I
20 think it's GI-156, I don't know the exact number,
21 but there was a systematic process that went back
22 and looked at those early generation plants, and in
23 some cases, backfits were made, and non-trivial
24 backfits.

25 So to answer your question, we're

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1 taking advantage of that work that was done in the
2 '80s that looked at those plants that were licensed
3 in the '60s and '70s. We didn't stop there. The
4 other thing that was done, as you know, is the
5 IPEEEs that looked at all those plants and didn't
6 matter what vintage.

7 And you can see, as evidenced in the
8 NUREGs, that there's a, and I forget the NUREG
9 number, we reference it, but you can look at that
10 NUREG and it has all the plants, it tells you if
11 the plant was a 1975 version or pre, and the type
12 of evaluations that they did to demonstrate that
13 the plant was okay.

14 The vast majority of the sites, the
15 vast majority of the sites, when you look at the
16 IPEEE, took the out that was given to them, that if
17 they could demonstrate the plant met the 1975
18 version of the SRP through analytical methods plus
19 walk-downs, they were okay from an external events
20 standpoint.

21 MEMBER SKILLMAN: Thank you.

22 CHAIR STETKAR: I'll go around the
23 table and ask for final comments from members and
24 such, but as we always do, this is a public
25 meeting, so we'll get the bridge line open to see

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1 if there's anyone out on the bridge line, and while
2 we're doing that, I'll ask if there any members of
3 the public who'd like to make a statement, please
4 come up to the microphone, identify yourself, and
5 do so.

6 DR. DUBOIS: Hi. My name is Dr. Gwen
7 DuBois, I'm an internist, a medical doctor, and I
8 have an MPH, a member of the Physicians for Social
9 Responsibility, and so two things I want to --
10 first of all, thank you for having it open to the
11 public. In medicines here, you know, there's often
12 a two-hit concept of events, a genetic
13 predisposition and environmental exposure, and then
14 a person gets cancer, for example.

15 So in talking about natural events,
16 there's a belief here that there's a generator
17 system that will, you know, come in and be
18 available. There wasn't at Fukushima because of
19 the Mark I, Mark II having the generators on the
20 ground floor. The information about the seven NRC
21 staffers who were concerned about out of 101 plants
22 having generators that have a technical problem
23 that they may not be available, you know, makes me
24 wonder if there is a natural event, are we to
25 believe that the generators will be the backup

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1 system that they need to be.

2 And I didn't see anything in the
3 newspapers about the NRC responding to that. You
4 know, these events are going to happen, and
5 especially, the second thing is with climate
6 change, and there's going to be more water, and
7 warmer waters. There's a good article in the New
8 England Journal of Medicine after Katrina that you
9 can expect more larger hurricanes, are these 100-
10 year events now 40-year events, and things like
11 that. So those are my two questions. Thank you.

12 CHAIR STETKAR: Thank you very much.
13 Is there anyone else who'd like to -- oh, I'll
14 leave it down. Just identify yourself.

15 MS. MINNISS: Regina Minniss and I'm a
16 private citizen, concerned private citizen, and I
17 was looking at your low water level conditions, and
18 it seems like you have a minimum of -- one of the
19 bullets says, specific discussion of plants that
20 may not have 24 hours of water onsite.

21 Fukushima, as you all know, has been
22 going on for five years and a 24-hour water onsite
23 seems very low. And I guess the second part of my
24 question is, with the water actually being rapidly
25 depleted, how much longer can the nuclear energy

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1 depend on water as a mitigator? That's it. Thank
2 you.

3 CHAIR STETKAR: Thank you. And thanks
4 a lot for putting it back up there. Is there anyone
5 else in the room that would like to make a comment?
6 If not, I hear pops and crackles, which is our
7 indication that the bridge line is open. But
8 again, to do me a favor, just somebody please say
9 hello out there if you're on the line. Anyone.
10 I'm not hearing anyone.

11 PARTICIPANT: Hello.

12 CHAIR STETKAR: Hello. Thank you.
13 It's crude. It's the only indication we have, if
14 you're not familiar with this process. Okay. We
15 now know that the line is actually open. If
16 there's anyone out there, a member of the public
17 who'd like to make a comment, please identify
18 yourself and do so. Okay. I'm not hearing any.
19 We'll get the line re-closed so the popping and
20 crackling stops.

21 And as we usually do in Subcommittee
22 meetings, I'll go around the table and see if any
23 Members have any final comments that they'd like to
24 make, or suggestions, for the full Committee
25 briefing. And so I can make him justify the fact

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1 that we fly him up here, I'll start with our
2 consultant. Steve?

3 MR. SCHULTZ: Thank you, John. I think
4 we have discussed a number of issues that warrant
5 additional attention, not only in the SECY, but --
6 and you've indicated that you've heard those,
7 identified them, some of them you responded to
8 already today, but to incorporate those in the
9 discussions related to the full committee meeting,
10 and also updating the SECY accordingly as you see
11 fit would be appropriate, but I have no new issues
12 to add at this point in time that we haven't
13 already discussed this afternoon.

14 CHAIR STETKAR: Thank you. Pete?

15 MEMBER RICCARDELLA: I have no comment.

16 CHAIR STETKAR: Harold.

17 MEMBER RAY: Well, I just want to
18 underscore that this is really important and it's -
19 - I feel like we're making a valuable contribution
20 in examining our ability to mitigate an event, but
21 it's always, to me, better, if we can, to avoid the
22 event in the first place, so the ability to
23 discriminate between things that we should try and
24 avoid as compared with being prepared to mitigate
25 them in the very rare circumstances in which they

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1 might occur, as well as things that we can't
2 predict.

3 Both of them are valuable and important
4 in my mind and so I'm going to always be focused on
5 whether we are relying too much on mitigation and
6 not enough on prevention. I haven't seen that
7 today, but that's where I put my emphasis in these
8 reviews, is, are we over-relying on mitigation, as
9 important as it is.

10 CHAIR STETKAR: Thank you. Dick?

11 MEMBER SKILLMAN: I think the staff did
12 a great job on the white paper. I think that they
13 really pulled a number of pieces together that we
14 might not have given much respect to and I think
15 that they put them in a logical order and made
16 sense out of a bunch of different pieces of
17 information. It is valuable for us. Thank you.

18 CHAIR STETKAR: Dr. Powers. Dr. Bley.

19 MEMBER BLEY: I'm sorry. This has come
20 a long way and I'm seeing it all come together, and
21 although today, a few things give me things I
22 really want to look at a little harder before the
23 full committee meeting, I think it's a good
24 presentation, and thanks.

25 CHAIR STETKAR: Charlie.

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1 MEMBER BROWN: Nothing else.

2 CHAIR STETKAR: Joy.

3 MEMBER REMPE: No comments, but I
4 appreciated the discussion and presentations today.

5 CHAIR STETKAR: Okay. Great. And
6 again, I'd like to thank the staff. I think the --
7 I personally, despite all of the stuff that I've
8 said today, I think the white paper was well
9 thought out. I think what you've heard me comment
10 on is, I'm looking for cracks to make sure -- to
11 have better confidence that the cracks have been
12 filled somewhere in the whole process, not
13 necessarily here, but somewhere in the whole
14 process.

15 And I know we'll be exploring more of
16 that in tomorrow's discussions. I think we have an
17 hour and a half scheduled on our agenda for the
18 full committee briefing, so make sure you highlight
19 the major issues that you want to do in that time.

20 I think that recommendation is that if
21 you can address -- you know, if you go back through
22 the transcript and can address, or your notes,
23 anything that we brought up orally, even if it's
24 oral, I think we'd appreciate that. Quite
25 honestly, I think that less detail about individual

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1 site-specific analyses for the full committee, I
2 think you have to show that -- you know, tell the
3 full committee that you did those, but it's not
4 worth three or four slides, you know, out of an
5 hour and a half presentation.

6 Yes, and I think it's also important
7 for the full committee to -- because I didn't get
8 it, quite honestly, I didn't get it out of the
9 white paper that something could have been passed
10 on to Task 3 if it affected one and only one site.
11 That was -- one of my initial questions that I had
12 jotted down was, why are you dwelling so much on,
13 you know, whether it's the Robinson or, I've
14 forgotten the other one, but it doesn't make any
15 difference, Columbia, for the ash, you know, why
16 are you dwelling on it in this context?

17 Other than that, unless you have any
18 questions more about kind of organizing
19 expectations for the full committee.

20 MEMBER POWERS: I think it would be
21 useful if they included one slide on the status of
22 their geomagnetic storms.

23 CHAIR STETKAR: Good suggestion. The
24 geomagnetic storm issue. The thing that we brought
25 up about, is this simply punting it to an infinite

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1 research activity rather than trying to draw some
2 sort of closure.

3 MEMBER POWERS: Yes, I mean, I think
4 that will just attract enough interest rather than
5 being bogged down and trying to describe orally.

6 CHAIR STETKAR: That's a good
7 suggestion. Anything else from anyone regarding
8 the full committee presentation, because you know
9 how those go, given the fact that most of the
10 committee is here, but it's still.

11 MR. SHAMS: You mentioned we have one
12 and a half hour for this --

13 CHAIR STETKAR: The agenda is already
14 set. Yes.

15 MR. SHAMS: Okay.

16 CHAIR STETKAR: And I'm assuming it'll
17 be on Thursday.

18 MR. SHAMS: Okay.

19 CHAIR STETKAR: With that, nothing
20 else, we are adjourned.

21 (Whereupon, the meeting in the above-entitled matter was concluded at 5:04
22 p.m.)

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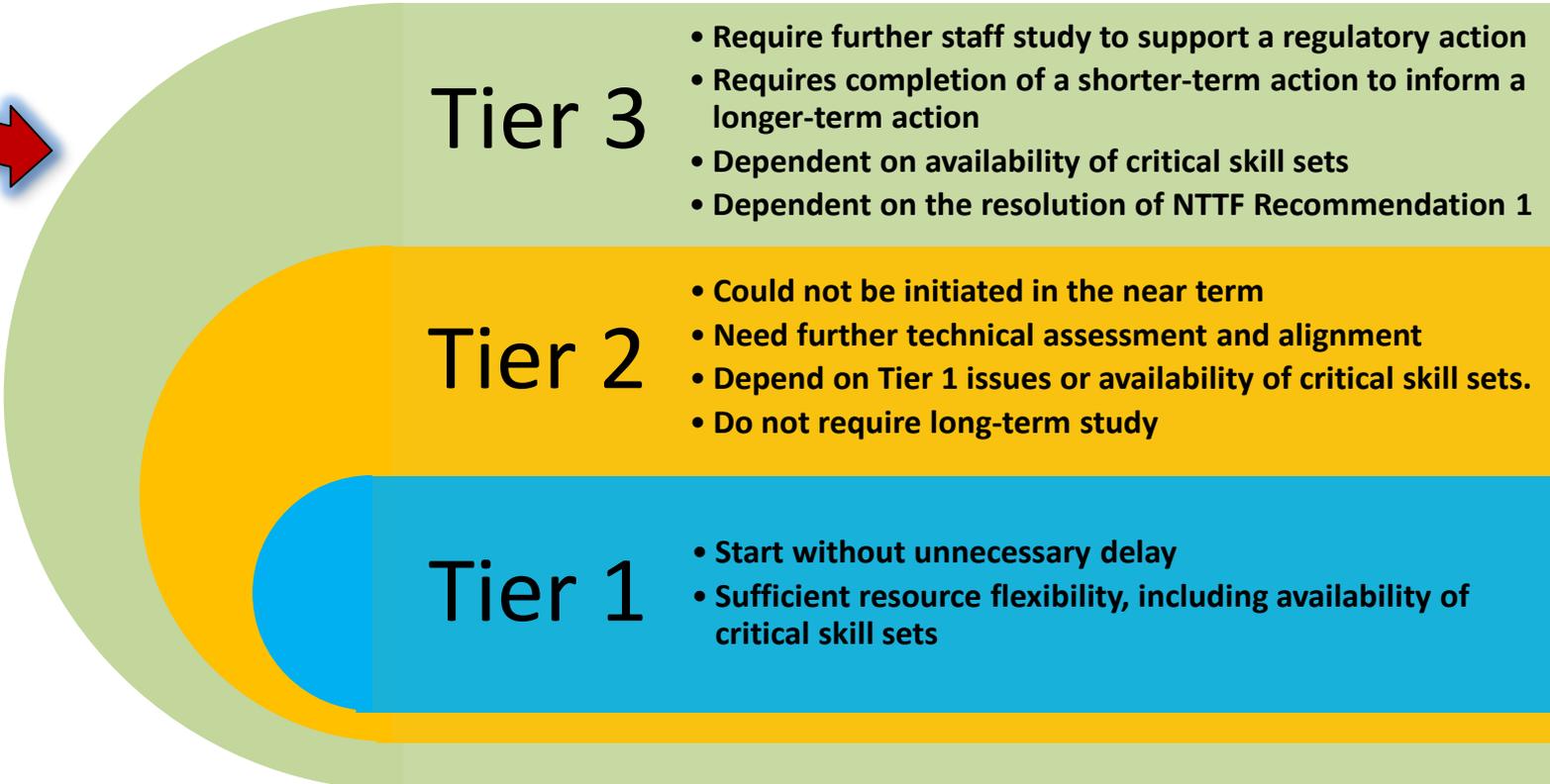
NRC Staff Preliminary Assessment of Natural Hazards other than Flooding and Seismic

ACRS Fukushima Subcommittee Meeting
April 21, 2016



Background

Fukushima Dai-ichi lessons learned developed and prioritized in a three-tiered approach (see SECY-11-0093 and SECY-11-0137)



Tier 3

- Require further staff study to support a regulatory action
- Requires completion of a shorter-term action to inform a longer-term action
- Dependent on availability of critical skill sets
- Dependent on the resolution of NTTF Recommendation 1

Tier 2

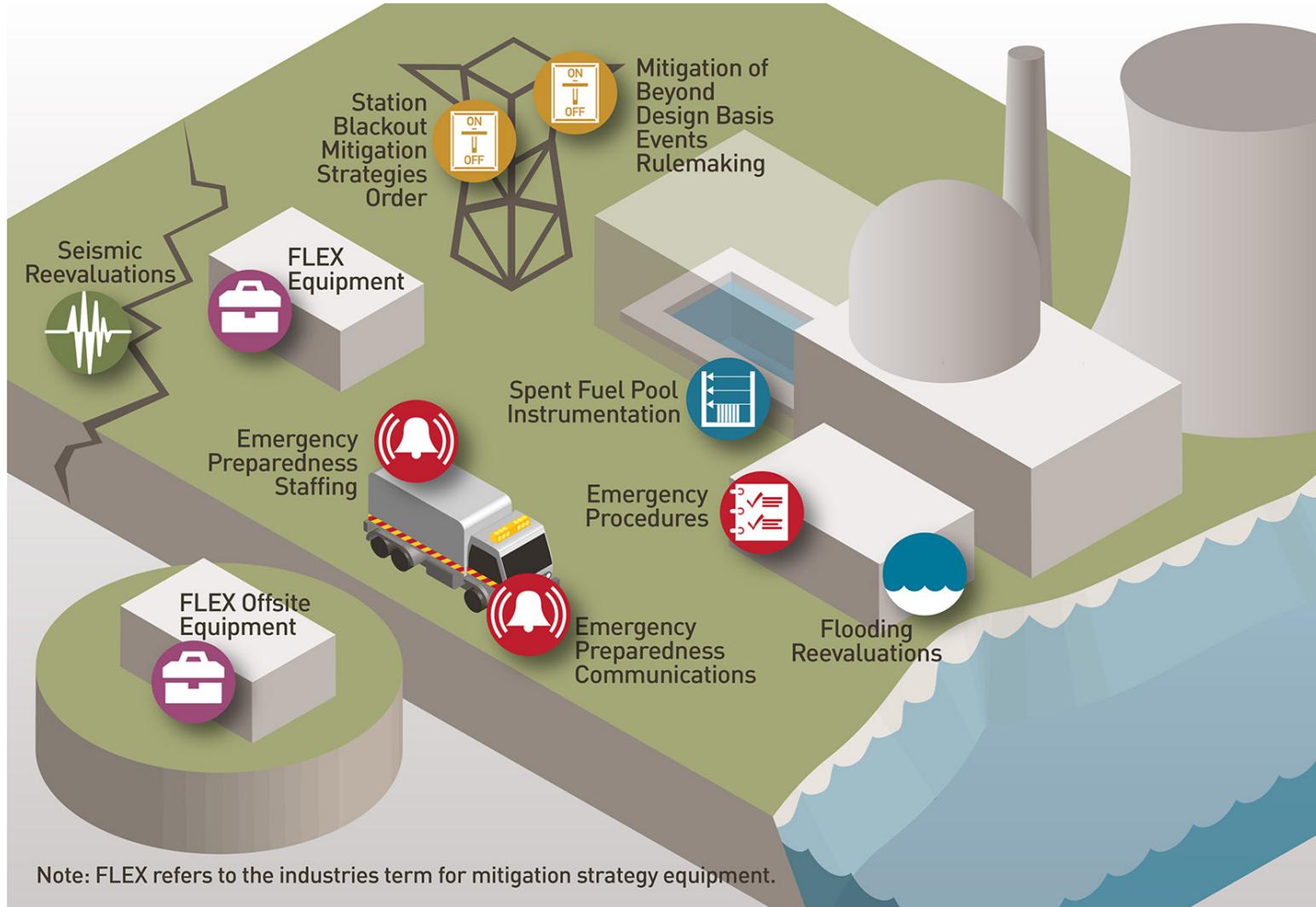
- Could not be initiated in the near term
- Need further technical assessment and alignment
- Depend on Tier 1 issues or availability of critical skill sets.
- Do not require long-term study

Tier 1

- Start without unnecessary delay
- Sufficient resource flexibility, including availability of critical skill sets



Mitigation of Beyond-Design-Basis Events Rulemaking



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
 - Closed Group 1 items
 - Group 2 updated assessment to be provided end of March 2016
 - 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 plan 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), to solicit stakeholder comments and to engage ACRS
 - Category 3 public meeting held on April 5, 2016, to solicit comments on white paper
 - During today's meeting the NRC staff will provide an overview of the white paper and provide insights to the ACRS on what areas the staff is considering changes to address stakeholder comments
 - Revisions to the technical content found in the white paper will be made to address stakeholder comments and ACRS insights
 - 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



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, lightning, 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



Preliminary Results of Step 1 Assessment

- Natural Hazards reviewed in accordance with Step 1 (continued)
 - Volcanic Activity
 - References work performed in accordance with 10 CFR 2.206 petition
 - Based on previous evaluations that concluded volcanic activity is hazard that should be considered, but only at the Trojan and Columbia sites. All other nuclear plant sites are too far away from active U.S. volcanos to have to consider this threat
 - Columbia evaluation of volcanic activity found in Updated Final Safety Analysis Report
 - Response to mitigation strategies order addresses volcanic activity and notes that structure housing phase 2 equipment to withstand loads placed on the structure from volcanic ash



Preliminary Results of Step 1 Assessment

- Natural hazards reviewed in accordance with Step 1 (continued)
 - Geomagnetic storms
 - Being evaluated as part of Tier 1 activity under mitigation of beyond-design-basis event rulemaking
 - Petition for rulemaking (PRM) 50-96 referenced in MBDBE proposed rule
 - NRC staff has received comments on geomagnetic storms in response to MBDBE rule and is currently assessing these comments
 - Because geomagnetic storms are being evaluated as Part of a Tier 1 activity and Commission will be informed of results of staff review as part of this activity, geomagnetic storms are proposed to be closed as part of Step 1 of the Tier 2 activity
 - To date no substantive comments received on Step 1 of the staff's assessment



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



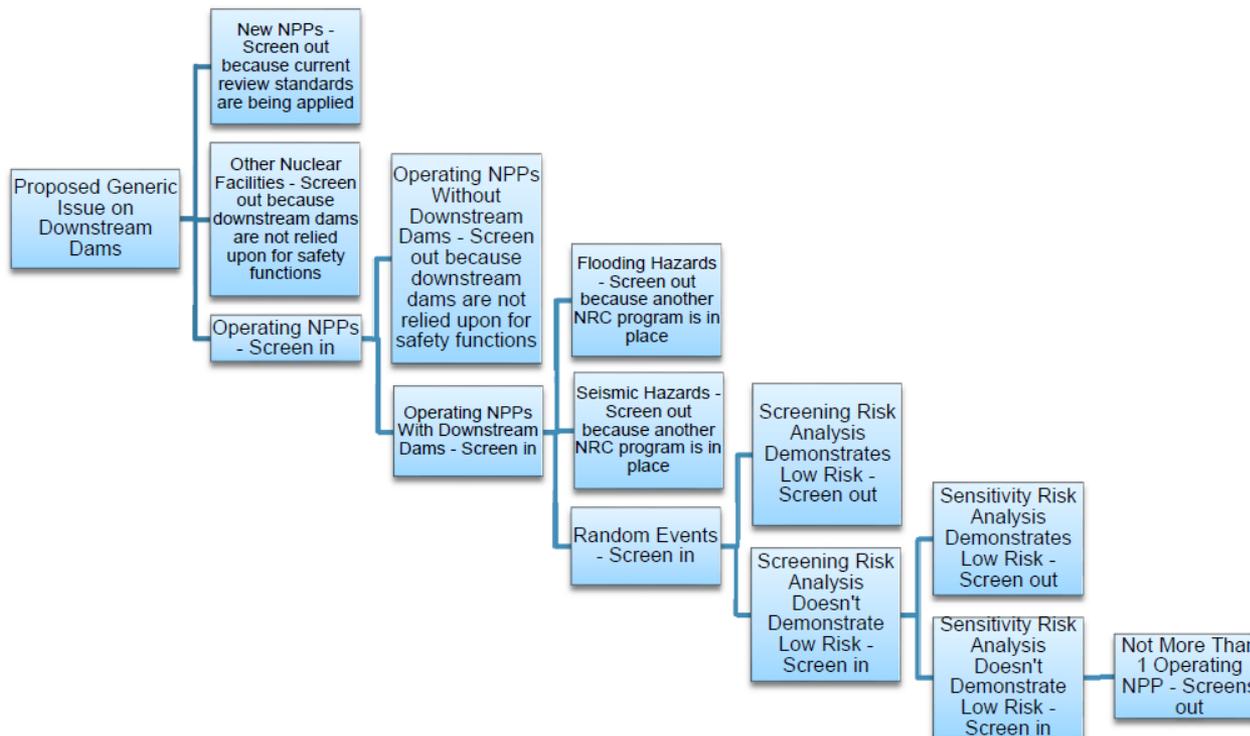
Preliminary Assessment of Low Water Conditions

- 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 downstream dam failure (continued)
 - Process for review outlined in March 11, 2016, pre-generic issue (ADAMS Accession No. ML15253A365)



Preliminary Assessment of Low Water Conditions

Low water conditions due to downstream dam failure (continued)

- Staff is considering changes to SECY write-up regarding Robinson as a result of stakeholder comments:
 - Adding more discussion regarding the capabilities of the alternate water supplies (i.e., deepwell pumps)
 - 4 deepwell pumps
 - “D” deepwell pump can provide cooling to the emergency diesel generators through a connection to the service water system
 - Wells can support FLEX long term cooling
 - Adding a discussion of how reactor coolant system inventory control is maintained
 - Use of low-leakage reactor coolant pump seals
 - Installed system or FLEX for RCS makeup
 - Conclusion that no further regulatory action needed at Robinson for random dam failure



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



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
- To date no substantive comments received on staff's assessment of extreme temperatures



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 identifies 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



Preliminary Results of Step 3 Assessment

- Snow loads (continued)
 - Preliminary Assessment
 - DC/COL ISG-007 guidance consistent with 1975 version of the SRP and branch technical position
 - 100 year snow load typically bound by plant design or structural margin associated with design
 - When extreme snow loads are evaluated against structural margin, staff's preliminary assessment is that a beyond-design-basis snow load is not likely to cause a catastrophic failure of a seismic Category I roof that leads to core damage
 - 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
 - To date no substantive comments received on staff's assessment of snow loads



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



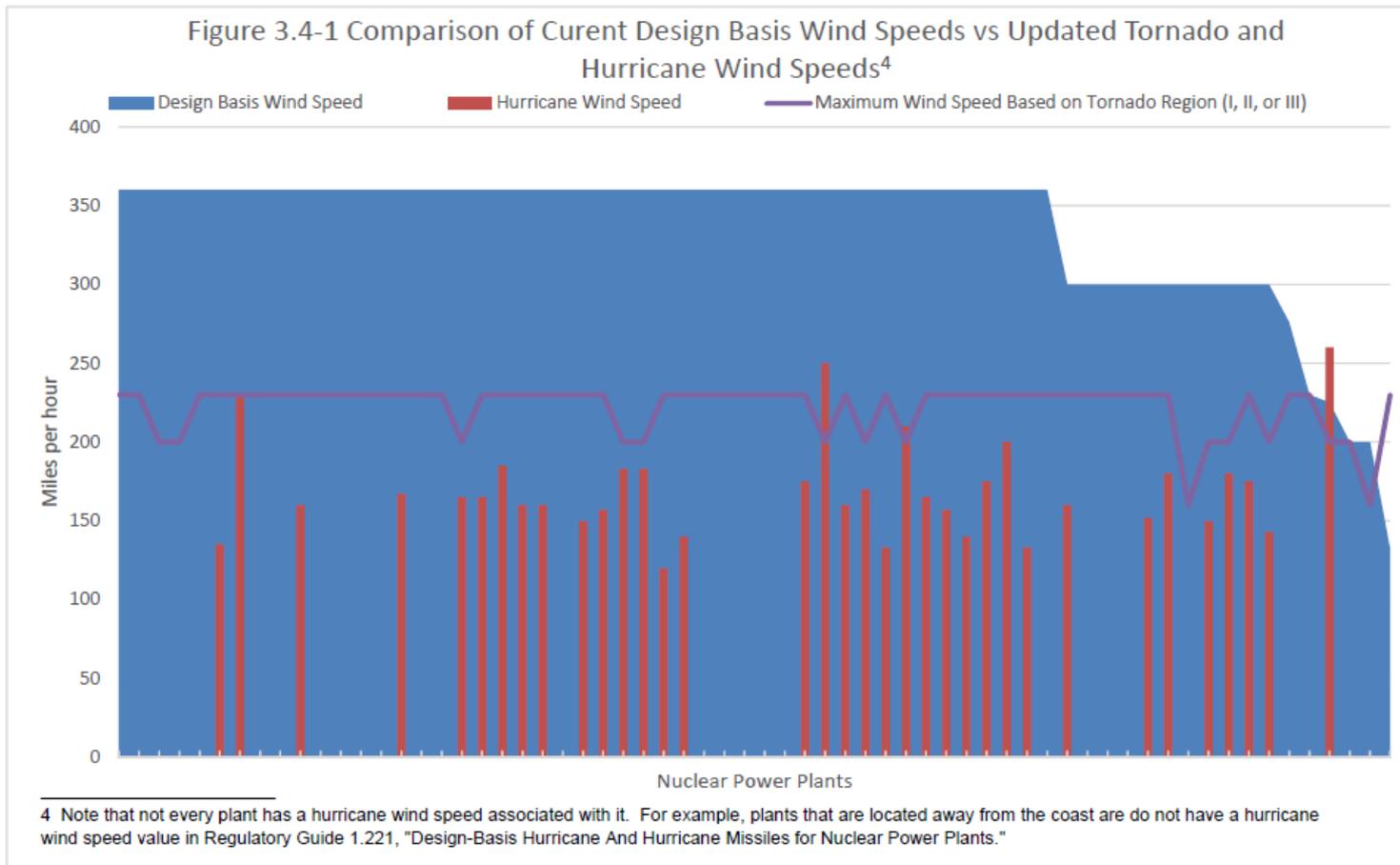
Preliminary Results of Step 3 Assessment

- Wind and missile loads from hurricanes and tornadoes (continued)
 - Insights from RIS 2015-06 and Enforcement Guidance Memorandum (EGM) 15-002
 - Tornado missile protection design-basis requirements are conservative
 - Staff using existing processes to ensure licensees continue to meet requirements in this area
 - EGM 15-02 provides a basis for enforcement discretion noting that tornado missile scenarios that lead to core damage are very low probability events



Preliminary Results of Step 3 Assessment

- Wind and missile loads from hurricanes and tornadoes
 - New wind load guidance generally bound by current plants design basis



Preliminary Results of Step 3 Assessment

- Wind and missile loads from hurricanes and tornadoes (continued)
 - Hurricane and Tornado missile spectrum chosen to:
 - Assess design of safety-related structures to provide protection against a missile damaging equipment internal to the structure (missile's penetration capability)
 - Assess design of safety-related structures to withstand impact loads (automobile missile)
 - Assess design of safety-related structures to protect against small wind-born missiles
 - Ability of wind-born missiles to penetrate concrete
 - Majority of sites have design-basis missile characteristics that bound missile characteristics found in latest regulatory guidance
 - Impact loads
 - Automobile missile's in current guidance higher than that found in current plant updated final safety analysis reports



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
 - To date no substantive comments received on staff's assessment of wind and missile loads from hurricanes and tornadoes.



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

(Alphabetical)

- ACRS – Advisory Committee on Reactor Safeguards
- ADAMS – Agencywide Documents Access and Management System
- CFR – *Code of Federal Regulations*
- COL – Combined License
- DC – Design Certification
- EGM – Enforcement Guidance Memorandum
- FLEX – diverse and flexible coping capability
- IN – Information Notice
- IPEEE– Individual Plant Examination of External Events
- ISG – Interim Staff Guidance
- MBDDBE – Mitigation of Beyond-Design-Basis Events
- NPP – Nuclear Power Plant
- NRC – Nuclear Regulatory Commission
- NTTF – Near-Term Task Force
- RCS – reactor coolant system
- RG – Regulatory Guide
- RIS – Regulatory Issue Summary
- SECY – Office of the Secretary of the Commission
- SRP – Standard Review Plan
- UHS - ultimate heat sink

